

# InteliGen 500

## Controller for parallel gen-set applications

### SW version 1.0.0

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# 1 Document information

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## 1.1 Clarification of notation

**Note:** This type of paragraph calls readers attention to a notice or related theme.

**IMPORTANT:** This type of paragraph highlights a procedure, adjustment etc., which can cause a damage or improper function of the equipment if not performed correctly and may not be clear at first sight.

**Example:** This type of paragraph contains information that is used to illustrate how a specific function works.

## 1.2 About this Global Guide

This manual contains important instructions for IntelliGen 500 controllers family that shall be followed during installation and maintenance of the controllers.

This manual provides general information how to install and operate IntelliGen 500 controllers.

This manual is dedicated for:

- ▶ Operators
- ▶ Control panel builders
- ▶ For everybody who is concerned with installation, operation and maintenance

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General security recommendations and set of measures

#### 1. AccessCode

- Change the AccessCode BEFORE the device is connected to a network.
- Use a secure AccessCode – ideally a random string of 8 characters containing lowercase, uppercase letters and digits.
- For each device use a different AccessCode.

#### 2. Password

- Change the password BEFORE the device enters a regular operation.
- Do not leave displays or PC tools unattended if an user, especially administrator, is logged in.

**IMPORTANT: Controller issues [WrmDefault Credentials \(page 795\)](#) or [SdDefault Credentials \(page 822\)](#) alarm, if the factory default password and/or access code are used. It is necessary to change the factory default settings of both password and access code to be able to operate a genset!**

### 3. MODBUS/TCP

- The MODBUS/TCP protocol (port TCP/502) is an instrumentation protocol designed to exchange data between locally connected devices like sensors, I/O modules, controllers etc. From its nature it does not contain any kind of security – neither encryption nor authentication. Thus it is intended to be used only in closed private network infrastructures.
- Avoid exposing the port TCP/502 to the public Internet.

### 4. SNMP

- The SNMP protocol (port UDP/161) version 1,2 is not encrypted. Thus it is intended to be used only in closed private network infrastructures.
- Avoid exposing the port UDP/161 to the public Internet.

## 1.4 General warnings

### 1.4.1 Remote control and programming

Controller can be remotely controlled. In the event that maintenance of gen-set has to be done, or controller has to be programmed, check the following points to ensure that the engine cannot be started or any other parts of the system cannot be effected.

To be sure:

- ▶ Disconnect remote control
- ▶ Disconnect binary outputs

### 1.4.2 SW and HW versions compatibility

Be aware to use proper combination of SW and HW versions.

### 1.4.3 Dangerous voltage

In no case touch the terminals for voltage and current measurement!

Always connect grounding terminals!

In any case do not disconnect controller CT terminals!



### 1.4.4 Adjust the setpoints

All parameters are adjusted to their typical values. However the setpoints has to be checked and adjusted to their real values before the first starting of the gen-set.

**IMPORTANT: Wrong adjustment of setpoints can destroy the gen-set.**



**Note:** The controller contains a large number of configurable setpoints, because of this it is impossible to describe all of its functions. Some functions can be changed or have different behavior in different SW versions. Always check the Global guide and New feature list for SW version which is used in controller. This manual only describes the product and is not guaranteed to be set for your application.

**IMPORTANT: Be aware that the binary outputs can change state during and after software reprogramming (before the controller is used again ensure that the proper configuration and setpoint settings are set in the controller).**



The following instructions are for qualified personnel only. To avoid personal injury do not perform any action not specified in related guides for product.

## 1.5 Certifications and standards

|   |  |
|---|--|
| <ul style="list-style-type: none"> <li>▶ EN 61000-6-2</li> <li>▶ EN 61000-6-4</li> <li>▶ EN 61010-1</li> <li>▶ EN 60068-2-1 (-20 °C/16 h for std version)</li> <li>▶ EN 60068-2-2 (70 °C/16 h)</li> <li>▶ EN 60068-2-6 (2÷25 Hz / ±1,6 mm; 25÷100 Hz / 4,0 g)</li> <li>▶ EN 60068-2-27 (a=500 m/s<sup>2</sup>; T=6 ms)</li> <li>▶ EN 60068-2-30:2005 25/55°C, RH 95%, 48hours</li> <li>▶ EN 60529 (front panel IP65, back side IP20)</li> </ul> |   |
|---|--|

## 1.6 Document history

| Revision number | Related sw. version | Date | Author         |
|-----------------|---------------------|------|----------------|
| 1               | 1.0.0               |      | Vladimír Zubák |

## 1.7 Symbols in this manual

|  |                       |  |                       |  |                              |  |                                     |
|--|-----------------------|--|-----------------------|--|------------------------------|--|-------------------------------------|
|  | 3 x Phases            |  | Connector - male      |  | Grounding                    |  | Resistor adjustable                 |
|  | Active current sensor |  | Contact               |  | GSM                          |  | Resistive sensor RPTC               |
|  | AirGate               |  | Contactor             |  | GSM modem                    |  | RS 232 male                         |
|  | Alternating current   |  | Controller simplified |  | IG-AVRi                      |  | RS 232 female                       |
|  | Analog modem          |  | Module simplified     |  | IG-AVRi TRANS                |  | Starter                             |
|  | Battery               |  | Current measuring     |  | Jumper                       |  | Switch - manually operated          |
|  | Binary output         |  | Current measuring     |  | Load                         |  | Transformer                         |
|  | Breaker contact       |  | Diode                 |  | Mains                        |  | USB type B male                     |
|  | Breaker contact       |  | Ethernet male         |  | Mains                        |  | USB type B female                   |
|  | Breaker               |  | Ethernet female       |  | Mobile provider              |  | Voltage measuring                   |
|  | Breaker               |  | Fuel solenoid         |  | Passive current sensor       |  | Wifi / WAN / LAN                    |
|  | Capacitor             |  | Fuse                  |  | Pick - up                    |  | <b>back to Document information</b> |
|  | Coil                  |  | Fuse switch           |  | Relay coil                   |  |                                     |
|  | Connector - female    |  | Generator             |  | Relay coil of slow-operating |  |                                     |
|  |                       |  | Generator schematic   |  | Resistor                     |  |                                     |

## 2 System overview

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### 2.1 General description

InteliGen 500 family controllers are comprehensive gen-set controllers for single generating sets operating in stand-by or parallel modes or for multiple gen-sets applications. A modular construction allows upgrades to different levels of complexity in order to provide the best solution for various customer applications. The controllers are equipped with a powerful graphic display showing icons, symbols and bar graphs for intuitive operation, which, together with its high level of functionality, sets new standards in Gen-set controls.

#### 2.1.1 The key features of InteliGen 500

- ▶ Easy-to-use operation and installation. The factory default configuration covers most applications
- ▶ Various customizations are possible thanks to its configurability
- ▶ Excellent remote communication capabilities
- ▶ High level of support for EFI engines (most world producers)
- ▶ High reliability

### 2.2 True RMS measurement

This controller measures AC values based on True RMS principle. This principle corresponds exactly to the physical definition of alternating voltage effective values. Under normal circumstances the mains voltage should have a pure sinusoidal waveform. However some nonlinear elements connected to the mains produce harmonic waveforms with frequencies of multiples of the basic mains frequency and this may result in deformation of the voltage waveforms. The True RMS measurement gives accurate readings of effective values not only for pure sinusoidal waveforms, but also for deformed waveforms.

**Note:** *The harmonic deformation causes that the Power Factor of a generator working parallel with the mains cannot reach values in a certain range around the PF 1.00. The higher the deformation, the wider the power factor dead range. If the requested power factor is adjusted inside the dead range, the controller cannot reach the requested value because of this fact.*

### 2.3 Configurability and monitoring

One of the key features of the controller is the system's high level of adaptability to the needs of each individual application and wide possibilities for monitoring. This can be achieved by configuring and using the powerful PC/mobile tools.

## 2.3.1 Supported configuration and monitoring tools

- ▶ IntelliConfig - complete configuration and single gen-set monitoring
- ▶ WinScope - special graphical monitoring software

**Note:** Use the IntelliConfig PC software to read, view and modify configuration from the controller or disk and write the new configuration to the controller or disk.

The firmware of controller contains a large number of binary inputs and outputs needed for all necessary functions available. However, not all functions are required at the same time on the same gen-set and also the controller hardware does not have so many input and output terminals. One of the main tasks of the configuration is mapping of “logical” firmware inputs and outputs to the “physical” hardware inputs and outputs.

## 2.3.2 Configuration parts

- ▶ Mapping of logical binary inputs (functions) or assigning alarms to physical binary input terminals
- ▶ Mapping of logical binary outputs (functions) to physical binary output terminals
- ▶ Assigning sensor characteristics (curves) and alarms to analog inputs
- ▶ Selection of peripheral modules, which are connected to the controller, and doing the same (as mentioned above) for them
- ▶ Selection of ECU type, if an ECU is connected
- ▶ Changing the language of the controller interface

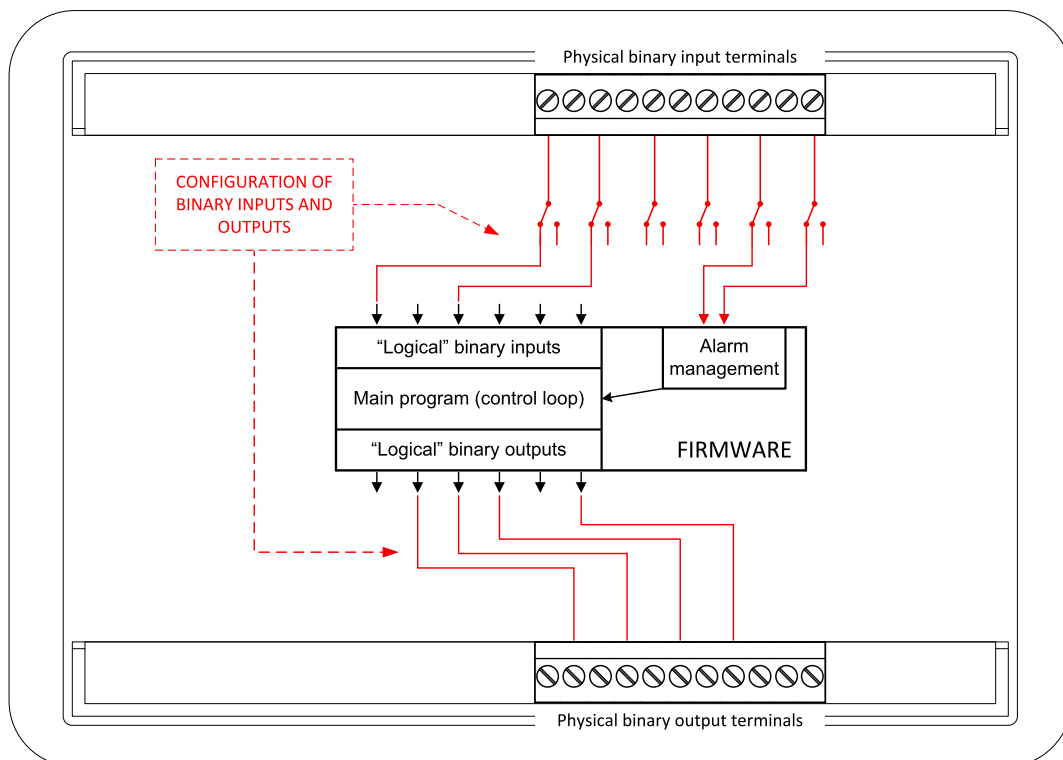


Image 2.1 Principle of binary inputs and outputs configuration

The controller is shipped with a default configuration, which should be suitable for most standard applications. This default configuration can be changed only by using a PC with the IntelliConfig software. See IntelliConfig documentation for details.

**Note:** You need one of communication modules to connect the controller to a PC with IntelliConfig. There is a special easy removable service module for cases when no communication module is permanently attached.

Once the configuration is modified, it can be saved to a file for later usage with another controller or for backup purposes. The file is called archive and has the file extension .ail3. An archive contains a full image of the controller at the time of saving (if the controller is online for the PC) except the firmware. Besides configuration it also contains current adjustment of all setpoints, all measured values, a copy of the history log and a copy of the alarm list.

The archive can be simply used for cloning controllers, i.e. preparing controllers with identical configuration and settings.

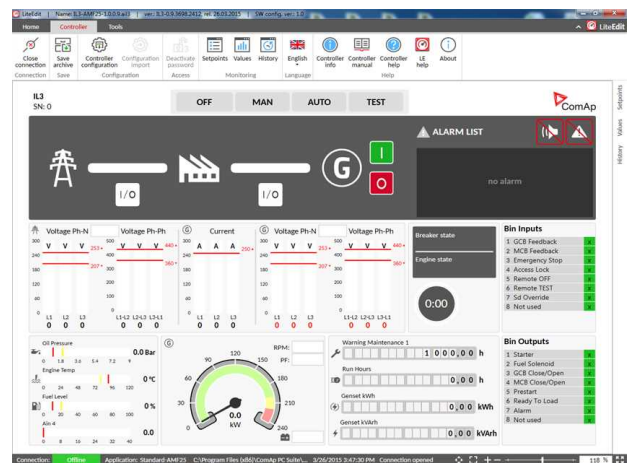
## 2.4 PC tools

### 2.4.1 IntelliConfig

Configuration and monitoring tool for IntelliGen controllers. See more in IntelliConfig Reference Guide.

**This tool provides the following functions:**

- ▶ Direct or internet communication with the controller
- ▶ Offline or online controller configuration
- ▶ Controller firmware upgrade
- ▶ Reading/writing/adjustment of setpoints
- ▶ Reading of measured values
- ▶ Browsing of controller history records
- ▶ Exporting data into a XLS file
- ▶ Controller language translation

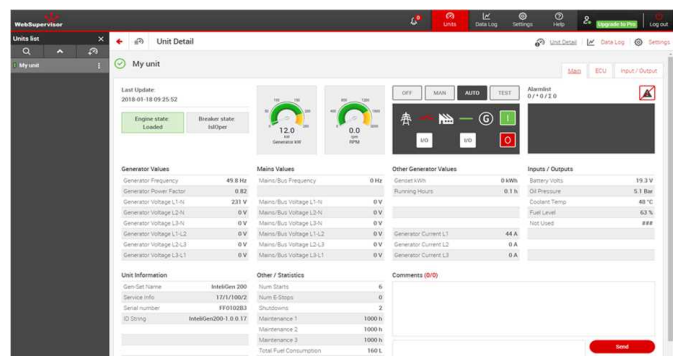


### 2.4.2 WebSupervisor

Web-based system for monitoring and controlling of controllers. See more at the WebSupervisor webpage.

**This tool provides the following functions:**

- ▶ Site and fleet monitoring
- ▶ Reading of measured values
- ▶ Browsing of controller history records
- ▶ On-line notification of alarms
- ▶ Email notification
- ▶ Also available as a smart-phone application



WebSupervisor available at: [www.websupervisor.net](http://www.websupervisor.net)

Demo account:

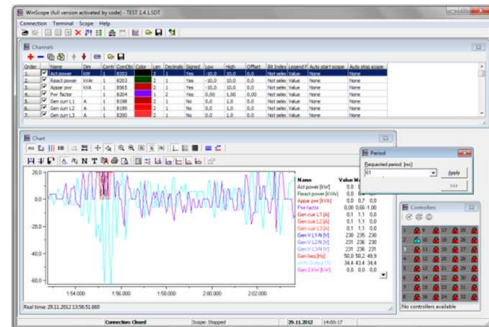
- ▶ Login: comaptest
- ▶ Password: ComAp123

## 2.4.3 WinScope

Special graphical controller monitoring software used mainly for commissioning and gen-set troubleshooting. See more in the WinScope Reference guide.

**This tool provides the following functions:**

- ▶ Monitoring and archiving of ComAp controller's parameters and values
- ▶ View of actual / historical trends in controller
- ▶ On-line change of controllers' parameters for easy regulator setup



## 2.5 Plug-in modules

### 2.5.1 CM-4G-GPS

GSM/4G module

- ▶ Wireless integrated solution
- ▶ Quick and easy installation
- ▶ Instant alarm SMS notification
- ▶ System control over SMS
- ▶ Quad Band GPRS/EDGE modem, 850/900/1800/1900 MHz, FDD LTE: Band 1, Band 2, Band 3, Band 4, Band 5, Band 7, Band 8, Band 20, all bands with diversity, WCDMA/HSDPA/HSUPA/HSPA+: Band 1, Band 2, Band 5, Band 8, all bands with diversity
- ▶ GPRS multi-slot class 10



### 2.5.2 CM-GPRS

GSM/GPRS module

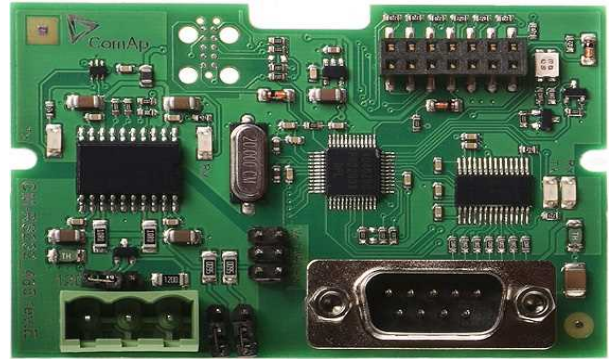
- ▶ Wireless integrated solution
- ▶ Quick and easy installation
- ▶ Instant alarm SMS notification
- ▶ System control over SMS
- ▶ Quad Band GPRS/EDGE modem, 850/900/1800/1900 MHz
- ▶ GPRS multi-slot class 10



## 2.5.3 CM-RS232-485

Communication module with two communication ports.

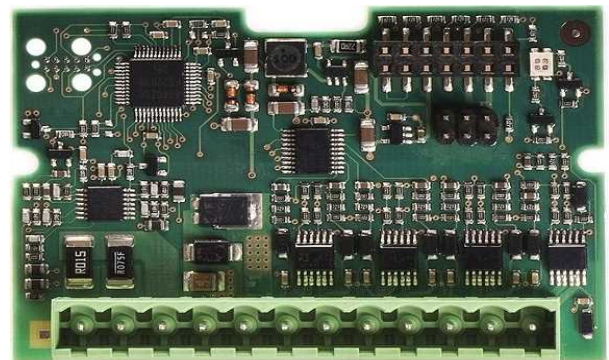
- ▶ RS232 and RS485 interface
- ▶ MODBUS
- ▶ Serial connection to IntelliConfig



## 2.5.4 EM-BIO8-EFCP

Hybrid current input and binary input/output extension module.

- ▶ Up to 8 additional configurable binary inputs or outputs





## 2.6 CAN modules

### 2.6.1 Intel AIN8

The unit offers the user the flexibility to configure the unit to have 8 analog inputs.

#### Supported sensors:

- ▶ Resistor 3-wire input
  - Common resistor: 0-250Ω, 0-2400Ω, 0-10kΩ
  - Temperature sensor: Pt100, Pt1000, Ni100, Ni1000
- ▶ Current (active or passive sensors)
  - ±20mA , 0-20mA, 4-20mA
- ▶ Voltage
  - ±1V, 0-2,4V, 0-5V, 0-10V
  - Lambda probes
  - Thermocouples are not supported (the measuring loop was designed for lambda probes, what caused non-support of thermocouples)

#### Impulse/RPM sensor:

- ▶ RPM measuring pulses with frequency 4Hz – 10kHz
- ▶ Impulse
  - Possibility to measure pulses from electrometer, flowmeter (measurement of total consumption, average fuel consumption)





## 2.6.2 IntelI AIN8TC

The unit offers flexibility to configure 8 thermocouple inputs.

### Supported sensors:

- ▶ J, K or L thermocouples
- ▶ thermocouples with and without cold junction compensation are supported



## 2.6.3 IntelI IO8/8

The unit offers the user the flexibility to configure the unit to have 8 binary inputs, 8 binary outputs, and 2 analog outputs, or 16 binary inputs, 0 binary outputs and 2 analog outputs via switches inside the controller.

### Configuration 8/8

- ▶ 8 Binary inputs (options: pull up or pull down logic)
- ▶ 8 Binary outputs (options: Low side switch (LSS) or High side switch (HSS))
- ▶ 2 Analog outputs (options: voltage (0-10V), current (0-20mA) and PWM (5V, adjustable frequency 200Hz-2,4kHz))

### Configuration 16/0

- ▶ 16 Binary inputs (options: pull up or pull down logic)
- ▶ 0 Binary outputs
- ▶ 2 Analog outputs (options: voltage (0-10V), current (0-20mA) and PWM (5V, adjustable frequency 200Hz-2,4kHz))



## 2.6.4 IGS-PTM

The unit offers the user the flexibility to configure the unit to have 8 binary inputs, 8 binary outputs, 4 analog inputs and 1 analog outputs.

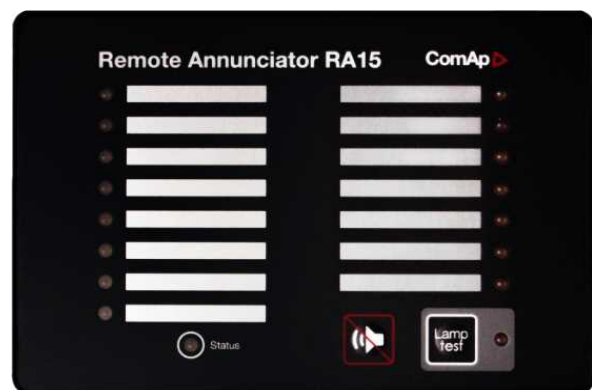
- ▶ Configurable 8 binary and 4 analog inputs
- ▶ Configurable 8 binary and 1 analog output
- ▶ LEDs indicate the state of binary inputs/outputs
- ▶ Measures values from Pt100 and Ni100 sensors
- ▶ Analog inputs (resistance range 0-250 Ohms, voltage range 0-100mV, current range 0-20mA - selectable via jumper)
- ▶ UL certified



## 2.6.5 IGL-RA15

Remote annunciator.

- ▶ 15 programmable LEDs with configurable colors red-green-yellow
- ▶ Lamp test function with status LED
- ▶ Customizable labels
- ▶ Local horn output
- ▶ Maximal distance 200 m from the controller
- ▶ Up to 4 units can be connected to the controller
- ▶ UL certified



[◀ back to System overview](#)

# 3 Applications overview

3.1 SPtM ..... 21  
 3.2 MINT ..... 22

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## 3.1 SPtM

The typical scheme of a single parallel to mains application is shown below. The controller controls two breakers – a mains breaker and a generator breaker. Feedback from both breakers is required.

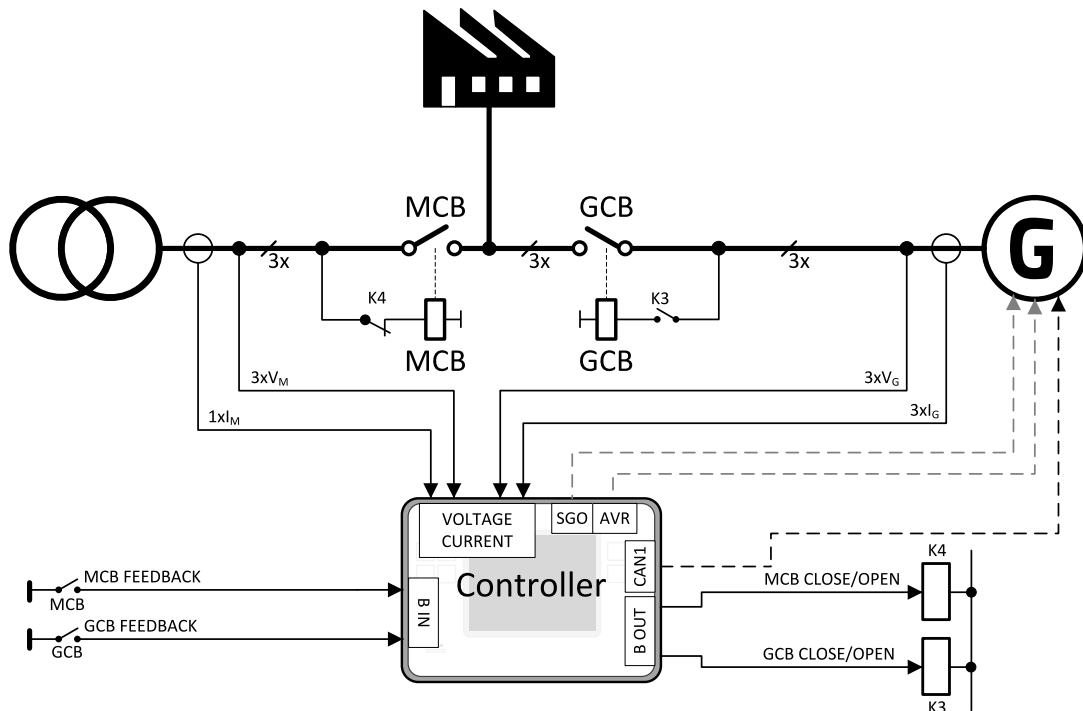


Image 3.1 Single parallel to mains application

### 3.2 MINT

The typical schemes of multiple island-parallel application without mains. The controller controls one breaker only, the generator breaker. Feedback from the generator breaker is required.

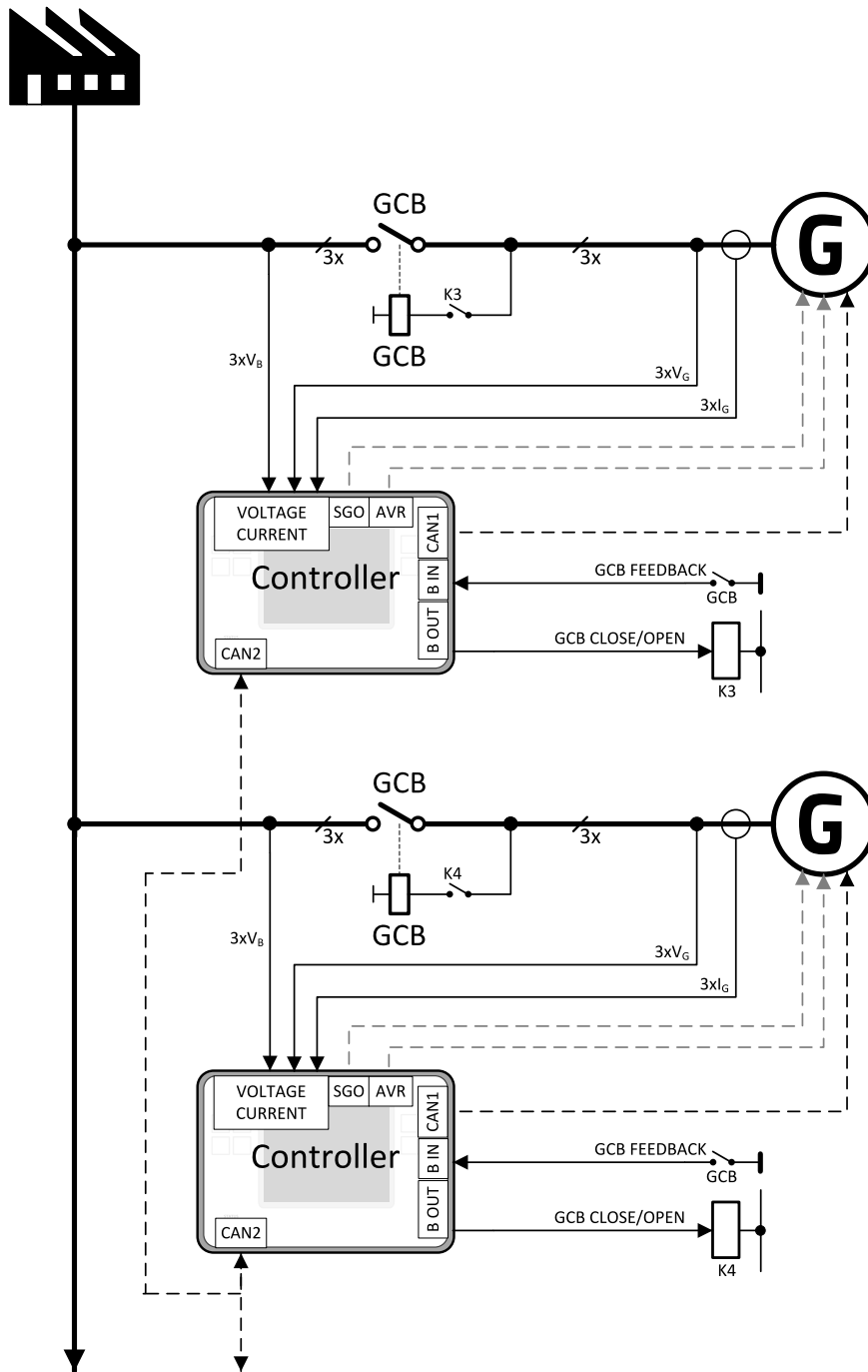


Image 3.2 Multiple island-parallel application without mains

[back to Applications overview](#)

# 4 Installation and wiring

|                                       |    |
|---------------------------------------|----|
| 4.1 Package content .....             | 23 |
| 4.2 Controller installation .....     | 24 |
| 4.3 Terminal Diagram .....            | 26 |
| 4.4 Recommended wiring .....          | 27 |
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## 4.1 Package content

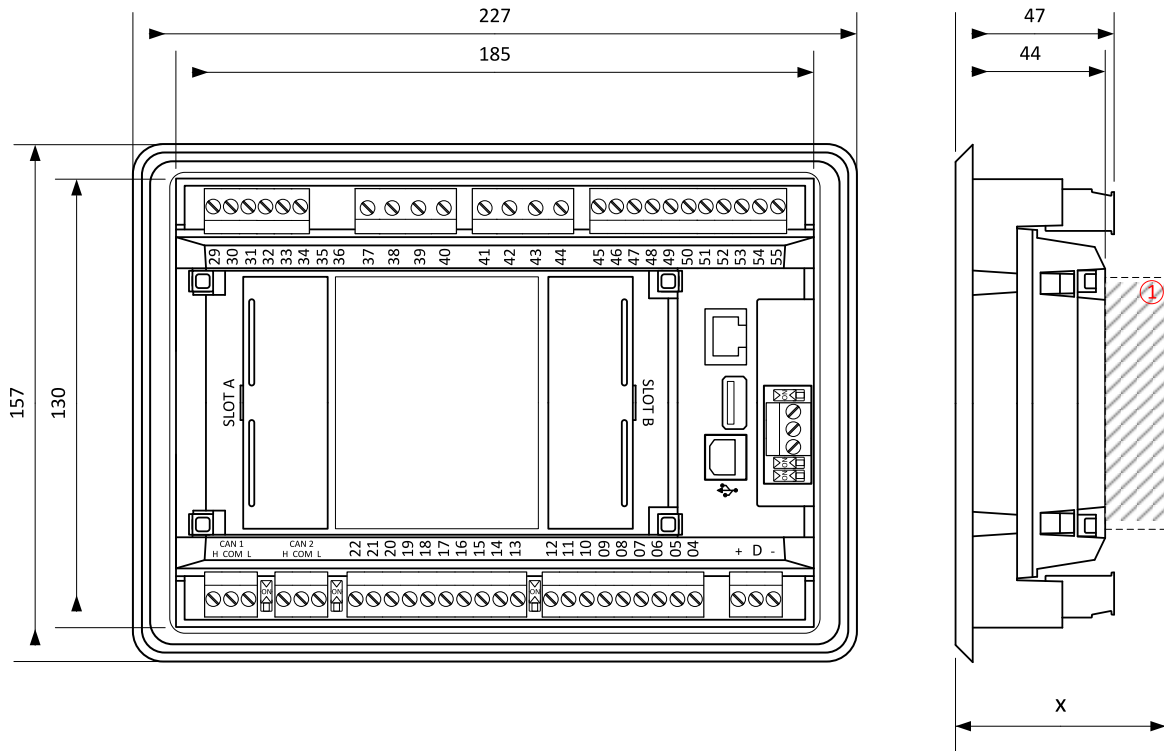
The package contains:

- ▶ Controller
- ▶ Mounting holders
- ▶ Terminal blocks

**Note:** *The package does not contain a communication or extension modules. The required modules should be ordered separately.*

## 4.2 Controller installation

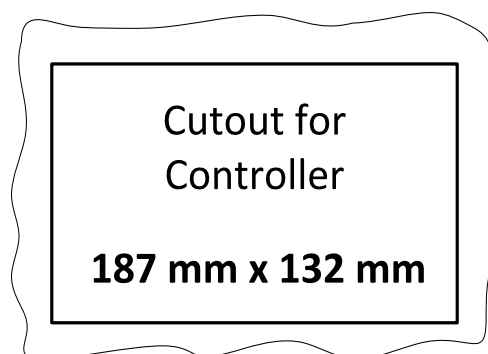
### 4.2.1 Dimensions



① Plug-in module

**Note:** Dimension *x* depends on plug-in module

**Note:** Dimensions are in millimeters.

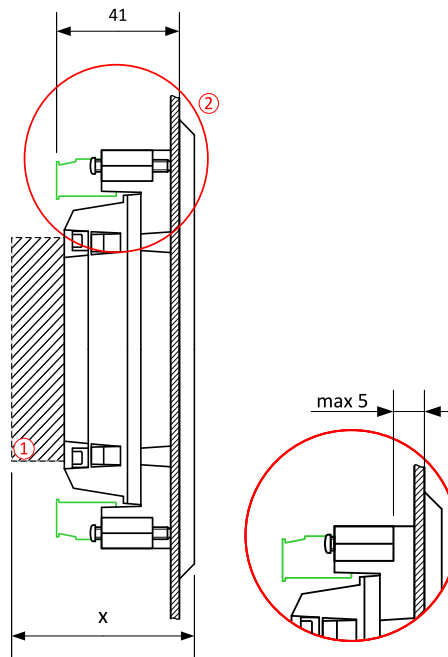


**Note:** Cutout is in millimeters.

### 4.2.2 Mounting

The controller is to be mounted onto the switchboard door. Requested cutout size is 187 x 132 mm. Use the screw holders delivered with the controller to fix the controller into the door as described on pictures below. Recommended torque for holders is 0.15 N·m.

## Panel door mounting



**Note:** The final depth of the controller depends on the selected extension module - it can vary between 41 and 56 mm. Mind also a size of connector and cables (e.g. in case of RS232 connector add about another 60 mm for standard RS232 connector and cable).

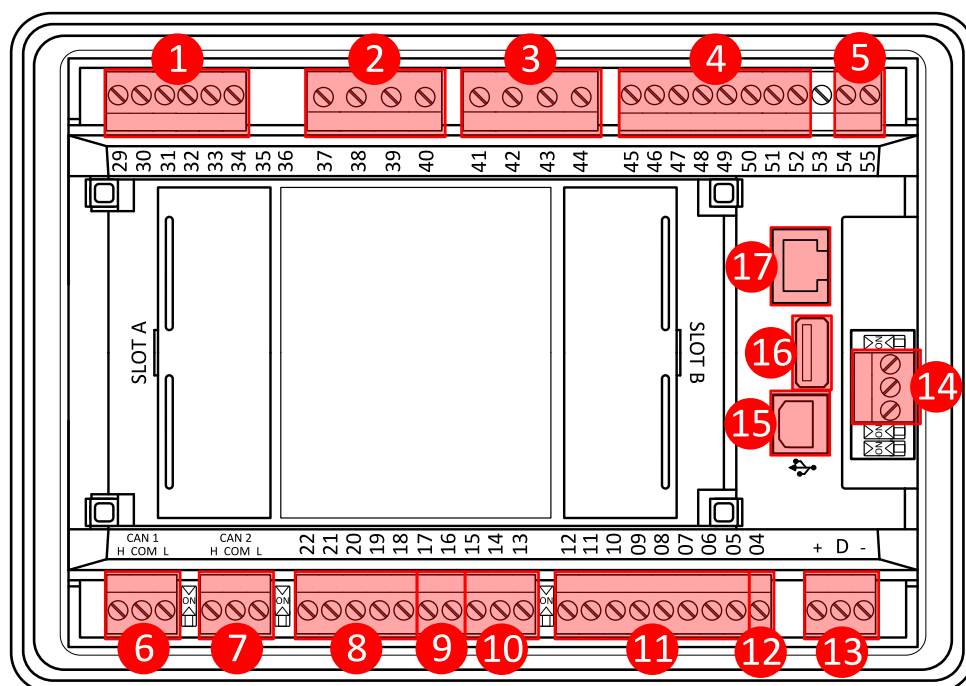
**Note:** These devices shall be mounted in a pollution degree 2 environment enclosure having adequate strength and thickness with acceptable spacings being provided.

**Note:** The accessibility of live parts through openings in the enclosure, reliable retention of guards or barriers for prevention of risk of electric shock, etc., shall be considered in the end product evaluation.

**Note:** Voltage sensing circuits shall be connected to controlled Overvoltage Category III circuits only in the end product installation.

## 4.3 Terminal Diagram

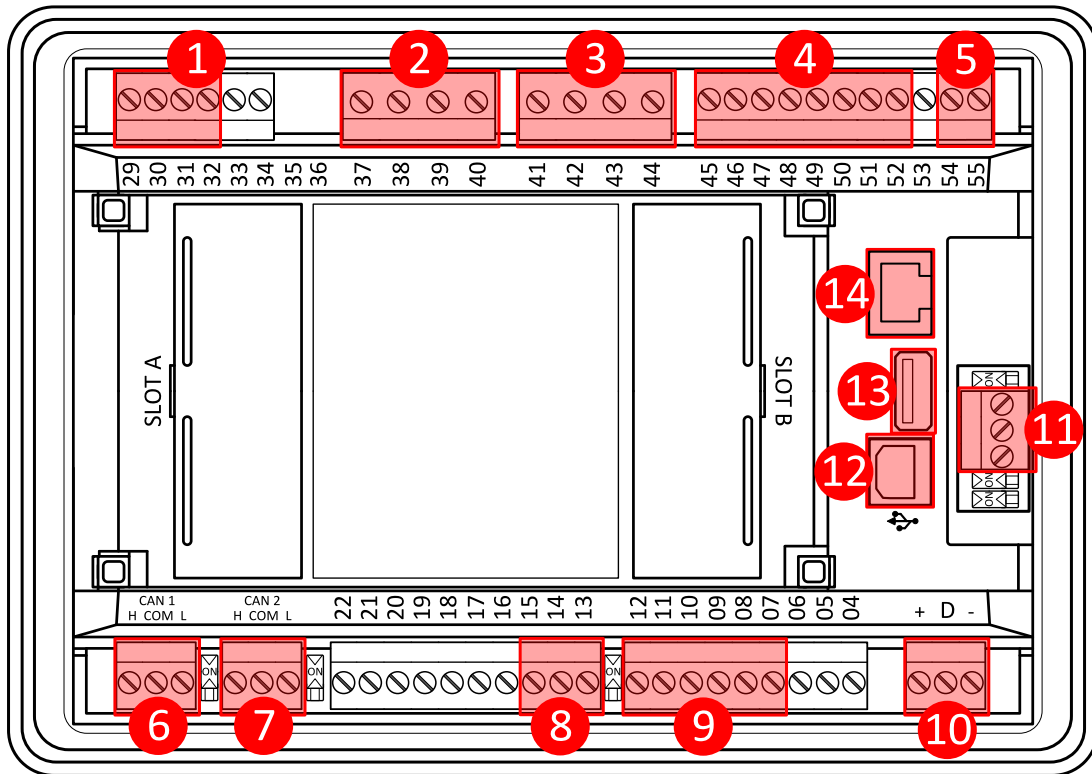
| ① CURRENT MEASUREMENT |     | ② GENERATOR VOLTAGE |    | ③ MAINS/BUS VOLTAGE |    | ④ BINARY INPUTS |      | ⑤ AVR INTERFACE |     |
|-----------------------|-----|---------------------|----|---------------------|----|-----------------|------|-----------------|-----|
| T29                   | COM | T37                 | N  | T41                 | N  | T45             | BIN1 | T54             | COM |
| T30                   | L1  | T38                 | L1 | T42                 | L1 | T46             | BIN2 | T55             | OUT |
| T31                   | L2  | T39                 | L2 | T43                 | L2 | T47             | BIN3 | ⑥ CAN1          |     |
| T32                   | L3  | T40                 | L3 | T44                 | L3 | T48             | BIN4 | T26             | L   |
| T33                   | COM |                     |    |                     |    | T49             | BIN5 | T27             | COM |
| T34                   | L1  |                     |    |                     |    | T50             | BIN6 | T28             | H   |
|                       |     |                     |    |                     |    | T51             | BIN7 |                 |     |
|                       |     |                     |    |                     |    | T52             | BIN8 |                 |     |



| ⑦ CAN2          |          | ⑨ RPM                      |         | ⑪ BINARY OUTPUTS |       | ⑬ POWER SUPPLY, D+ |        |
|-----------------|----------|----------------------------|---------|------------------|-------|--------------------|--------|
| T23             | L        | T16                        | RPM GND | T05              | BOUT1 | T01                | BATT - |
| T24             | COM      | T17                        | RPM IN  | T06              | BOUT2 | T02                | D+     |
| T25             | H        | ⑩ SPEED GOVERNOR INTERFACE |         | T07              | BOUT3 | T03                | BATT + |
| ⑧ ANALOG INPUTS |          | T13                        | COM     | T08              | BOUT4 | ⑭ RS485            |        |
| T18             | A<br>COM | T14                        | VOUT    | T09              | BOUT5 | T56                | B      |
| T19             | A01      | T15                        | PWM     | T10              | BOUT6 | T57                | COM    |
| T20             | A02      |                            |         | T11              | BOUT7 | T58                | A      |
| T21             | A03      |                            |         | T12              | BOUT8 | ⑮ USB              |        |
| T22             | A04      |                            |         | ⑯ E-STOP         |       | ⑰ USB HOST         |        |
|                 |          |                            |         | T04              |       | ⑱ ETHERNET         |        |



## 4.4 Recommended wiring



|           |                      |             |  |
|-----------|----------------------|-------------|--|
| <b>1</b>  | Current inputs       | 29 - 32     | Current measurement wiring (page 31)   |
| <b>2</b>  | Mains voltage inputs | 37 - 40     | Voltage measurement wiring - SPtM (page 33)<br>Voltage measurement wiring - MINT (page 35) |
| <b>3</b>  | Bus voltage inputs   | 41 - 44     | Voltage measurement wiring - SPtM (page 33)<br>Voltage measurement wiring - MINT (page 35) |
| <b>4</b>  | Binary inputs        | 45 - 52     | Binary inputs (page 38)  |
| <b>5</b>  | AVR                  | 54 - 55     | AVR Interface (page 49)  |
| <b>6</b>  | CAN1                 | H, COM, L   | CAN bus and RS485 wiring (page 44)   |
| <b>7</b>  | CAN2                 | H, COM, L   | CAN bus and RS485 wiring (page 44)   |
| <b>8</b>  | Speed governor       | 13 - 15     | Speed governor interface (page 49)   |
| <b>9</b>  | Binary outputs       | 07 - 12     | Binary Outputs (page 39)   |
| <b>10</b> | Power supply         | "+" "D" "-" | Power supply (page 28)   |
| <b>11</b> | RS485                | A, COM, B   | CAN bus and RS485 wiring (page 44)   |

|    |          |       |                    |
|----|----------|-------|--------------------|
| 12 | USB      | USB B | USB (page 49)      |
| 13 | USB HOST | USB A | USB HOST (page 49) |
| 14 | Ethernet | RJ45  | Ethernet (page 49) |

### 4.4.1 General

To ensure proper function:

- ▶ Use grounding terminals.
- ▶ Wiring for binary inputs and analog inputs must not be run with power cables.
- ▶ Analog and binary inputs should use shielded cables, especially when the length is more than 3 m.

#### Tightening torque, allowable wire size and type, for the Field-Wiring Terminals:

For Mains(Bus) Voltage, Generator Voltage and Current terminals



Specified tightening torque is 0,56 Nm (5,0 In-lbs)

Use only diameter 2,0 - 0,5 mm (12 - 26 AWG) conductor, rated for 90°C minimum.

For other controller field wiring terminals



Specified tightening torque 0,79 nm (7,0 In-lb)

Use only diameter 2,0 - 0,5 mm (12 - 26 AWG) conductor, rated for 75°C minimum.



Use copper conductors only.

### 4.4.2 Grounding

The shortest possible length of wire should be used for controller grounding. Use cable min 2.5 mm<sup>2</sup>.

The negative " - " battery terminal must be properly grounded.

Switchboard and engine must be grounded at common point. Use as short cable as possible to the grounding point.

### 4.4.3 Power supply

To ensure proper function:

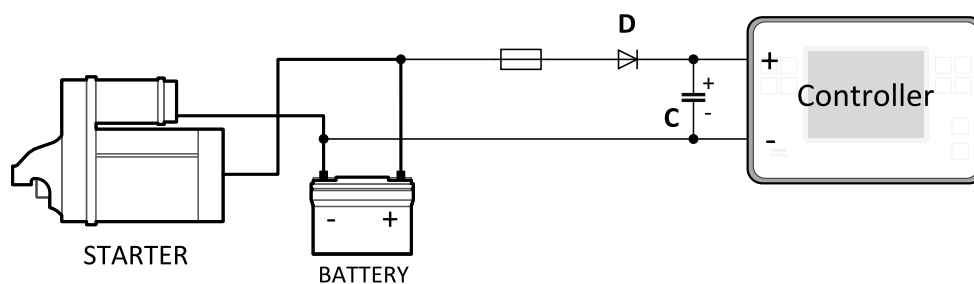
- ▶ Use power supply cable min. 1.5 mm<sup>2</sup>

Maximum continuous DC power supply voltage is 36 V DC. The controller's power supply terminals are protected against large pulse power disturbances. When there is a potential risk of the controller being subjected to conditions outside its capabilities, an outside protection device should be used.

It is necessary to ensure that potential difference between generator current COM terminal and battery " - " terminal is maximally  $\pm 2$  V. Therefore is strongly recommended to interconnect these two terminals together.

**Note:** The controller should be grounded properly in order to protect against lightning strikes. The maximum allowable current through the controller's negative terminal is 4 A (this is dependent on binary output load).

For the connections with 12 V DC power supply, the controller includes internal capacitors that allow the controller to continue in operation during cranking if the batter voltage dip occurs. If the voltage dip goes during cranking to 0 V and after 50 ms it recovers to 4 V, the controller continues operating. This cycle can repeat several times. During this voltage dip the controller screen backlight can turn off.



**Note:** Recommended fusing is 4 A fuse.

**Note:** In case of the dip to 0 V the high-side binary outputs will be temporarily switched off and after recovering to 4 V back on.

**IMPORTANT:** When the controller is power up only by USB and the USB is disconnected then the actual statistics can be lost.

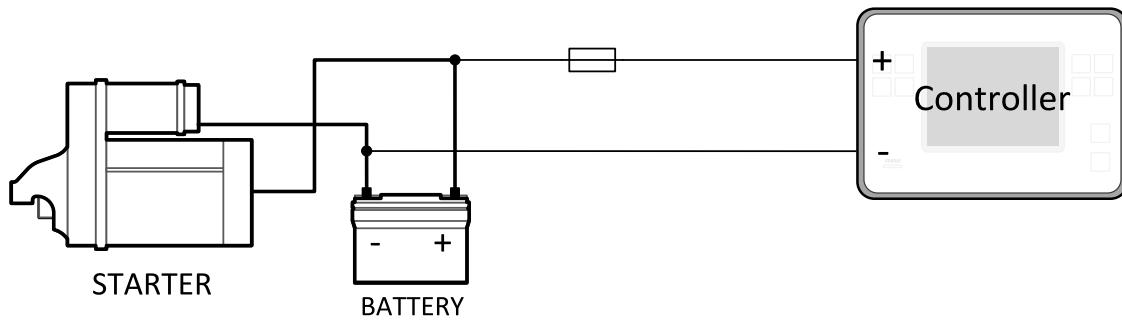
**Note:** Suitable conductor protection shall be provided in accordance with NFPA 70, Article 240.

**Note:** Low voltage circuits (35 volts or less) shall be supplied from the engine starting battery or an isolated secondary circuit.

**Note:** It is also possible to further support the controller by connecting the external capacitor and separating diode. The capacitor size depends on required time. It shall be approximately thousands of  $\mu$ F. The capacitor size should be 5 000  $\mu$ F to withstand 150 ms voltage dip under following conditions: Voltage before dip is 12 V, after 150 ms the voltage recovers to min. allowed voltage, i.e. 8 V.

## Power supply fusing

A 4 A fuse should be connected in-line with the battery positive terminal to the controller and modules. These items should never be connected directly to the starting battery. Fuse value and type depends on number of connected devices and wire length. Recommended fuse (not fast) type - T4 A. Not fast due to internal capacitors charging during power up.



**Note:** Recommended fusing is 4 A fuse.

**IMPORTANT:** 4 A fuse is calculated without BOUT consumption nor extension modules. Real value of fuse depends on consumption of binary outputs and modules.

**Example:** Maximal consumption of binary outputs can be 22 A

- ▶ 2 x 10 A on high current outputs (for 10 seconds)
- ▶ 2 A on all others binary outputs

#### 4.4.4 Measurement wiring

Use 1.5 mm<sup>2</sup> cables for voltage connection and 2.5 mm<sup>2</sup> for current transformers connection. Adjust Connection type (page 244), Nominal Voltage Ph-N (page 246), Nominal Voltage Ph-Ph (page 246), Nominal Current (page 243), Gen Mains VT Ratio (page 246) and CT Ratio (page 244) by appropriate setpoints in the Basic Settings group.

**IMPORTANT:** Risk of personal injury due to electric shock when manipulating voltage terminals under voltage. Be sure the terminals are not under voltage before touching them.

Do not open the secondary circuit of current transformers when the primary circuit is closed. Open the primary circuit first.

#### Mains measurement wiring

Connect CT according to following drawings

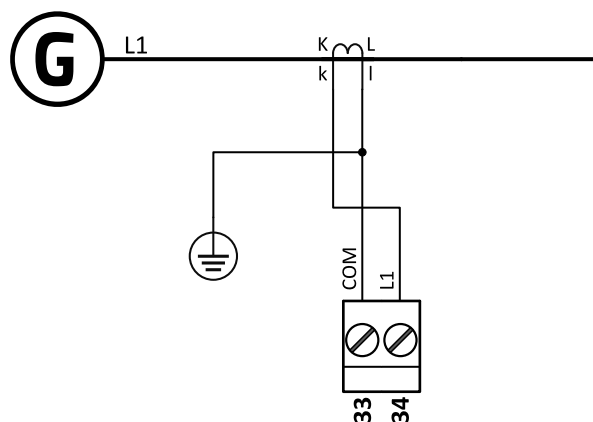


Image 4.1 Mains measurement wiring

## Current measurement wiring

The number of CT's is automatically selected based on selected value of setpoint **Connection type** (page 244) [3Ph4Wire / High Leg D / 3Ph3Wire / Split Ph / Mono Ph].

Generator currents and power measurement is suppressed if current level is bellow <1 % of CT range.

To ensure proper function:

- ▶ Use cables of 2.5 mm<sup>2</sup>
- ▶ Use transformers to 5 A
- ▶ Connect CT according to following drawings:

### 3 phase application:

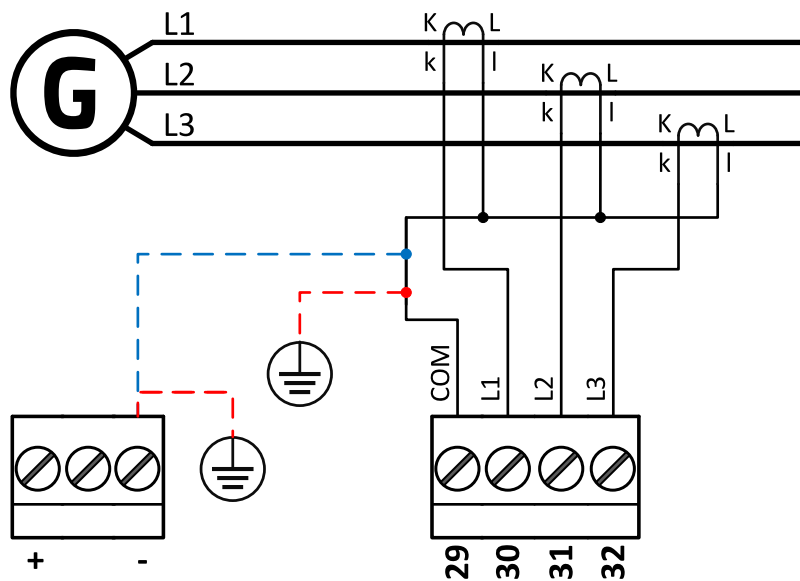


Image 4.2 3 phase application

**IMPORTANT:** It is necessary to ensure that potential difference between current COM terminal and power supply “-” terminal is maximally  $\pm 2$  V. There are 2 options how to ensure this:

- ▶ "Red" option - properly ground both terminals
- ▶ "Blue" option - interconnect these two terminals

Always apply only one option. Never realize both options on one installation.

Split phase application:

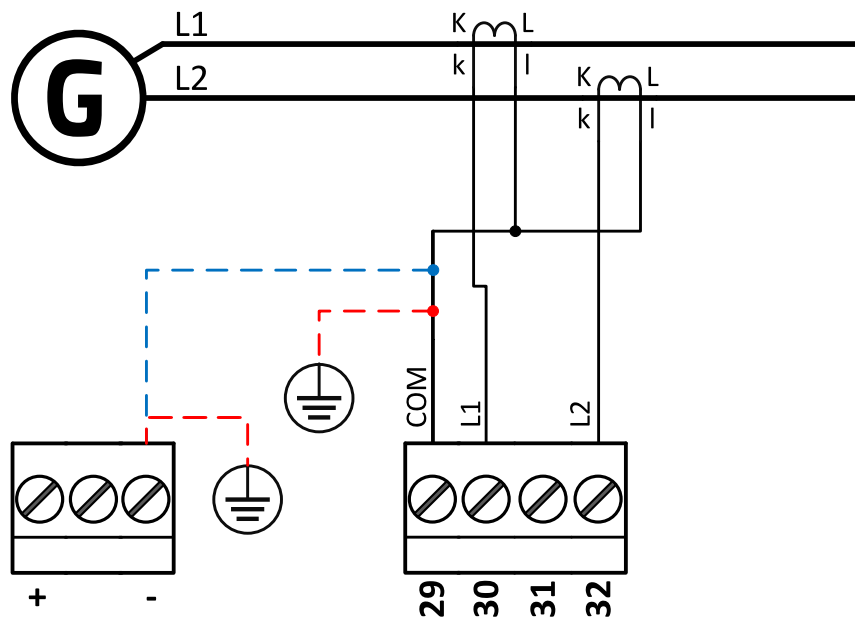


Image 4.3 Split phase application

**IMPORTANT:** The second phase of split phase connection is connected to the terminal, where is normally connected the third phase.

**IMPORTANT:** It is necessary to ensure that potential difference between current COM terminal and power supply “-” terminal is maximally  $\pm 2$  V. There are 2 options how to ensure this:

- ▶ "Red" option - properly ground both terminals
- ▶ "Blue" option - interconnect these two terminals

Always apply only one option. Never realize both options on one installation.

### Mono phase application:

Connect CT according to following drawings. Terminals phase 2 and phase 3 are opened.

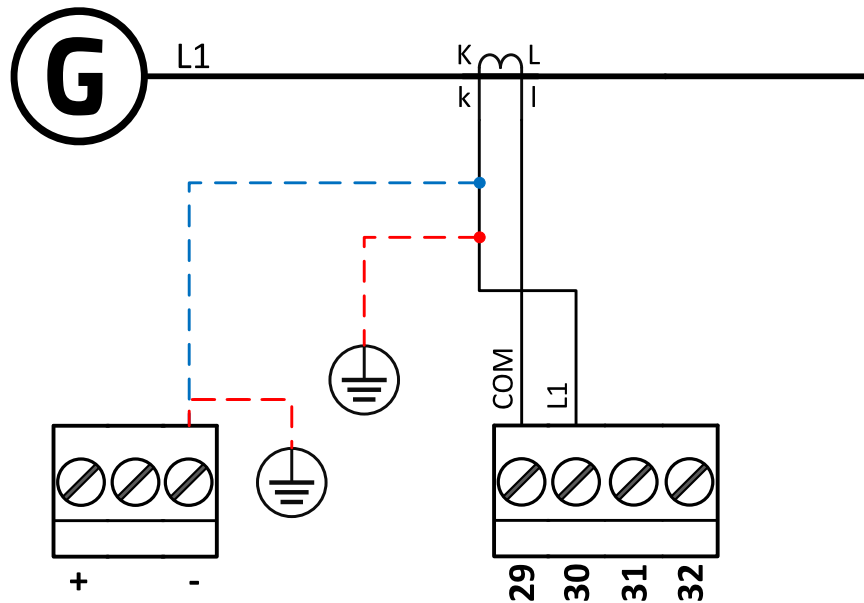


Image 4.4 Mono phase application

**IMPORTANT:** It is necessary to ensure that potential difference between current COM terminal and power supply “-” terminal is maximally  $\pm 2$  V. There are 2 options how to ensure this:

- ▶ "Red" option - properly ground both terminals
- ▶ "Blue" option - interconnect these two terminals

Always apply only one option. Never realize both options on one installation.

### Voltage measurement wiring - SPtM

There are 4 voltage measurement Connection Type (setpoint **Connection type** (page 244) [3Ph4Wire / High Leg D / 3Ph3Wire / Split Ph / Mono Ph]) options, every type matches to corresponding generator connection type.

**Note:** For fusing of voltage measurement input use T1A or T2A fuse.

The generator protections are evaluated from different voltages based on **Connection type** (page 244) setting:

- ▶ 3Ph 4W – Ph-Ph voltage, Ph-N voltage
- ▶ 3Ph 3W – Ph-Ph voltage
- ▶ Split Ph – Ph-N voltage
- ▶ Mono Ph – Ph-N voltage

ConnectionType: 3 Phase 4 Wires

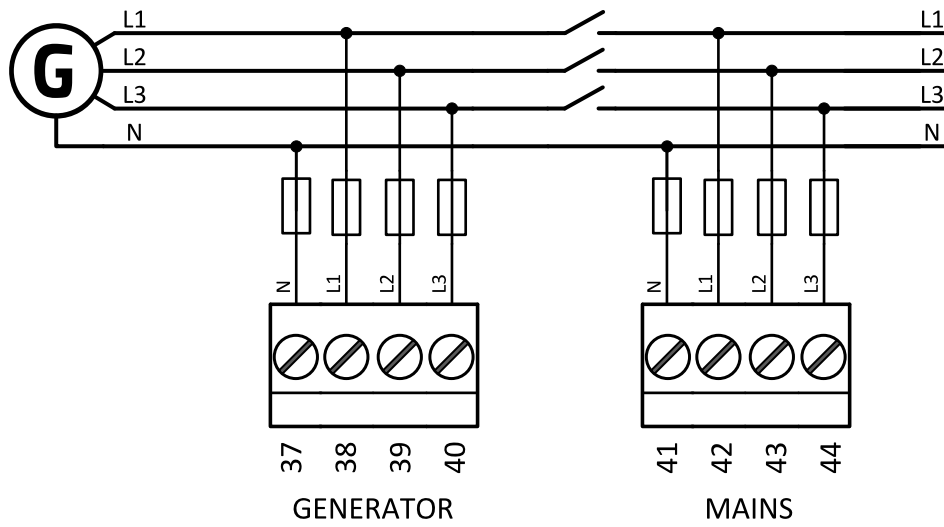


Image 4.5 3 phase application with neutral

ConnectionType: 3 Phase 3 Wires

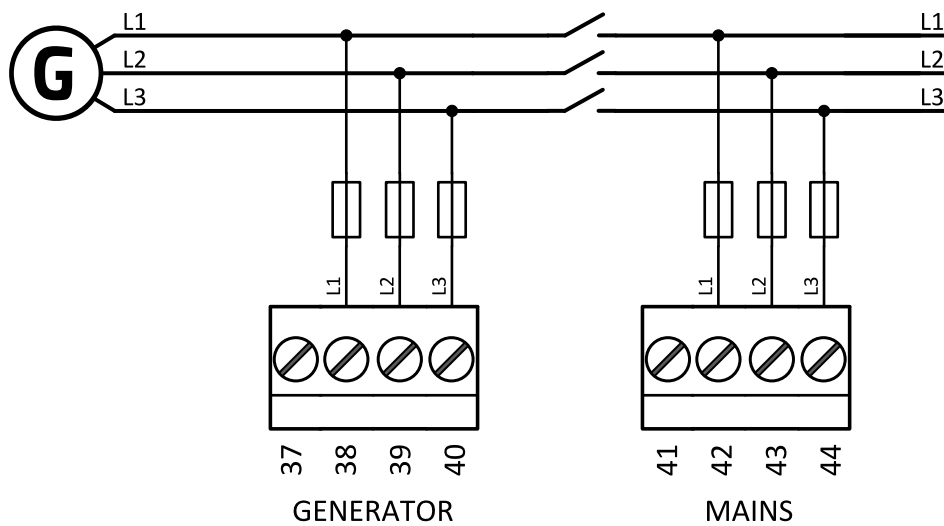


Image 4.6 3 phase application without neutral



ConnectionType: Split Phase

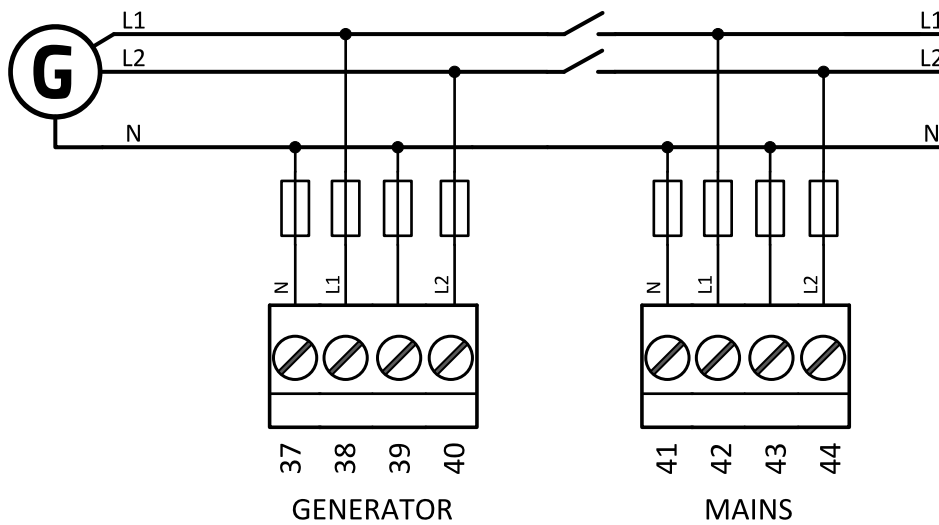


Image 4.7 Split phase application

**IMPORTANT:** The second phase of split phase connection is connected to the terminal, where is normally connected the third phase.

ConnectionType: Mono Phase

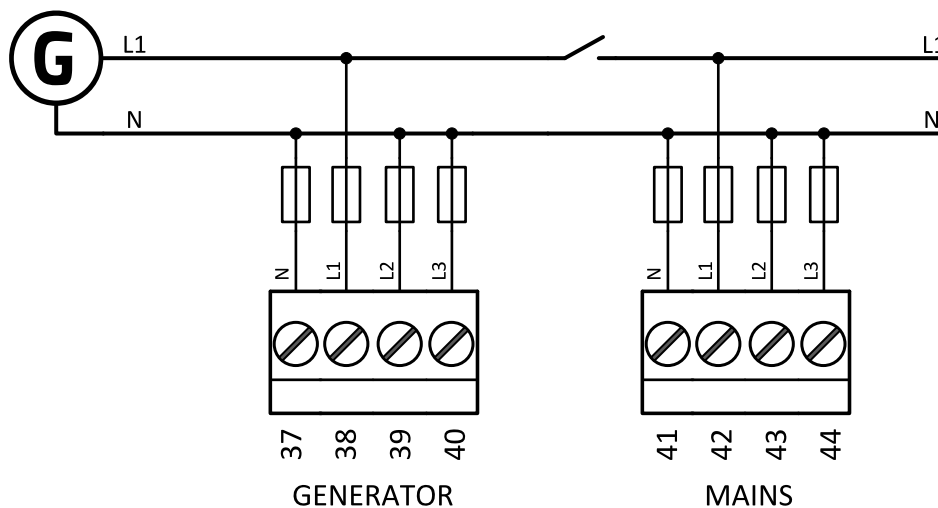


Image 4.8 Mono phase application

**Voltage measurement wiring - MINT**

There are 4 voltage measurement Connection Type (setpoint **Connection type (page 244)** [3Ph4Wire / High Leg D / 3Ph3Wire / Split Ph / Mono Ph]) options, every type matches to corresponding generator connection type.

**Note:** For fusing of voltage measurement input use T1A or T2A fuse.

The generator protections are evaluated from different voltages based on **Connection type (page 244)** setting:

- ▶ 3Ph 4W – Ph-Ph voltage, Ph-N voltage
- ▶ 3Ph 3W – Ph-Ph voltage
- ▶ Split Ph – Ph-N voltage
- ▶ Mono Ph – Ph-N voltage

**ConnectionType: 3 Phase 4 Wires**

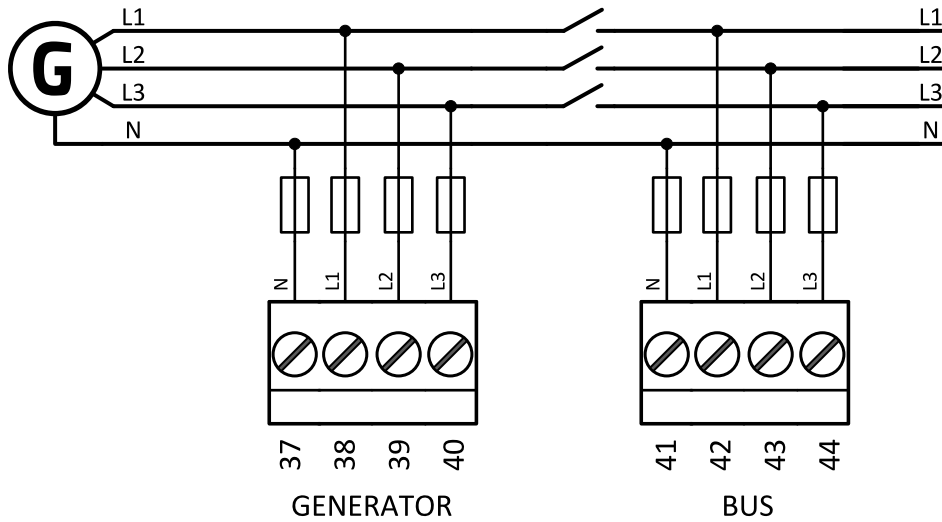


Image 4.9 3 phase application with neutral

**ConnectionType: 3 Phase 3 Wires**

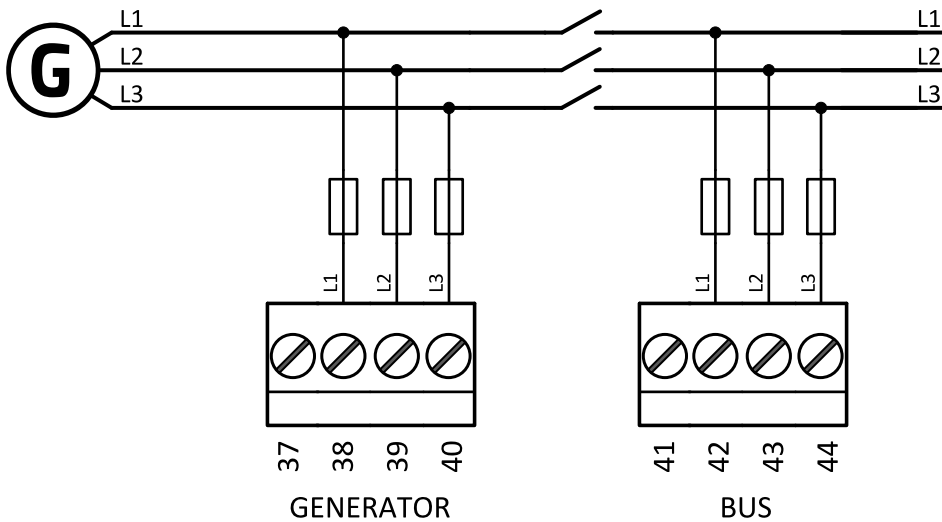


Image 4.10 3 phase application without neutral

### ConnectionType: Split Phase

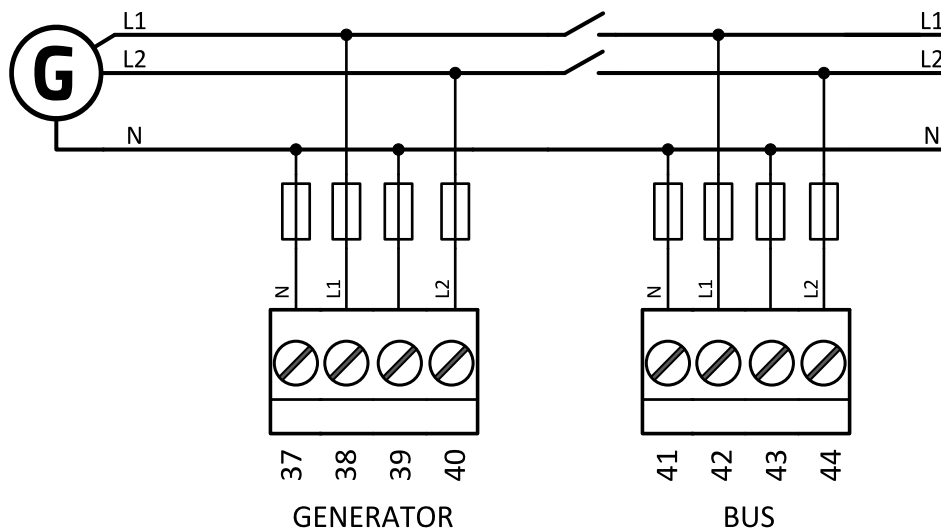


Image 4.11 Split phase application

**IMPORTANT:** The second phase of split phase connection is connected to the terminal, where is normally connected the third phase.

### ConnectionType: Mono Phase

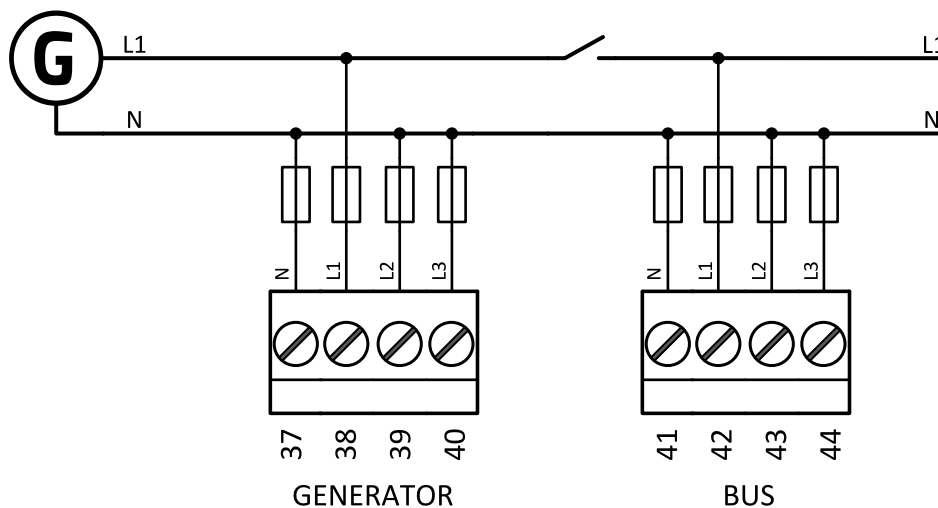
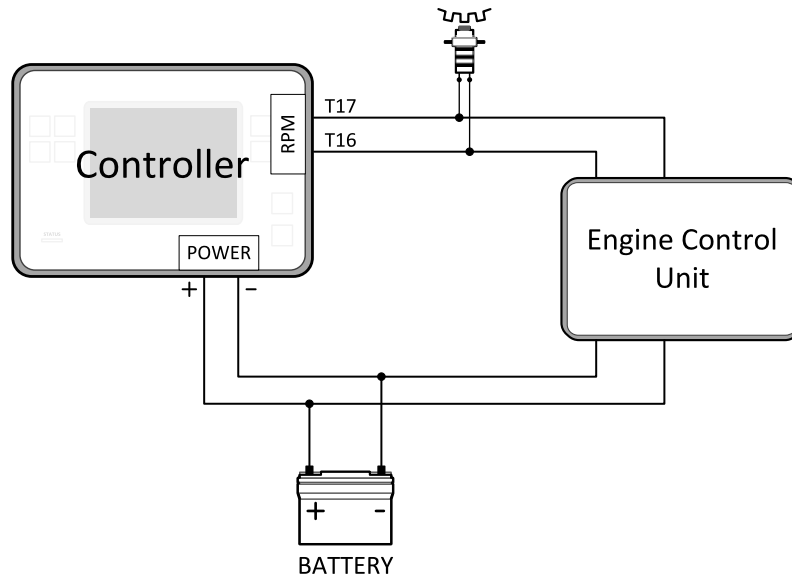


Image 4.12 Mono phase application

## 4.4.5 Magnetic pick-up

A magnetic speed sensor (pickup) is the most common method of engine speed measurement. To use this method, mount the pickup opposite to the engine flywheel, connect the cable to the controller as shown on the picture below and adjust the setpoint **Gear Teeth** (page 248) according to the number of teeth on the flywheel. For the details about the pick-up input parameters **see Technical data on page 217**

**IMPORTANT:** To ensure proper function use a shielded cable.



If engine will not start:

- ▶ Check ground connection from pick-up to controllers, eventually disconnect ground connection to one of them.

**Note:** In some cases the controller will measure a RPM value even though the gen-set is not running: RPM is measured from the generator voltage (Gear Teeth = 0). Controller is measuring some voltage value on input terminals due to open fusing. If  $RPM > 0$  the controller will be put into a Not ready state and the engine will not be allowed to start.

### 4.4.6 Binary inputs

Use minimally 1 mm<sup>2</sup> cables for wiring of Binary inputs.

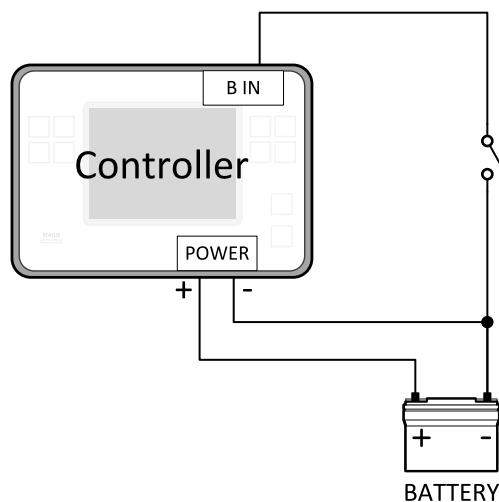


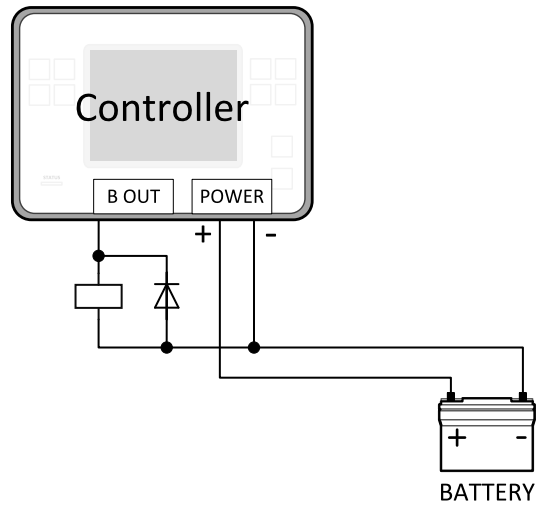
Image 4.13 Wiring binary inputs

**Note:** The name and function or alarm type for each binary input have to be assigned during the configuration.

## 4.4.7 Binary Outputs

Use min. 1 mm<sup>2</sup> cables for wiring of binary outputs. Use external relays as indicated on the schematic below for all outputs except those where low-current loads are connected (signalization etc...).

**IMPORTANT: Use suppression diodes on all relays and other inductive loads!**



**Note:** Every single binary output can provide up to 0,5 A of steady current.

## 4.4.8 E-Stop

E stop has dedicated terminal T049. Power supply of binary output 1 and binary output 2 (terminals 4 and 5) is internally connected (in controller) to E-Stop terminal. It means higher security and faster disconnection of these outputs. More information about E-Stop functions **see E-Stop on page 153**.

**Note:** This function has the same behavior as binary input *EMERGENCY STOP* (PAGE 665).

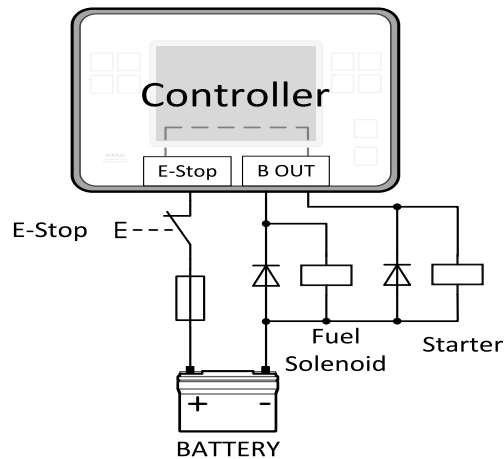


Image 4.14 E-Stop wiring

**Note:** Recommended fusing is 1.2 A fuse.

**Note:** Grey dashed line symbolizes internal connection between E-Stop and binary outputs 1 and 2.

**Note:** For proper functionality of E-Stop, the terminal T049 must be always wired. Terminal can be connected to battery+ or to terminal T03 (BATT+)

## 4.4.9 Emergency stop

The Emergency Stop function can be made in two ways:

- ▶ Connecting a normally closed “mushroom-type” button to the binary input . This is a purely software solution.
- ▶ A hard-wired solution, where the button also disconnects the power supply from the controller outputs.

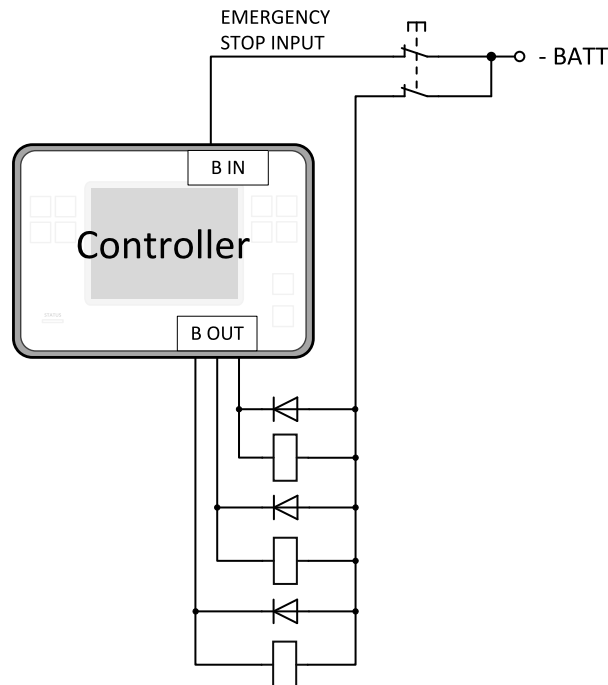


Image 4.15 Hard-wired emergency stop

## 4.4.10 Analog inputs

The analog inputs are designed for resistive automotive type sensors like VDO or DATCON. The sensors are connected either by one wire (the second pole is the sensor body) or by two wires.

- ▶ In the case of grounded sensors, connect the AI COM terminal to the engine body as near to the sensors as possible.
- ▶ In the case of isolated sensors, connect the AI COM terminal to the negative power supply terminal of the controller as well as one pole of each sensor.

Analog inputs are typically used for: Oil Pressure, Coolant Temperature and Fuel Level. All of these parameters are connected with relevant protections.

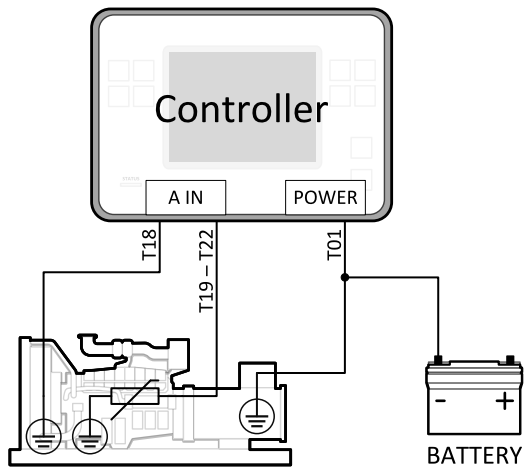


Image 4.16 Grounded sensors

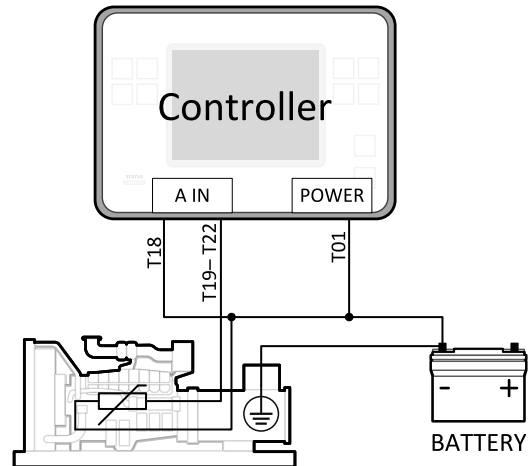


Image 4.17 Isolated sensors

**Note:** Schemes show only analog input connection overview, not actual wiring.

**Note:** The name, sensor characteristic and alarm types for each analog input have to be assigned during configuration.

## Analog inputs with voltage & current sensors

On each analog input, there is a possibility to connect voltage or current output sensor. Recommended wiring connections for these measurements are below.

### Voltage sensors

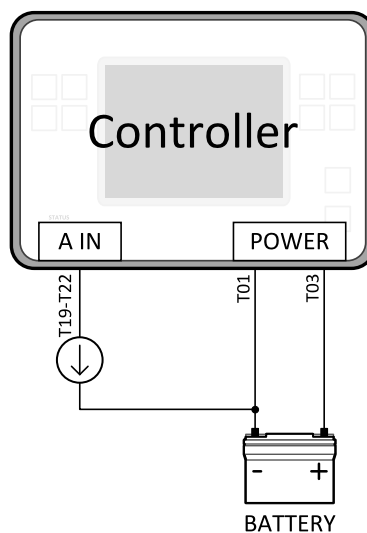


Image 4.18 Wiring of analog input with voltage sensor



## Current sensors

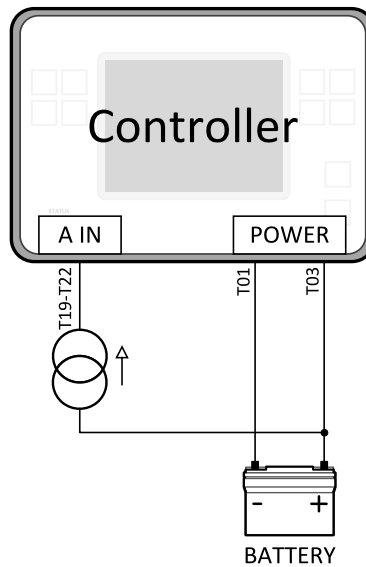


Image 4.19 Wiring of analog input with current sensor

## Analog inputs with tristate sensors

It is possible to use tristate sensor with each analog input. Select Sensor option Tristate and use this wiring:

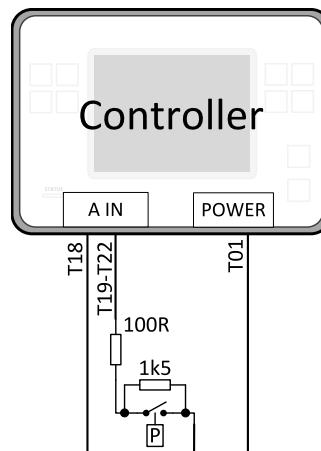


Image 4.20 Tristate sensor

Tristate sensor (binary sensor with fail detection)

- ▶ **Below 750  $\Omega$**  = Inactive
- ▶ **Between 750  $\Omega$  and 2400  $\Omega$**  = Active
- ▶ **Below 10  $\Omega$  or Over 2400  $\Omega$**  = sensor failure (wire shorted or interrupted)

## Analog inputs with binary sensors

It is possible to use binary sensor with each analog input. Select Sensor option Binary and use this wiring:

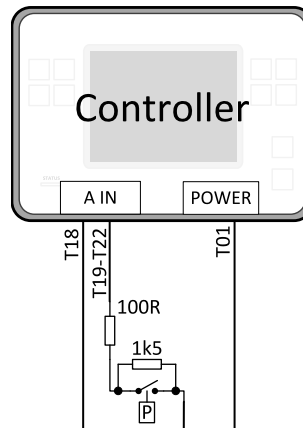


Image 4.21 Binary sensor

Binary sensor (binary sensor without fail detection)

- ▶ **Below 750  $\Omega$**  = Inactive
- ▶ **Between 750  $\Omega$  and 2400  $\Omega$**  = Active

## 4.4.11 CAN bus and RS485 wiring

### CAN bus wiring

The wiring of the CAN bus should be provided in such a way that the following rules are observed:

- ▶ The maximum length of the CAN bus depends on the communication speed. For a speed of 250 kbps, which is used on the CAN1 bus (extension modules, ECU) and CAN2 bus, the maximum length is 200 m.
- ▶ The bus must be wired in linear form with termination resistors at both ends. No nodes are allowed except on the controller terminals.
- ▶ Shielded cable<sup>1</sup> has to be used, shielding has to be connected to the terminal T01 (Grounding).
- ▶ External units can be connected on the CAN bus line in any order, but keeping line arrangement (no tails, no star) is necessary.
- ▶ The CAN bus has to be terminated by 120 Ohm resistors at both ends use a cable with following parameters:

|                             |                                     |
|-----------------------------|-------------------------------------|
| <b>Cable type</b>           | Shielded twisted pair               |
| <b>Impedance</b>            | 120 $\Omega$                        |
| <b>Propagation velocity</b> | $\geq 75\%$ (delay $\leq 4.4$ ns/m) |
| <b>Wire crosscut</b>        | $\geq 0.25$ mm <sup>2</sup>         |
| <b>Attenuation (@1MHz)</b>  | $\leq 2$ dB/100 m                   |

<sup>1</sup>Recommended data cables: BELDEN (<http://www.belden.com>) - for shorter distances: 3105A Paired - EIA Industrial RS-485 PLTC/CM (1x2 conductors); for longer distances: 3106A Paired - EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)

**Note:** Communication circuits shall be connected to communication circuits of Listed equipment.

**Note:** A termination resistor at the CAN (120 Ω) is already implemented on the PCB. For connecting, close the jumper near the appropriate CAN terminal.

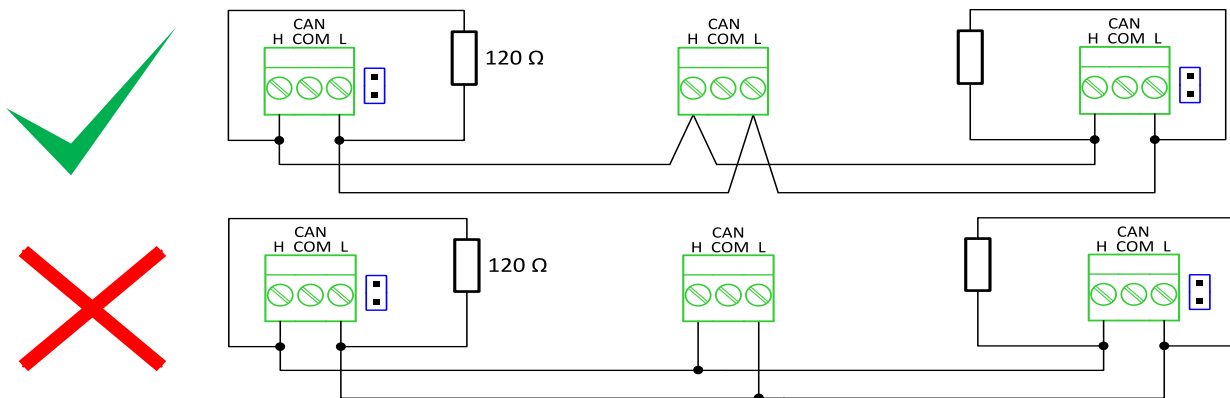


Image 4.22 CAN bus topology

► For shorter distances (connection within one building)

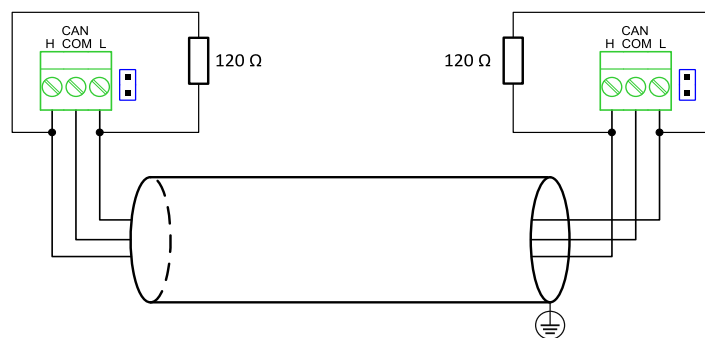


Image 4.23 CAN bus wiring for shorter distances

**Note:** Shielding shall be grounded at one end only. Shielding shall not be connected to CAN COM terminal.

- ▶ For longer distances or in case of surge hazard (connection out of building, in case of storm etc.)

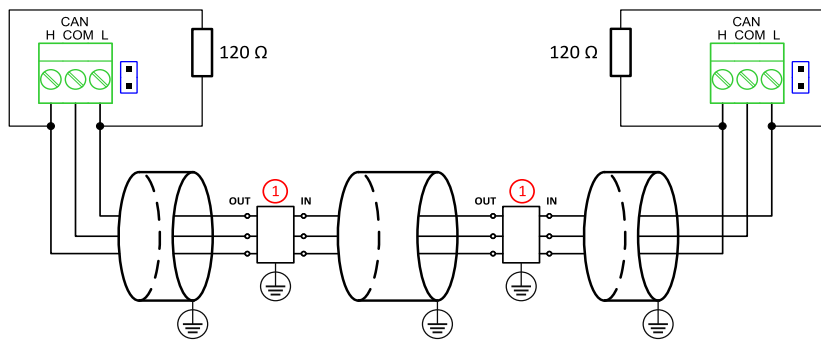


Image 4.24 CAN bus wiring for longer distances

① Recommended PT5-HF-12DC-ST<sup>1</sup>

## RS485 wiring

The wiring of the RS485 communication should be provided in such a way that the following rules are observed:

**Note:** A termination resistor at the CAN (120Ω) is already implemented on the PCB. For connecting, close the jumper near the appropriate CAN terminal.

- ▶ Standard maximum bus length is 1000 m.
- ▶ Shielded cable<sup>2</sup> has to be used, shielding has to be connected to the terminal T01 (Grounding).
- ▶ External units can be connected on the RS485 line in any order, but keeping line arrangement (no tails, no star) is necessary.
- ▶ The line has to be terminated by 120 Ohm resistors at both ends.
- ▶ For shorter distances (connection within one building).

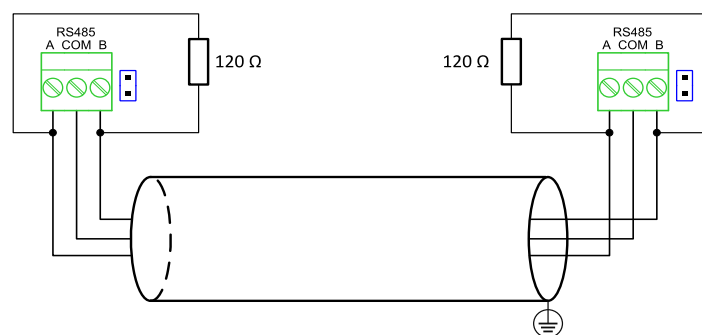


Image 4.25 RS485 wiring for shorter distances

<sup>1</sup>Protections recommended: Phoenix Contact (<http://www.phoenixcontact.com>): PT 5-HF-12DC-ST with PT2x2-BE (base element) or Saltek (<http://www.saltek.cz>): DM-012/2 R DJ

<sup>2</sup>Recommended data cables: BELDEN (<http://www.belden.com>) - for shorter distances: 3105A Paired - EIA Industrial RS-485 PLTC/CM (1x2 conductors); for longer distances: 3106A Paired - EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)

- ▶ For longer distances or in case of surge hazard (connection out of building, in case of storm etc.)

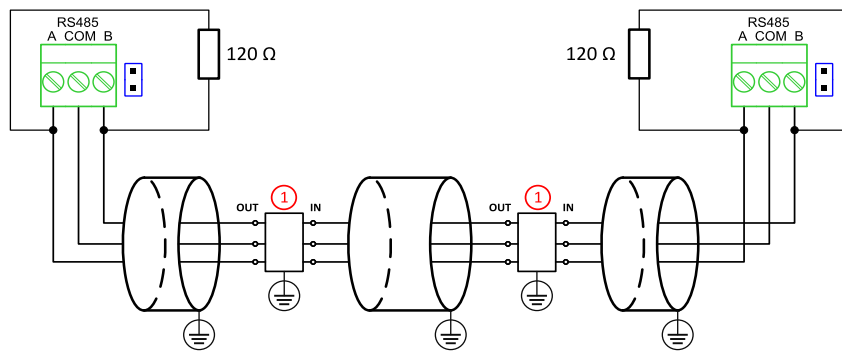


Image 4.26 RS485 wiring for longer distances

- ① Recommended PT5HF-5DC-ST<sup>1</sup>

**Note:** Communication circuits shall be connected to communication circuits of Listed equipment.

<sup>1</sup>Recommended protections: Phoenix Contact (<http://www.phoenixcontact.com>): PT 5-HF-5DC-ST with PT2x2-BE (base element)(or MT-RS485-TTL) or Saltek (<http://www.saltek.cz>): DM-006/2 R DJ

## On board RS485 description

### Balancing resistors

The transmission bus into the RS-485 port enters an indeterminate state when it is not being transmitted to. This indeterminate state can cause the receivers to receive invalid data bits from the noise picked up on the cable. To prevent these data bits, you should force the transmission line into a known state. By installing two 620 Ohm balancing resistors at one node on the transmission line, you can create a voltage divider that forces the voltage between the differential pair to be less than 200 milli-Volts, the threshold for the receiver. You should install these resistors on only one node. The figure below shows a transmission line using bias resistors. Balancing resistors are placed directly on the PCB of controller. Use jumpers PULL UP/PULL DOWN to connect the balancing resistors.

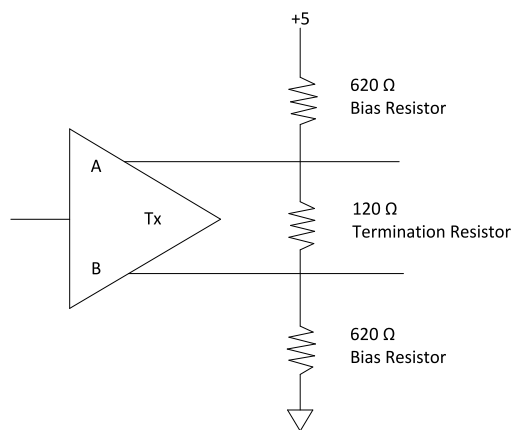


Image 4.27 Balancing resistors

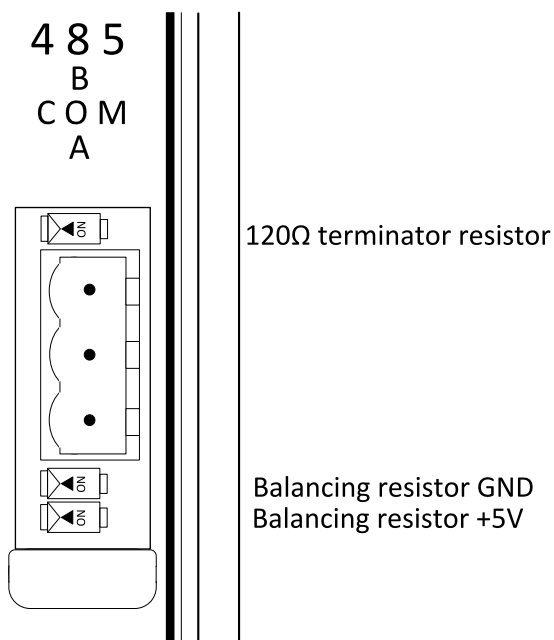


Image 4.28 RS485 on board

## 4.4.12 USB

This is required for computer connection. Use the shielded USB A-B cable.

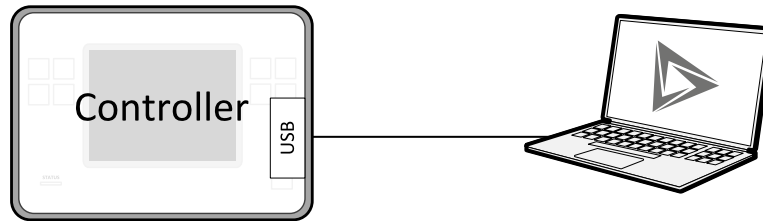


Image 4.29 USB connection

## 4.4.13 USB HOST

USB Flash Drive can be connected into USB A connector.

## 4.4.14 Ethernet

Ethernet Cat5/Cat6 cable fitted with the RJ45 connector can be connected to the ethernet interface.

## 4.4.15 AVR Interface

The output from the controller work in the following mode:

- ▶ Output type: Voltage in range of -10 V to +10 V maximum
- ▶ Maximum load current: 5 mA both sourcing and sinking.
- ▶ Precision: 1% of set value +/-100 mV.
- ▶ Resolution/minimum step: 3 mV approx.
- ▶ Step response: less then 10 ms, measured between 10% and 90%
- ▶ Output ripple: 30 mV max. at 50% of PWM
- ▶ Galvanic insulation: YES

Please see chapter **Voltage control outputs (page 107)** (Analog output) for more information about set-up of controller's AVR.

**Note:** For the connection of individual AVRs please refer to concrete AVR manual.

**IMPORTANT:** Read carefully specific AVR instructions before connecting to controller.

## 4.4.16 Speed governor interface

The speed governor output is used to control the speed or the power of the engine via the remote speed controlling input provided by the speed governor. The output from the controller can work in the following modes:

- ▶ voltage mode -10 to 10 V (10k output resistance can be internally connected by jumper)
  - Maximum load current: 5 mA both sourcing and sinking.
  - Precision: 1% of set value +/-100mV.
  - Resolution/minimum step: 3 mV approx.
  - Step response: less then 10 ms, measured between 10% and 90%.

- Output ripple: 30 mV max. at 50% of pwm.
- Galvanic insulation: NO
- ▶ 5 V PWM mode
  - PWM amplitude: 5 V.
  - PWM frequency: 500 to 2900 Hz defined by setpoint **Speed Governor PWM Rate** (page 347)
  - Maximum load current: 20 mA both sourcing and sinking.
  - PWM Resolution: 14 bit.
  - Galvanic insulation: NO

Please see chapter **Speed control outputs** (page 105) (Analog output) for more information about set-up of controller's Speed governor.

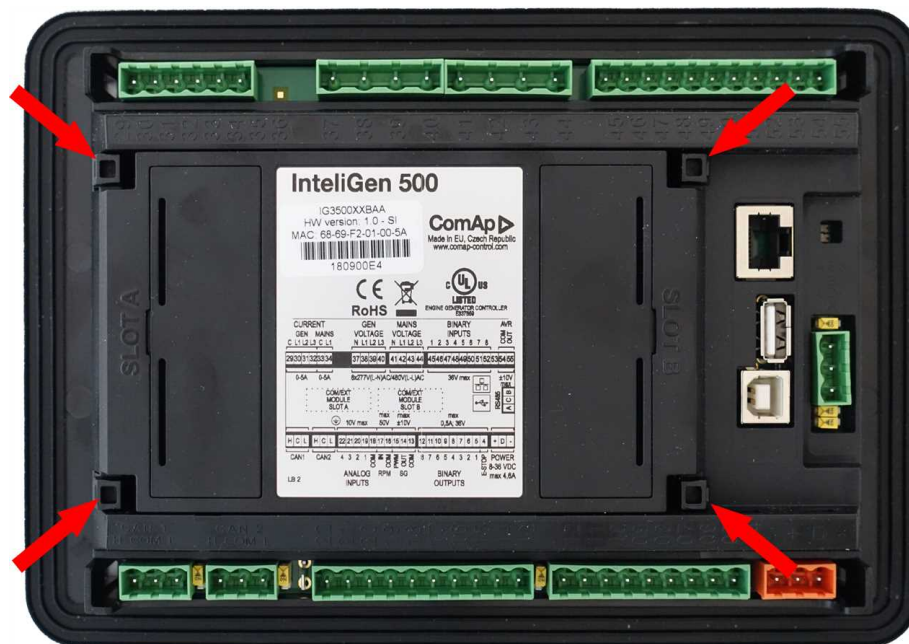
**Note:** For the connection of individual speed governors please refer to concrete speed governor manual.

**IMPORTANT:** Read carefully specific Speed governor instructions before connecting to controller.

## 4.5 Plug-in module installation

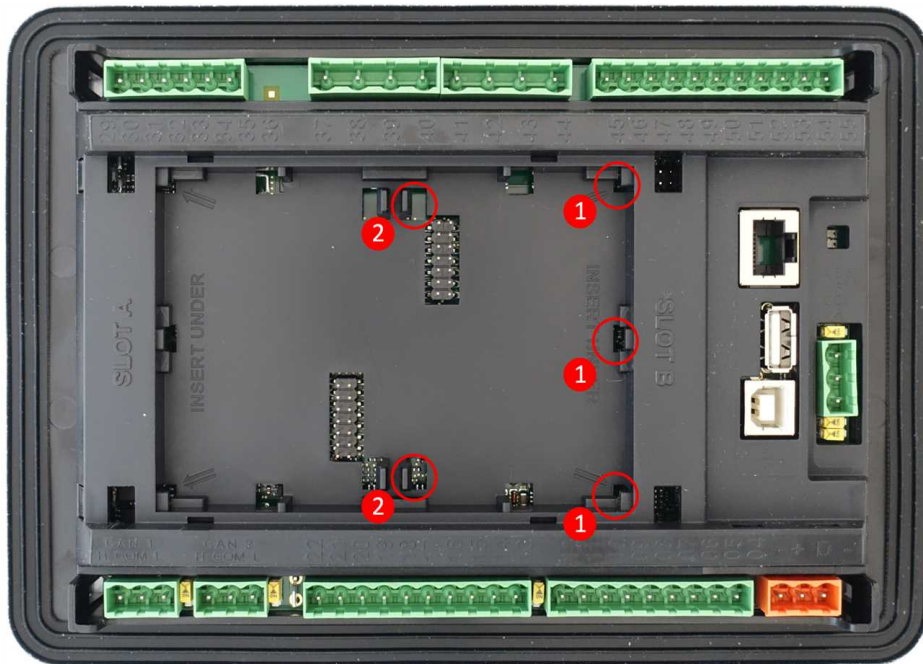
### 4.5.1 Installation

Remove the back cover. To do this, press four holders which are located in corners.

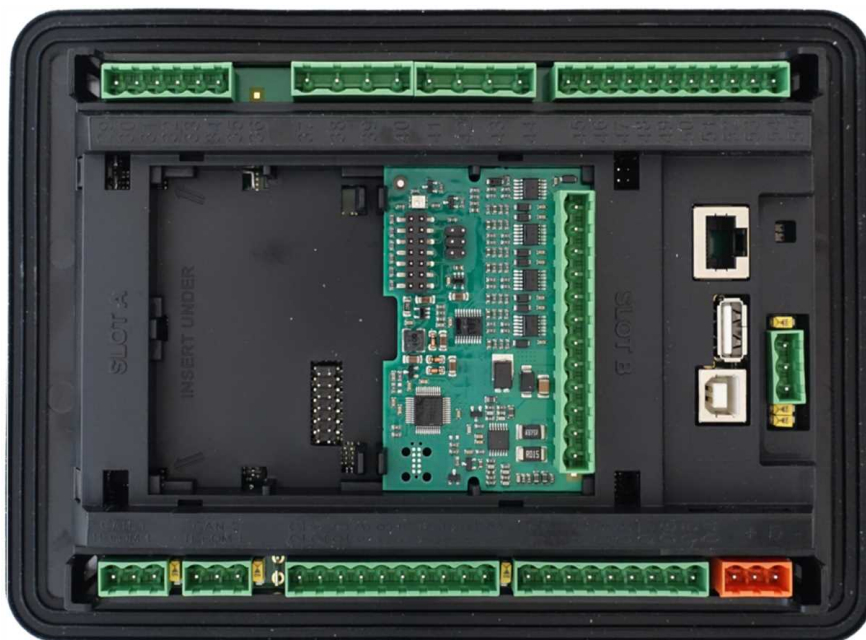




After removing back cover insert the plug-in module. Plug-in module has to be inserted under holders. Start with holders marked by symbol 1. On the controller are also arrows for better navigation. After inserting plug-in module under holders 1 press it down to holders marked by symbol 2 which locks the module.



Insert the plug-in module under holders marked by symbol 1.



After locking the plug-in module into holders, place back the back cover (small cover for connectors has to be removed from back cover). Finally insert the small cover for connectors. Small covers are unique for each plug-in module.

## 4.6 Maintenance

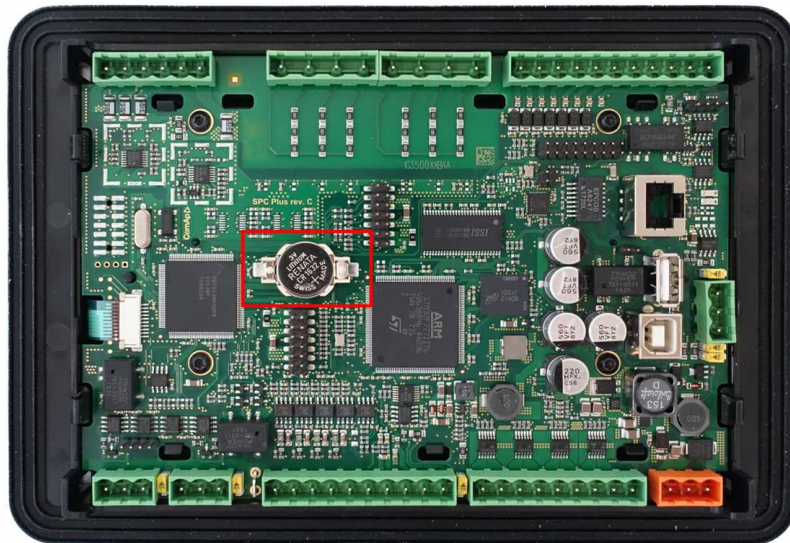
### 4.6.1 Backup battery replacement

The internal backup battery lifetime is approx. 6 years. If replacement of backup batter is needed, follow these instructions:

- ▶ Connect the controller to a PC and save an archive for backup purposes (not necessary but recommended).
- ▶ Disconnect all terminals from the controller and remove the controller from the switchboard.
- ▶ Remove the back cover and all plug-in modules.
- ▶ Release the rear cover using a flat screwdriver or another suitable tool.



- ▶ The battery is located in a holder on the circuit board. Remove the old battery with a small sharp screwdriver and push with a finger the new battery into the holder.



- ▶ Put the rear cover back. Use slight pressure to lock the snaps into the housing. Pay attention that the cover is in correct position and not upside down!
- ▶ Put back the plugin modules and back cover.
- ▶ Power the controller on, adjust date and time and check all setpoints.

🔍 **back to Installation and wiring**

# 5 Controller setup

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| 5.2 Controller configuration and PC tools connection ..... | 54 |
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## 5.1 Default configuration

### 5.1.1 Default configuration

#### Binary inputs

| Number      | Description                        | Configured function              |
|-------------|------------------------------------|----------------------------------|
| <b>BIN1</b> | Generator circuit breaker feedback | <b>GCB FEEDBACK (PAGE 668)</b>   |
| <b>BIN2</b> | Mains circuit breaker feedback     | <b>MCB FEEDBACK (PAGE 672)</b>   |
| <b>BIN3</b> | Emergency stop button              | <b>EMERGENCY STOP (PAGE 665)</b> |
| <b>BIN4</b> | Access lock keyswitch              | <b>ACCESS LOCK (PAGE 615)</b>    |
| <b>BIN5</b> | Switch controller to OFF mode      | <b>REMOTE OFF (PAGE 676)</b>     |
| <b>BIN6</b> | Switch controller to TEST mode     | <b>REMOTE TEST (PAGE 678)</b>    |
| <b>BIN7</b> | Suppression of alarms              | <b>SD OVERRIDE (PAGE 680)</b>    |
| <b>BIN8</b> | Free slot                          | <b>NOT USED (PAGE 673)</b>       |

#### Binary outputs

| Number       | Description                            | Function                         |
|--------------|--|----------------------------------|
| <b>BOUT1</b> | Starter motor control                  | <b>STARTER (PAGE 737)</b>        |
| <b>BOUT2</b> | Fuel solenoid valve                    | <b>FUEL SOLENOID (PAGE 715)</b>  |
| <b>BOUT3</b> | Indication of breaker state            | <b>GCB CLOSE/OPEN (PAGE 716)</b> |
| <b>BOUT4</b> | Indication of breaker state            | <b>MCB CLOSE/OPEN (PAGE 726)</b> |
| <b>BOUT5</b> | Activation of any devices before start | <b>PRESTART (PAGE 732)</b>       |
| <b>BOUT6</b> | Gen-set can be connected to load       | <b>READY TO LOAD (PAGE 734)</b>  |
| <b>BOUT7</b> | Indication of unconfirmed alarm        | <b>ALARM (PAGE 695)</b>          |
| <b>BOUT8</b> | Free slot                              | <b>NOT USED (PAGE 731)</b>       |

#### Analog inputs

| Number      | Configured sensor | Function                       |
|-------------|-------------------|--------------------------------|
| <b>AIN1</b> | VDO 10 Bar        | <b>OIL PRESSURE (PAGE 774)</b> |
| <b>AIN2</b> | VDO40-120°C       | <b>COOLANT TEMP (PAGE 771)</b> |

|             |            |                              |
|-------------|------------|------------------------------|
| <b>AIN3</b> | VDOLevel % | <b>FUEL LEVEL (PAGE 772)</b> |
| <b>AIN4</b> | None       | <b>NOT USED (PAGE 773)</b>   |

## 5.2 Controller configuration and PC tools connection

|                         |    |
|-------------------------|----|
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### 🔍 back to Controller setup

This chapter contains brief introduction into the specifics of firmware and archive upload and connection of various PC tools to the controller. If you require detailed information on each PC tool please use the included Help in those PC tools or download their Reference Guides.

### 5.2.1 USB

You may connect to the controller using the USB port. In this case standard USB A to B cable should be used.

#### Connection using IntelliConfig

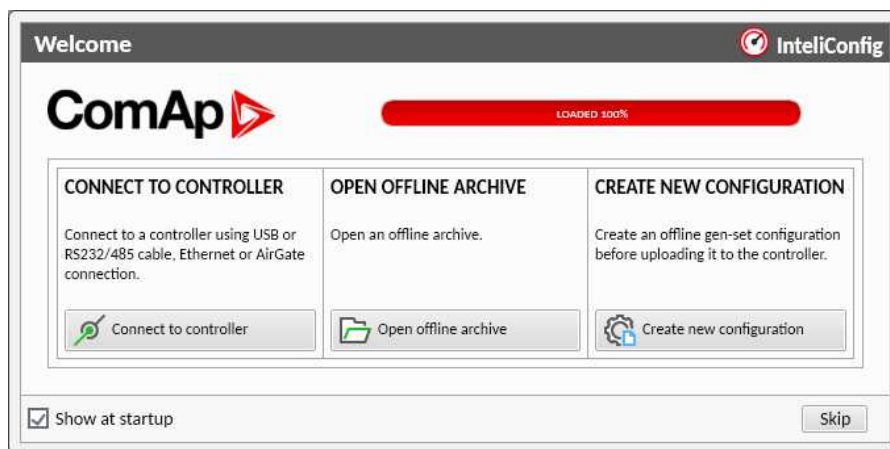


Image 5.1 First screen of IntelliConfig - select connect to controller



Image 5.2 Second screen of IntelliConfig - select detected controllers

## Connection using WinScope

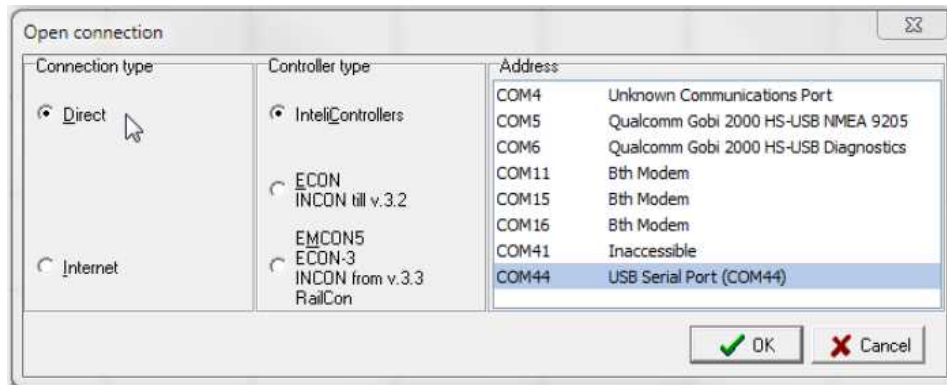


Image 5.3 WinScope screen - select direct connection

### 5.2.2 RS232/RS485

It is possible to connect to the controller using RS232 or RS485 direct connection (serial port or USB to RS232/RS485 converter may be used). The following settings need to be checked in the controller:

- ▶ **COM1 Mode (page 466)** = Direct
- ▶ **Controller Address (page 252)** has to be set to the same value as in the PC tool

## Connection using InteliConfig

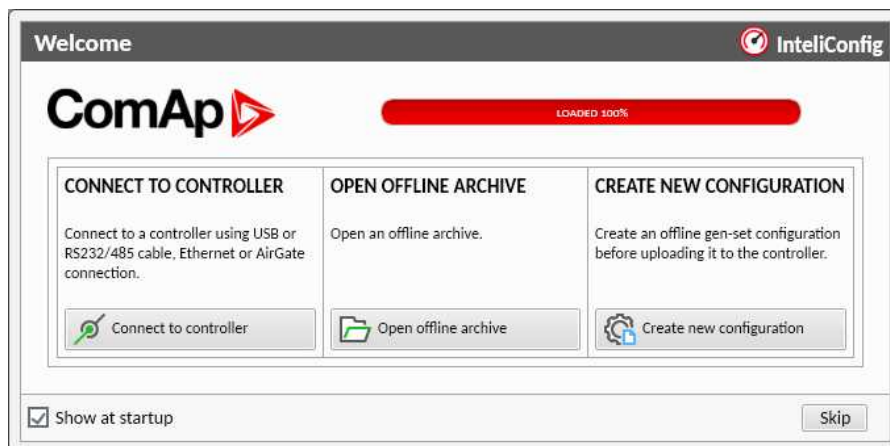


Image 5.4 First screen of InteliConfig - select connect to controller

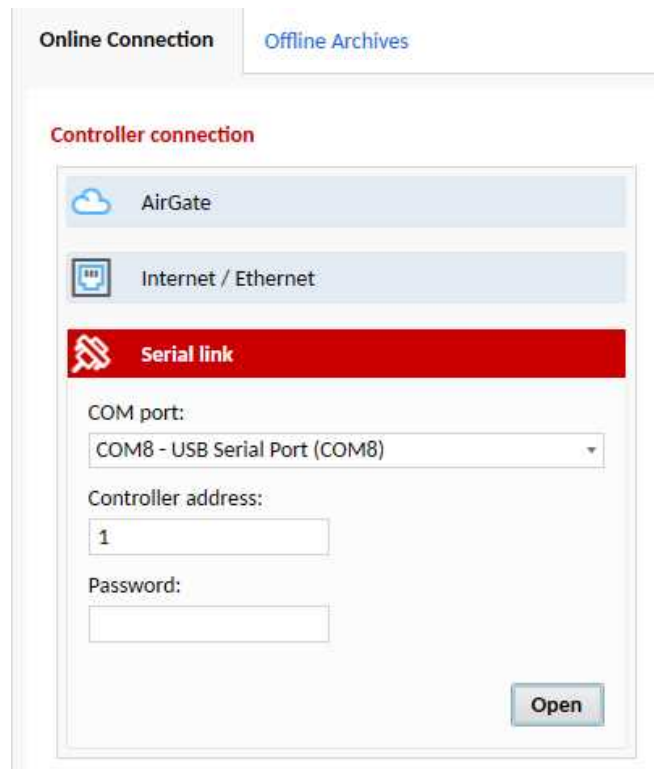


Image 5.5 Second screen of IntelIconfig - select Serial link

## Connection using WinScope

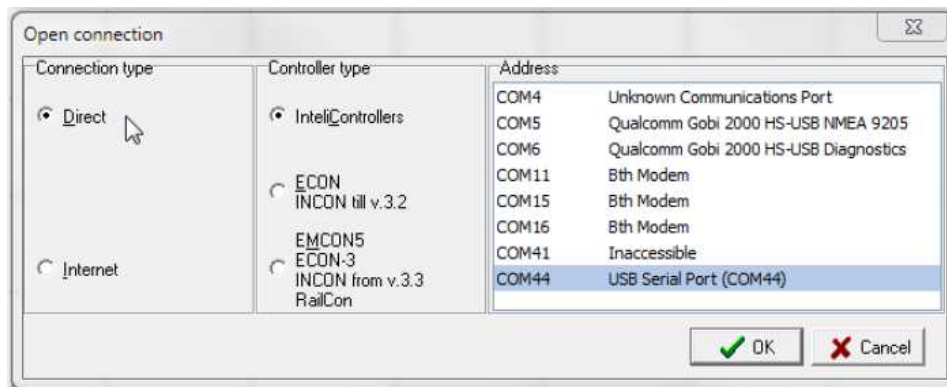


Image 5.6 WinScope screen - select direct connection

**Note:** Winscope supports only 19200, 38400, 57600 speeds.

### 5.2.3 Ethernet

It is possible to connect to the controller using ethernet port.

#### Direct connection

When you use direct connection the controller needs to be reachable directly from the PC you use (i.e. one LAN or WAN without any firewalls and other points that may not allow the connection). The following settings need to be checked in the controller:



- ▶ **Controller Address (page 252)** has to be set to the same value as in the PC tool.
- ▶ **IP Address Mode (page 255)** can be set to AUTOMATIC when there is DHCP service is available. Otherwise it needs to be set to FIXED.
- ▶ **IP Address (page 256)** is either set automatically or it can be adjusted to a specific requested value.
- ▶ **Subnet Mask (page 256)** is either set automatically or it can be adjusted to a specific requested.
- ▶ **Gateway IP (page 257)** can be set here when it is used.

## Connection using IntelliConfig

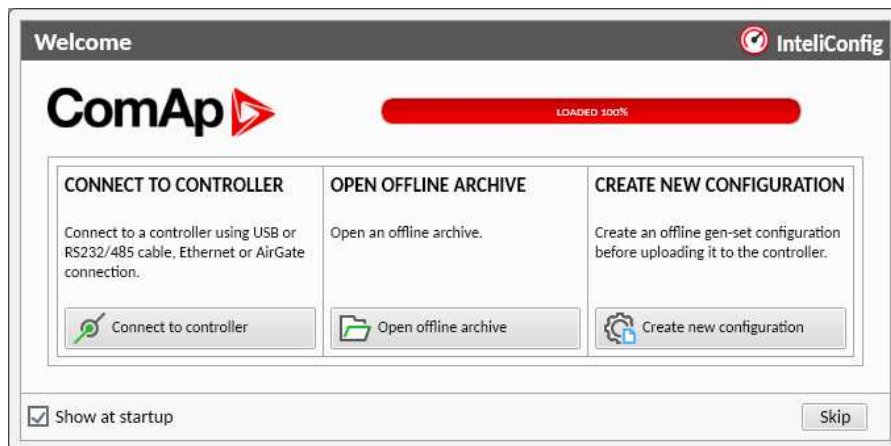


Image 5.7 First screen of IntelliConfig - select connect to controller

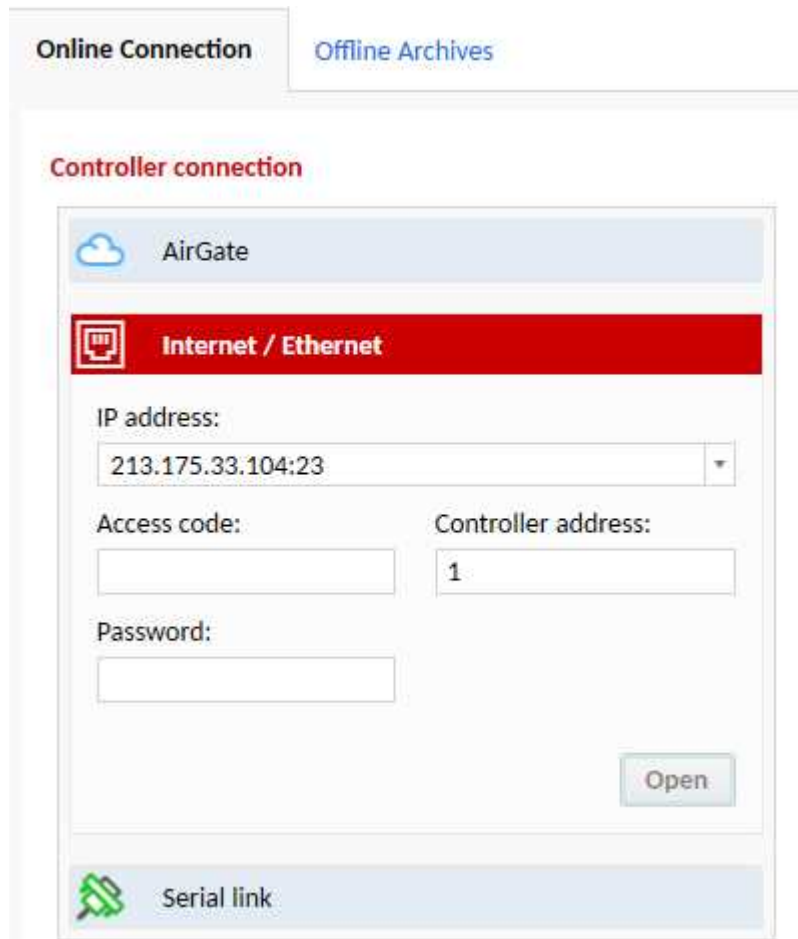


Image 5.8 Second screen of IntelGenConfig - select Internet/Ethernet

### Connection using WinScope

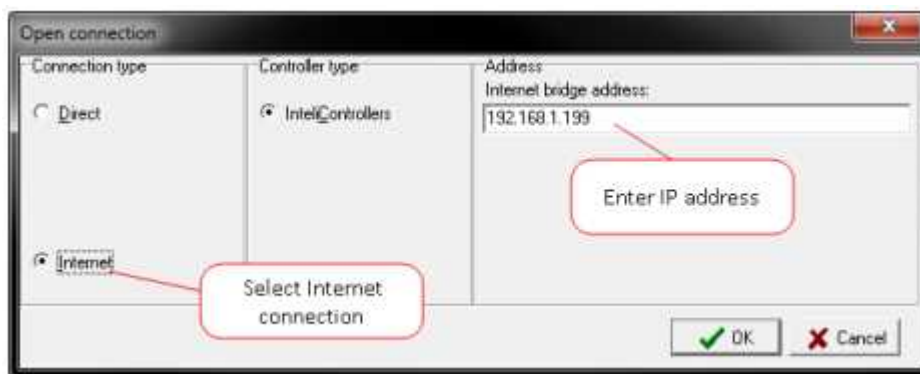


Image 5.9 WinScope screen

### AirGate connection

You can use ComAp's AirGate service that allows you to connect to any controller via internet no matter what are the restrictions of the local network (if the controller can connect to the internet AirGate service will work). The following setpoints have to be adjusted:



- ▶ **Controller Address (page 252)** has to be set to the same value as in the PC tool.
- ▶ **IP Address Mode (page 255)** can be set to AUTOMATIC when there is DHCP service is available. Otherwise it needs to be set to FIXED.
- ▶ **IP Address (page 256)** is either set automatically or it can be adjusted to a specific requested value.
- ▶ **Subnet Mask (page 256)** is either set automatically or it can be adjusted to a specific requested.
- ▶ **Gateway IP (page 257)** can be set here when it is used.
- ▶ **AirGate Connection (page 259)** has to be set to Enabled.
- ▶ **AirGate Address (page 260)** currently there is one AirGate server running at URL airgate.comap.cz (enter this URL into the setpoint).

## Connection using IntelliConfig

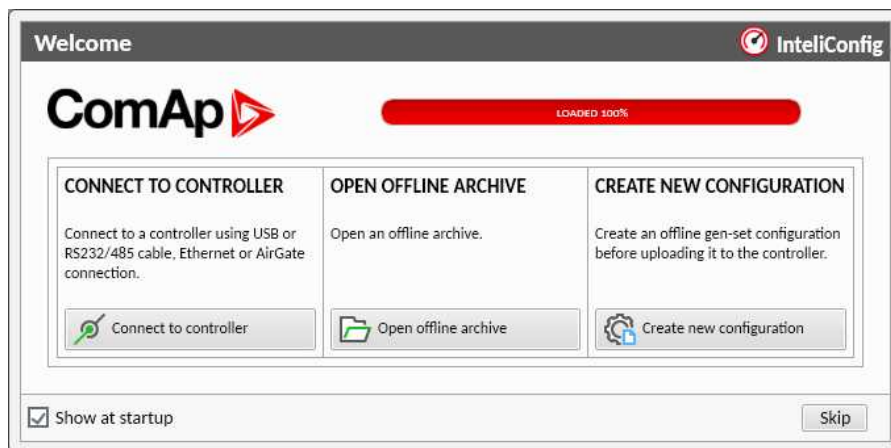


Image 5.10 First screen of IntelliConfig - select connect to controller



Image 5.11 Second screen of IntelConfig - select AirGate

### Connection using WinScope

WinScope doesn't support connection via AirGate.



## 5.3 Functions

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 **back to Controller setup**

## 5.3.1 Operating Modes

Selecting the operating mode is done through Left  and Right  buttons on the front panel or by changing the **Controller mode (page 249)** setpoint (from the front panel or remotely).

**Note:** *If this setpoint is configured as password-protected, the correct password must be entered prior to attempting to change the mode.*





**Note:** *The mode cannot be changed if Access Lock input is active.*

The following binary inputs can be used to force one respective operating mode independent of the mode setpoint selection:





- ▶ **Remote OFF (page 676)**
- ▶ **Remote TEST (page 678)**
- ▶ **Remote MAN (page 675)**
- ▶ **Remote AUTO (page 675)**

If the respective input is active the controller will change the mode to the respective position according to the active input. If multiple inputs are active, the mode will be changed according to priorities of the inputs. The priorities match the order in the list above. If all inputs are deactivated, the mode will return to the original position given by the setpoint.

## OFF

No start of the gen-set is possible. If the gen-set is running, it is not possible to switch directly to OFF mode. First you have to stop the engine. After that the controller will stay in Not ready status and cannot be started any way. The MCB is closed permanently (**MCB Opens On (page 325) = GenRun**) or is open or closed according to whether the mains is present or not (**MCB Opens On (page 325) = MainsFail**). No AMF or Power management function will be performed. The buttons MCB , GCB , Start  and Stop  including the appropriate binary inputs for external buttons are not active.

**Note:** When engine is running, it is not possible to switch gen-set to OFF mode

No system start activation is possible. If mains is healthy and MCB is opened, then is MCB tried to close after the delay given by setpoint MCB Close Delay. In case of mains fail and option MCB Open On - Mains Fail is chosen then is MCB tried to open. In MGCB application is MGCB opened in case is closed. No AMF or Power management function will be performed. The buttons MCB , GCB , Start  and Stop  including the appropriate binary inputs for external buttons are not active.

## MAN

The engine can be started and stopped manually using the START and STOP buttons (or external buttons wired to the appropriate binary inputs) in MAN mode.

When the engine is running and generator parameters are in the limits, GCB can be closed to a dead bus or synchronization can be started by the GCB button.

Also MCB can be closed and opened manually using the MCB button, regardless of whether the mains are present or not.

Controller does not respond to external signals and/or conditions. The gen-set is fully in manual control; there is no automatic way to stop it (except protections). The gen-set stays running until STOP button is pressed. Controller does not take place in **Power management (page 79)** in MINT application.

In MAN mode can be the system started by pressing the START button or by activating binary input Start Button. If there is present Gen-set controller, their system start/stop is activated/deactivated via internal communication line. In case of MCB application can be controlled only the MCB breaker by pressing the MCB button or by activating the binary input MCB Button. In case of MGCB application the control of MCB breaker and MGCB breaker is depending on the setting of Setpoint CB Control In MAN Mode. MGCB breaker can be controlled also by pressing the MGCB button or by activating the binary input MGCB Button.

## AUTO

Gen-set is controlled based on external signal (**REMOTE START/STOP (PAGE 677)**) or by conditions (AMF, Power management system, ...).

When one condition deactivates the engine does not stop if another condition for automatic starts is active.

The controller does not respond to buttons Start , Stop , MCB ON/OFF  and GCB ON/OFF .

**IMPORTANT: If a red alarm is present and the gen-set is in AUT mode, it can start by itself after all red alarms become inactive and are acknowledged!!! To avoid this situation, adjust the setpoint Reset To Manual (page 250) to the Enabled position.**

System activation is based on external signal (REMOTE START/STOP (PAGE 677) ) or by conditions (AMF, Power management system, ...).

When one condition deactivates will not be deactivated if another condition for automatic starts is active.

The controller does not respond to buttons Start , Stop , MCB ON/OFF  and MGCB ON/OFF .

## TEST

The behavior of the controller in TEST mode depends mainly on the setting of the setpoints and binary inputs. TEST mode can be activated via front panel of controller or via binary input REMOTE TEST (PAGE 678).

The gen-set will be started when the controller is put to TEST mode and will remain running unloaded. If a mains failure occurs, the MCB will be opened and after Open Transfer Min Break (page 350) the GCB will be closed and the gen-set will supply the load. After the mains have recovered, the delay Mains Return Delay (page 319) will count down and if it elapses and the mains is still ok, the controller will transfer the load back to the mains after Open Transfer Min Break (page 350) and the gen-set will remain running unloaded again until the mode is changed.

The controller does not respond to buttons Start , Stop , MCB ON/OFF  and GCB ON/OFF .

Behavior of TEST mode also depends on setpoints Transfer BusGen To Mains (page 352) and Transfer Mains To Gen Bus (page 351) and on binary inputs FORCE ISLAND (PAGE 666) and FORCE PARALLEL (PAGE 666).

The system start is activated when the controller is put in to TEST mode.

MCB application - system start is active, if Gen-sets will be started their GCB will be closed in to the parallel state.

MGCB application - system start is active, if Gen-sets will be started their GCB will be closed but MGCB stays opened.

If mains failure occurs, the MCB is opened and in MGCB application will be the MGCB breaker closed.

After the mains return, the back synchronisation is activated and system is transferred back to the TEST mode if the TEST request is still active.

The transfer is depending on the setting see Subgroup: Load Transfer on page 350.

## 5.3.2 Engine start

### Diesel engine

- ▶ After the command for start is issued (pressing Start button in MAN mode, auto start condition is fulfilled in AUTO mode or controller is switched to TEST mode), outputs PRESTART (PAGE 732) and GLOW PLUGS (PAGE 720) are energized for time period given by the setpoints Prestart Time (page 273) and Glow Plugs Time (page 275).
- ▶ After Prestart Time (page 273) and Glow Plugs Time (page 275), the output FUEL SOLENOID (PAGE 715) is energized and after Fuel Solenoid Lead (page 276) the starter of motor is activated by energizing the output STARTER (PAGE 737).

- ▶ When one or more of following conditions are met, the starter output is de-energized:
  - The engine speed exceeds the value of **Starting RPM (page 273)**, or
  - One of **Additional running engine indications (page 132)** signals becomes active.
- ▶ The controller remains in the Starting phase until the engine speed exceeds the value of **Starting RPM (page 273)**, after that it is considered as started and the Idle period will follow.
- ▶ The maximum duration that the output **STARTER (PAGE 737)** is energized is determined by the setpoint **Maximum Cranking Time (page 272)**. If the engine does not start within this period, the output **STARTER (PAGE 737)** is de-energized and a pause with length determined by **Cranking Fail Pause (page 272)** will follow. **PRESTART (PAGE 732)** and **GLOW PLUGS (PAGE 720)** outputs are active during the pause. After the pause has elapsed, the next start attempt is executed. The number of start attempts is given by the setpoint **Cranking Attempts (page 271)**.
- ▶ Once the engine is started, the Idle period follows. The binary output **IDLE/NOMINAL (PAGE 723)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 276)**.
- ▶ After the idle period has finished, the output **IDLE/NOMINAL (PAGE 723)** is activated and the start-up sequence is finished. The **Stabilization (page 68)** phase follows.

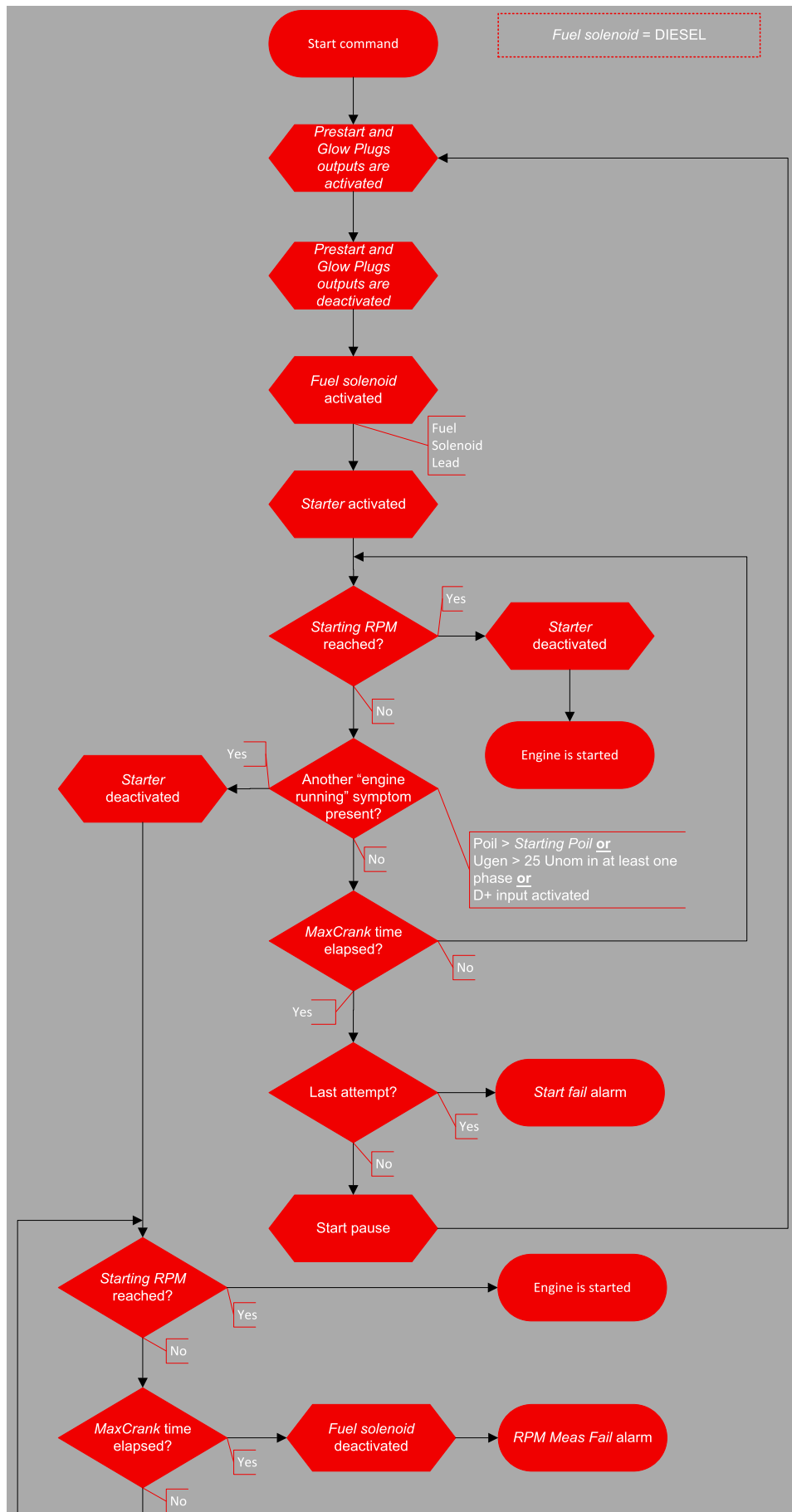


Image 5.12 Flowchart of start of diesel engine

## GAS engine

The setpoint **Fuel Solenoid (page 271)** has to be switched to the Gas position.

- ▶ After the command for start is issued (pressing Start button in MAN mode, auto start condition is fulfilled in AUTO mode or controller is switched to TEST mode), outputs **PRESTART (PAGE 732)** and **GLOW PLUGS (PAGE 720)** are energized for time period given by the setpoints **Prestart Time (page 273)** and **Glow Plugs Time (page 275)**.
- ▶ After **Prestart Time (page 273)** and **Glow Plugs Time (page 275)**, starts countdown of **Sd Ventilation Time (page 280)**
- ▶ After **Sd Ventilation Time (page 280)**, the starter of engine is activated by energizing the output **STARTER (PAGE 737)**.
- ▶ When the engine speed exceeds 30RPM, the outputs **FUEL SOLENOID (PAGE 715)** and **IGNITION (PAGE 723)** are energized.
- ▶ When the engine speed exceeds value of **Starting RPM (page 273)**, the starter of engine is de-energized, the engine is considered as started and the Idle period will follow.

**IMPORTANT: Additional running engine indications (page 132) signals are not evaluated during the start of a gas engine. The Pickup must be used in any case!**

- ▶ The maximum duration that the output **STARTER (PAGE 737)** is energized is determined by the setpoint **Maximum Cranking Time (page 272)**. If the engine does not start within this period, outputs **STARTER (PAGE 737)** and **FUEL SOLENOID (PAGE 715)** are de-energized and a pause with length determined by **Cranking Fail Pause (page 272)** will follow. **PRESTART (PAGE 732)**, **GLOW PLUGS (PAGE 720)** and **IGNITION (PAGE 723)** outputs are active during the pause. After the pause has elapsed, the next start attempt is executed. The number of start attempts is given by the setpoint **Cranking Attempts (page 271)**.
- ▶ Once the engine is started, the Idle period follows. The binary output **IDLE/NOMINAL (PAGE 723)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 276)**.
- ▶ After the idle period has finished, the output **IDLE/NOMINAL (PAGE 723)** is activated and the start-up sequence is finished. The **Stabilization (page 68)** phase follows.



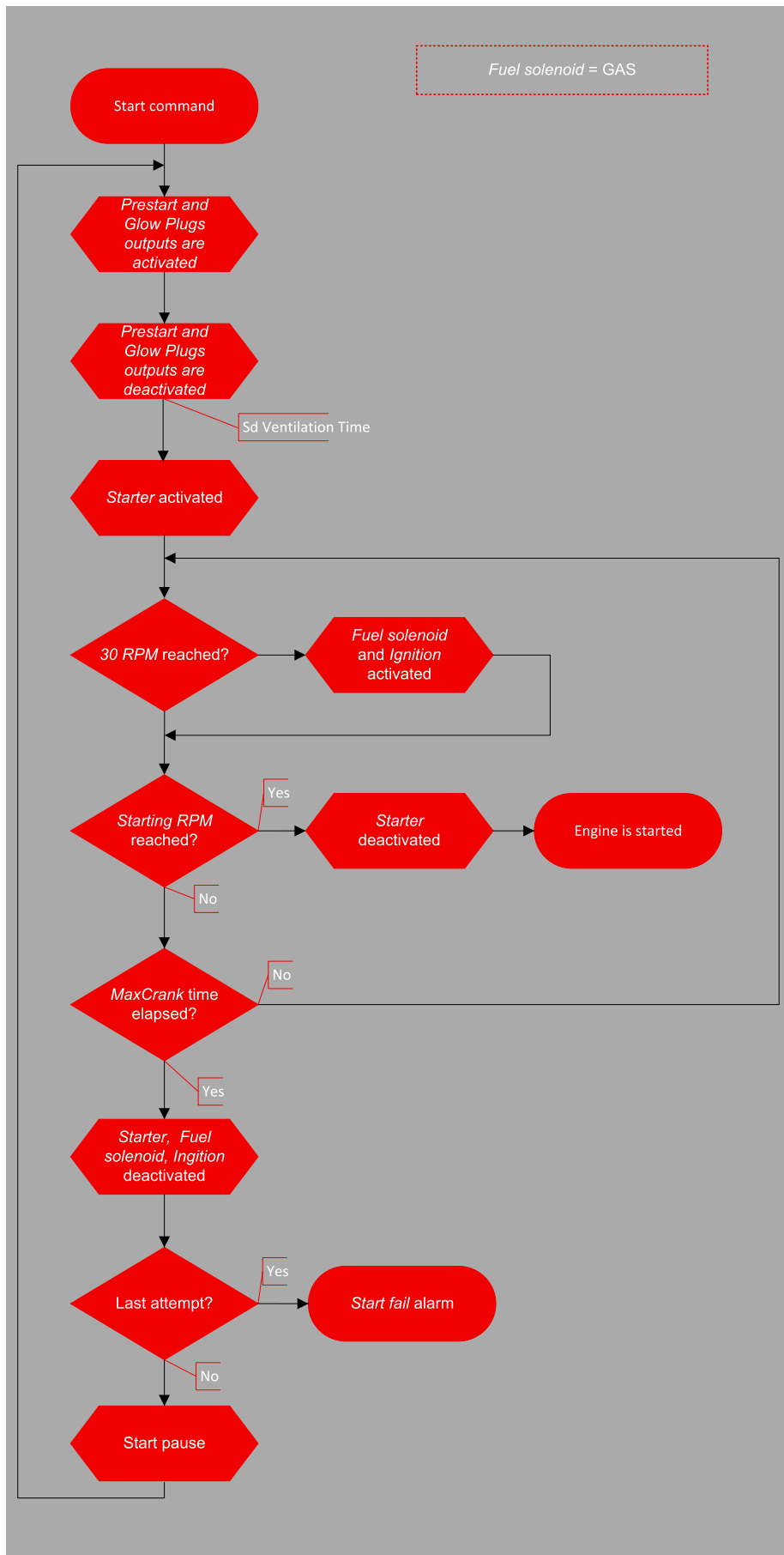


Image 5.13 Flowchart of start of gas engine

### 5.3.3 Stabilization

When the **Engine start (page 63)** sequence is finished, the gen-set goes into the stabilization phase. There are two timers (setpoints) in this phase:

- ▶ **Minimal Stabilization Time (page 278)** starts to count down just after the idle period has finished. Generator voltage and frequency are not checked (respective protections are not evaluated) and the GCB cannot be closed even if the generator voltage and frequency are within limits.
- ▶ **Maximal Stabilization Time (page 279)** starts to count down just after the idle period has finished. Generator voltage and frequency are not checked (respective protections are not evaluated) but, opposite to the previous timer, the GCB can be closed if generator voltage and frequency are within limits.

In situations where the GCB is closed automatically (AUTO, TEST modes), the closing of GCB or starting of synchronization will occur in the first moment when the generator voltage and frequency will get into limits and the **Minimal Stabilization Time (page 278)** has already elapsed.

In the event that the generator voltage or frequency are not within limits within the **Maximal Stabilization Time (page 279)** period, the appropriate protection(s) will be activated and the gen-set will be cooled down and stopped.

**Note:** The limits for the generator voltage and frequency are given by setpoints in the **Group: Generator settingsMains Settings (page 304)**.

**Note:** The value of the **Minimal Stabilization Time (page 278)** setpoint has to be lower than the value of **Maximal Stabilization Time (page 279)** setpoint.

### 5.3.4 Connecting to load

When the **Stabilization (page 68)** phase is finished, the gen-set can be connected to the load.

The command for connecting the gen-set to the load is issued either automatically (AUTO, TEST modes) or manually by pressing the GCB button. The following conditions must be valid:

- ▶ The gen-set is running and the **Minimal Stabilization Time (page 278)** timer has elapsed.
- ▶ The gen-set voltage and frequency are within limits.

**Note:** The speed governor and AVR must be adjusted properly to achieve these limits as the controller does not perform any regulation and the regulation outputs have constant values given by the **Voltage Regulator Bias (page 354)** and **Speed Governor Bias (page 346)** setpoints.

There are two ways to connect the gen-set to the load (bus bar). This depends on the state of **MCB FEEDBACK (PAGE 672)** and on the measured mains/bus voltage.

#### Connecting to dead bus

##### SPtM

If the MCB is open, the bus bar is considered as voltage-free and the GCB is closed without synchronization.

##### MINT

The measured bus voltage is also taken in account and it must be below 2% of the nominal bus voltage together with the open MCB (evaluated by **MCB Feedback (page 672)**) and also others GCB have to be open to close the GCB without synchronization.

**Note:** If the group of gen-sets is activated and multiple gen-sets have to start simultaneously and connect to the empty bus bar, there is an internal logic to prevent closing of more GCBs to the bus bar at the same moment without synchronization. One of the gen-sets will close the GCB, the others will wait and then they will synchronize to the first one.

**Note:** There also is a protection of “Bus power loss sensing”. The “Bus Measure Error” is detected in MINT application when the voltage on the controller’s bus terminals is out of limits 20 seconds after:

- ▶ GCB (own) was closed in MAN or AUT mode
- ▶ MCB (feedback) was closed in AUT mode
- ▶ Any other GCB in power management group (on CAN bus) was closed.

The alarm is activated after 20s. However, the GCB (own) closing is blocked immediately for safety reasons. This protection can avoid e.g. potential direct closing of GCB while the controller’s bus conductors are unintentionally unplugged from the terminals.

## Synchronization

### Synchronization process

Behavior of synchronization process depends on, which breaker is used for synchronization and in which **Controller mode (page 249)** is controller switched.

**Note:** When the controller starts to synchronize and the main measuring screen is displayed, it will be automatically change to the synchroscope screen for the entire duration of synchronization. After synchronization the synchroscope screen is automatically changed back to the main measuring screen. It is also possible to change screens manually (arrows up and down) after displaying the synchroscope screen. In this case there is no automatic return to the main measuring screen after synchronization is finished.

### Synchronization via GCB in AUTO mode

Gen-set synchronization to the mains (common bus bar) via GCB (available for SPtM and MINT):

- ▶ if the mains (bus) voltage or the mains (bus) frequency gets out of the limits then the synchronization continues until the mains fail is confirmed. Then:
  - In SPtM - MCB is opened and GCB is closed.
  - In MINT - Bus measurement error alarm is issued and controller goes to slow stop.
- ▶ if the gen-set voltage or frequency gets out of the limits during the synchronization the synchronization process is interrupted. The synchronization starts again when gen-set parameters gets restored. the synchronization timeout starts count down again.
- ▶ If the synchronization timeout gets elapsed the slow stop protection gets active.

### Synchronization via GCB in MAN mode

Gen-set synchronization to the mains (common bus bar) via GCB (available for SPtM and MINT):

- ▶ Behavior is exactly the same as in AUTO mode - but the synchronization does not start again automatically when parameters of the gen-set gets out of limits and back. The breaker control button must be pressed again.
- ▶ When the GCB button is pressed during the synchronization, then the synchronization process is interrupted.

### Synchronization via MCB in AUTO mode

Gen-set synchronization to the mains (common bus bar) via MCB (available only for SPtM):

- ▶ if the mains (bus) voltage or the Mains frequency gets out of the limits during synchronization, then the synchronization process is interrupted and can continue again when mains parameters gets restored after **Mains Return Delay (page 319)**.
- ▶ if the gen-set voltage or frequency gets out of the limits during the synchronization, the synchronization process continues until the generator parameters fail is confirmed.
- ▶ If the synchronization timeout gets elapsed the **Wrn Reverse Synchro Fail (page 810)** protection gets active and GCB stays closed. Synchronization is stopped.

### Synchronization via MCB in MAN mode

Gen-set synchronization to the mains (common bus bar) via MCB (available only for SPtM):

- ▶ Behavior is exactly the same as in AUTO mode - but the synchronization does not start again automatically when parameters of the mains gets out of limits and back. The breaker control button must be pressed again.
- ▶ When the MCB button is pressed during the synchronization, then the synchronization process is interrupted.

### Synchronization types

There are two types of synchronization. Type of synchronization is adjusted via setpoint **Synchronization Type (page 358)**.

#### Phase match

The phase match synchronization consists of voltage matching and frequency/angle matching. The maximum duration of synchronization is given by the setpoint **Synchronization Timeout (page 358)**. If the synchronization is not successful within this period of time, the **STP Synchronization Fail (page 837)** alarm will be issued.

#### Voltage matching

The gen-set bus voltage is regulated to match the mains/bus voltage with tolerance given by the setpoint **Voltage Window (page 359)**. The regulation is adjusted by the setpoints **Voltage Gain (page 356)** and **Voltage Int (page 356)**.

#### Frequency/angle matching

The gen-set bus frequency is regulated to match the mains/bus frequency first. The frequency regulation loop is active (setpoints **Frequency Gain (page 347)** and **Frequency Int (page 348)**). Once the frequency is matched, the regulation loop is switched to match the angle (setpoint **Angle Gain (page 348)**). When the angle is matched with tolerance +/- **Phase Window (page 359)** for a time given by the setpoint **Dwell Time (page 359)** and the voltage is matched too, then the GCB or MGCB is closed.

**Note:** *The matching loops will continue to run even if the GCB or MGCB close command has been already issued until the controller receives **GCB FEEDBACK (PAGE 668)** or **MGCB Feedback** or a **GCB or MGCB fail alarm** occurs. After the feedback has been received, the control loops are switched to load and power factor loops or load and power factor sharing respectively.*

#### Slip synchronization

The slip synchronizing is based on frequency/angle matching. The maximum duration of synchronizing is given by the setpoint **Synchronization Timeout (page 358)**. If the synchronizing is not successful within this period of time, the Sync Timeout alarm will be issued.

The Gen-set frequency is regulated to match the mains/bus frequency + **Slip Frequency (page 360)** value and the window is set by setpoint **Slip Frequency Window (page 360)**. When the generator frequency reaches

(Mains/Bus Frequency + Slip frequency) value regulation loop is stopped (output is frozen at the actual value). If the generator frequency remains inside the window for the time longer than setpoint **Dwell Time (page 359)** the controller will allow GCB closing. The controller calculates periodically so called preclosing angle (based on the actual value **Slip Frequency (page 570)** and CB closing delay given by the setpoint CB Latency). When the preclosing angle is reached the controller issues CB closing command. The breaker will close and CB feedback confirms that to the controller. When the breaker is closed the controller goes to parallel and activates regulation loops again (parallel to Mains regulation loop).

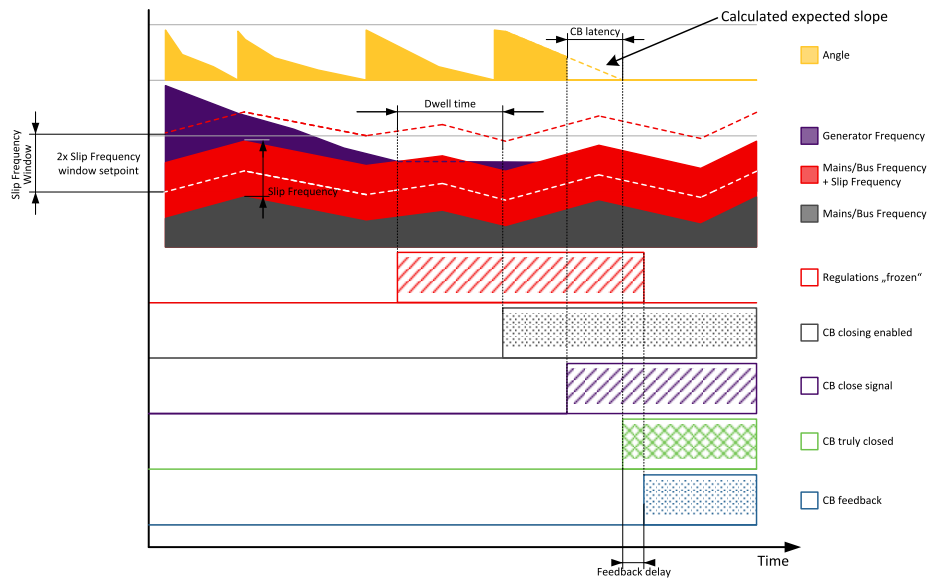


Image 5.14 Slip synchronization

If the generator frequency goes out of the window (either because generator frequency changes or Mains/Bus frequency changes or setpoint **Slip Frequency Window (page 360)** changes) the controller will reactivate regulation loop and try to reach the target value again. The sync timeout timer runs regardless of this. If the generator frequency reaches the target frequency again the regulations are frozen and if the generator frequency remains in the window for the time longer than setpoint **Dwell Time (page 359)** the controller will continue in the standard sequence as seen in the previous case. \*If the sync timeout elapses the controller will immediately stop synchronization.

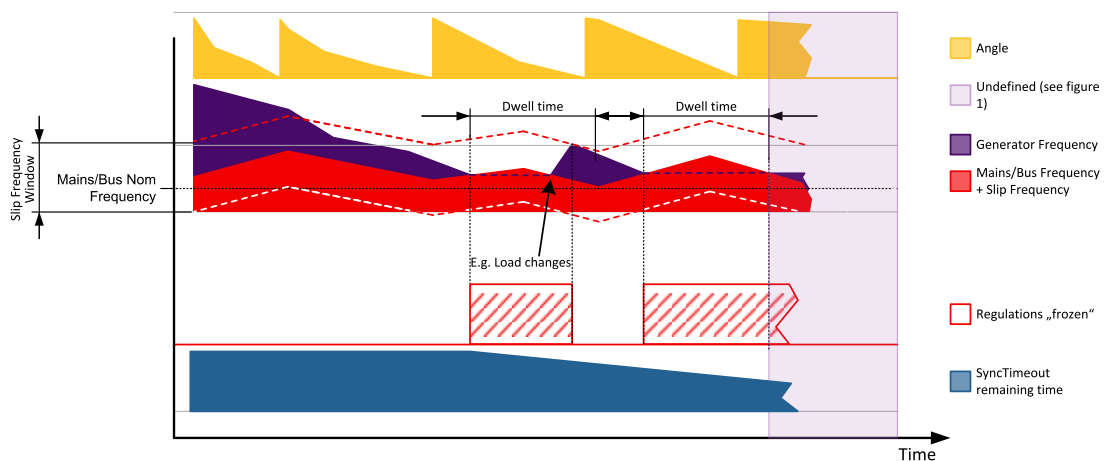


Image 5.15 Slip synchronization

The window is limited by the actual measured Mains/Bus frequency if one of the window limits is below this value (e.g. for setting where setpoint **Slip Frequency (page 570)** is set to 0.1Hz and setpoint **Slip Frequency Window (page 360)** is set to 0.5Hz).

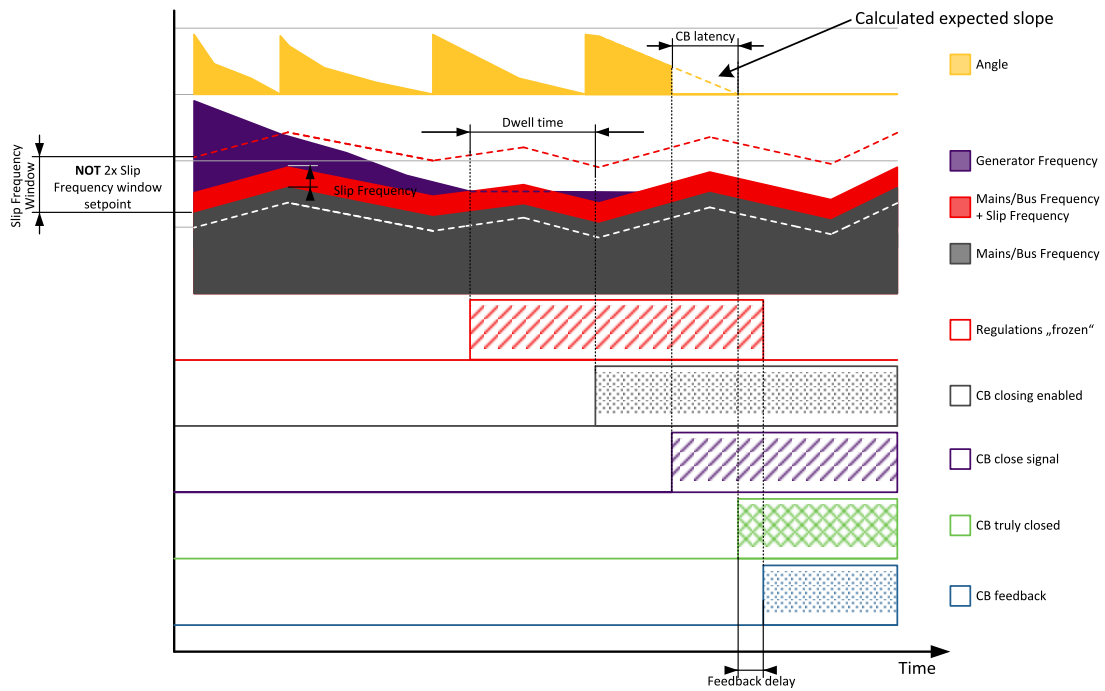


Image 5.16 Slip synchronization

Slip synchronization has a dead band. When the dead band is reached the frequency regulation is disabled. Once it is disabled it will be enabled again only when the frequency goes out of the slip frequency window. Dead band is introduced to allow the controller to detect the match.

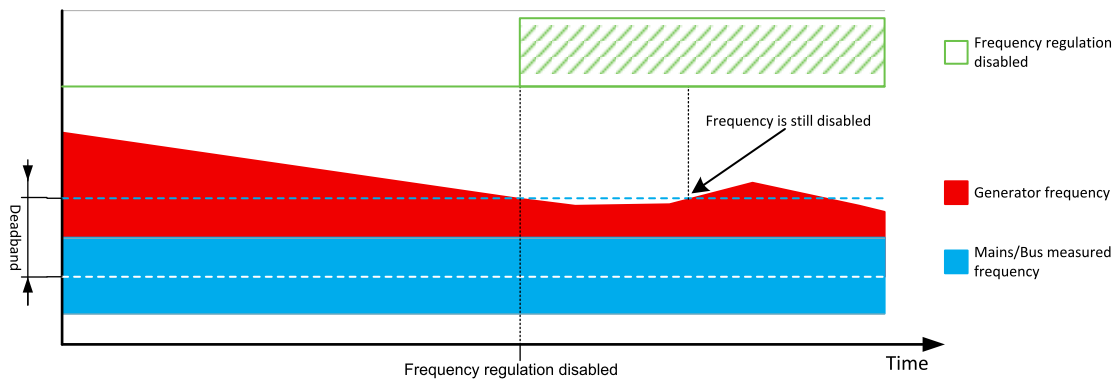
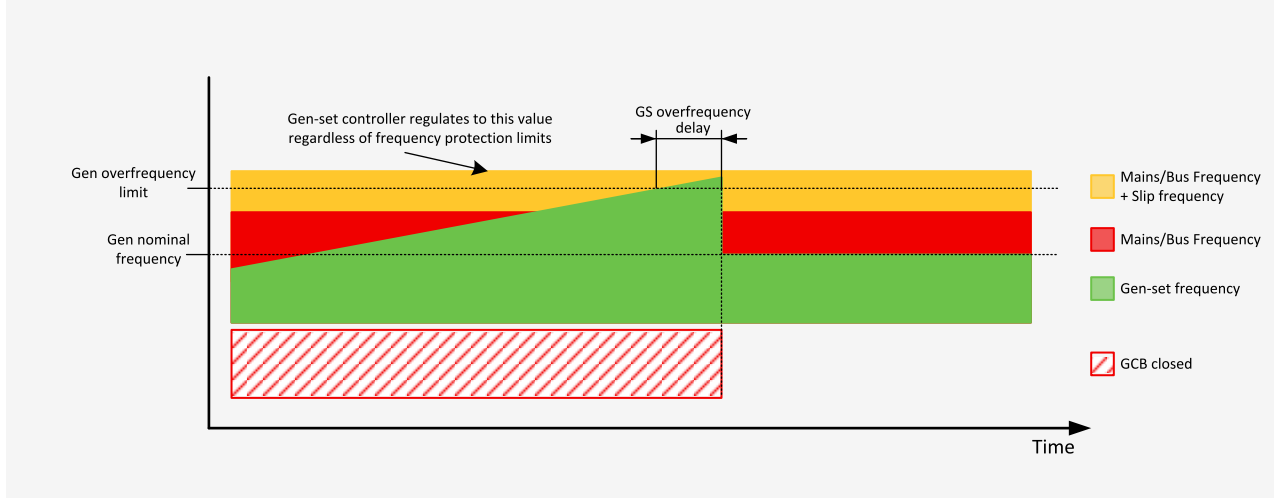


Image 5.17 Slip synchronization - deadband

**Note:** Due to the nature of this function it is possible that in limit cases the gen-set controller will regulate the generator frequency outside of protection limits. Example: Mains/Bus frequency is high but within its protection limits (e.g. 50.9Hz, limit is 51Hz). **Slip Frequency (page 360)** is set to 0.5Hz. This will cause regulation loop of the gen-set controller to push the gen-set frequency to 51.4Hz and eventually the controller will issue overfrequency delay. It is recommended to set the setpoint **Slip Frequency (page 360)** as low as possible that still enables successful synchronization. This minimizes the risk of this problem happening. Furthermore when slip synchronization is used it is recommended to set Mains/Bus Frequency protection limits to more rigid values than the generator frequency protection limits. In this case the setpoint **Slip Frequency (page 360)** can be set to 0.1Hz and the Mains/Bus Frequency overfrequency protection limit is set to 50.9Hz instead of 51Hz. This will ensure that problematic state cannot be reached.

**Note:**



### 5.3.5 Multiple island operation

This chapter describes the situation where multiple gen-sets are running parallel to each other but not with mains. This situation will occur either when:

- ▶ The common bus bar is dead due to opened MCB or there are no mains at all and the group of gen-sets has been activated, or
- ▶ The group was running parallel to mains and the MCB has been opened.

**IMPORTANT: The controller in MINT application does not control the MCB! Only the MCB position is evaluated from the binary input MCB FEEDBACK (PAGE 672) and the position is the basic source of information for switching between island and parallel to mains operation.**

If the bus bar is empty, the first gen-set will close its GCB without synchronization. Following gen-sets will synchronize to the already energized bus bar. In the event that multiple gen-sets start simultaneously and the bus bar is empty, the system will prevent closing of multiple GCBs to the bus bar without synchronization. Instead of this, one of the gen-sets will close the GCB and energize the bus bar and the others will wait and then synchronize to the bus bar.

When a stop command is received, e.g. from the power management or binary input **REMOTE START/STOP (PAGE 677)** is deactivated or the STOP button is pressed, the GCB will be opened and the gen-set will go to cool down phase.

Behavior of controllers is adjusted via **Power management (page 79)** settings. Please see this chapter for more information.

## 5.3.6 Parallel to mains operation - SPtM application

After the gen-set has been synchronized to the mains, the parallel to mains operation follows. It consists of the following phases:

### Ramping the power

#### Power up

The first phase of the parallel to mains operation is the ramping of the gen-set up to the desired power level. The speed of the ramp is given by the setpoint **Load Ramp (page 353)**. The setpoint adjusts the ramp time for a change from 0% to 100% of nominal power.

#### Power down

When a stop command is received the gen-set load is ramped down before opening the GCB. The ramp speed is given by the setpoint **Load Ramp (page 353)** and the end level is given by **Unload MGCB Open Level Generator Unload GCB Open Level (page 352)**.

When the GCB button is pressed, the gen-set load is ramped down before opening the GCB as well. But after the GCB has been opened, the gen-set remains running until a stop command comes or the GCB is pressed again to reclose the GCB.

### Load control

Load control ensures that the gen-set keep the certain load in parallel to mains operation (**MCB Feedback (page 672)** and **GCB Feedback (page 668)** = active).

There are available two modes of load control. Type of control is adjusted via setpoint **Load Control PTM (page 230)**.

**Note:** In both modes, the lower level of the power is always limited by the setpoint **Minimal Power PTM (page 305)**. If the requested load (given by the active load control mode, e.g. *Baseload, Import/Export*) is below this limit the requested load is limited to the level adjusted by this setpoint.

#### Baseload

**Load Control PTM (page 230)** = Baseload. Genset produces amount of the power given by setpoint **Baseload (page 233)**. The rest of power is supplied from the mains or exported to the mains (depends on proportions of load and **Baseload (page 233)** setpoint). Even in baseload control mode can be the Import/Export limited. This function can be activated by setpoint **Import/Export Limitation (page 235)** = Enabled. Then the request for the power of the genset operating in baseload can be limited to prevent the Import/Export go below the limit given by setpoint **Import Load (page 234)**.

**Example:** Baseload = 1000 kW, load = 700 kW, Import load = 100 kW. Then the Baseload request will be limited to 600 kW to prevent the Import power go below 100 kW.

**Example:** Baseload = 1000 kW, load = 700 kW, Import load = -100 kW. Then the Baseload request will be limited to 800 kW to prevent the Import power go below -100 kW (actually it is limitation of the export).

#### Import/Export

**Load Control PTM (page 230)** = Imp/Exp. Gen-set produces the certain amount of power to keep constant import/export from the mains regardless the demand of the load. The requested import/export is given by setpoint **Import Load (page 234)**. If the value of the setpoint is >0 the power is imported from the mains, if setpoint value is <0, then the power is exported to the mains.



## PF control

PF control ensures that the gen-set keep the certain reactive load in parallel to mains operation (**MCB Feedback (page 672)** and **GCB Feedback (page 668)** = active).

There are available two modes of PF control. Type of control is adjusted via setpoint **PF Control PTM (page 231)**.

### Base PF

The power factor on the gen-set is kept on the level given by the setpoint **Base Power Factor (page 233)** regardless the load demand. The rest of demanded reactive power is supplied from the mains. Values >1 means that capacitive reactive power is supposed to be imported from mains, values <1 means that inductive reactive power is imported from the mains.

### Import/Export

Gen-set produces the certain amount of reactive power to keep constant PF imported from the mains regardless the demand of the load. The requested power factor import is given by setpoint **Import PF (page 234)**. Values >1 means that the gen-set is pushing the capacitive power to the system (system Gen-set - Load- Mains) , values <1 means that the gen-set is pushing the inductive power to the system.

## Transfers of load

Type of transfer of load between mains and gen-set and vice versa is adjusted via setpoints **Transfer BusGen To Mains (page 352)** and **Transfer Mains To Gen Bus (page 351)**.

### Types of transfers

|                 |   |
|-----------------|---|
| Open            | Transfer of the load from generator to mains and vice versa without parallel work and synchronization (one breaker opens and second is closed - checking feedbacks). The setpoint <b>Open Transfer Min Break (page 350)</b> sets the minimal duration of break.   |
| Close Only      | Transfer of the load from generator to mains and vice versa with synchronization and parallel work. The maximal time of parallel work is given by setpoint <b>Close Transfer Max Duration (page 350)</b> .<br>In case of synchronization fail, MCB stays close and gen-set is stopped.  |
| Close Primarily | Transfer of the load from generator to mains and vice versa with synchronization and parallel work. The time of parallel work is given by setpoint <b>Close Transfer Max Duration (page 350)</b> .<br>In case of synchronization fail, open transfer is done.   |
| Soft Transfer   | Transfer of the load from generator to mains and vice versa with parallel work and soft loading/unloading of the gen-set. This function is proceeded like the closed transfer, but there is time limitation of loading/unloading of the gen-set adjusted via setpoint <b>Load Ramp (page 353)</b> . The transfer is succeed only when the gen-set is fully loaded/unloaded (level of load when mains is considered as unloaded - gen-set is loaded is adjusted via setpoint <b>Mains Unload MCB Open Window (page 353)</b> ), level of load when gen-set is considered as unloaded is adjusted via setpoint <b>Unload MGCB Open LevelGenerator Unload GCB Open Level (page 352)</b> . |

## Transfer of load in MAN mode

Behavior of transfer of load in MAN mode is adjusted via setpoint **CB Control In MAN Mode** (page 238). For details see the setpoint description.

## Transfer of load in AUTO mode

Behavior of transfer of load in AUTO mode is affected by binary inputs **FORCE ISLAND** (PAGE 666), **FORCE PARALLEL** (PAGE 666) and **REMOTE START/STOP** (PAGE 677).

When more binary inputs are activated at the same time, their priority is shown in the list below:

- ▶ **FORCE ISLAND** (PAGE 666) (highest priority).
- ▶ **REMOTE START/STOP** (PAGE 677).
- ▶ **FORCE PARALLEL** (PAGE 666) (lowest priority).

**Note:** AMF function has the highest priority (if it is enabled).

| Logical binary input                | AUTO mode   | TEST mode  |
|-------------------------------------|---|--|
| <b>FORCE ISLAND</b> (PAGE 666)      | <p>When activated:</p> <ul style="list-style-type: none"> <li>▶ starts gen-set</li> <li>▶ the transfer of load from mains to generator is done</li> </ul> <p>When deactivated:</p> <ul style="list-style-type: none"> <li>▶ the transfer of load from generator to mains is done</li> <li>▶ cooling and stopping of the gen-set</li> </ul>                                | <p>The gen-set is started anyway due to the TEST mode.</p> <p>When activated:</p> <ul style="list-style-type: none"> <li>▶ the transfer of load from mains to generator is done</li> </ul> <p>When deactivated:</p> <ul style="list-style-type: none"> <li>▶ the transfer of load from generator to mains is done</li> </ul>   |
| <b>REMOTE START/STOP</b> (PAGE 677) | <p>When activated:</p> <ul style="list-style-type: none"> <li>▶ starts gen-set</li> <li>▶ if mains parameters ok - synchronize, run in parallel</li> <li>▶ if mains parameters not ok - run in island</li> </ul> <p>When deactivated:</p> <ul style="list-style-type: none"> <li>▶ unloading (if gen-set was in parallel), cooling and stopping of the gen-set</li> </ul> | <p>The gen-set is started anyway due to the TEST mode.</p> <p>When activated:</p> <ul style="list-style-type: none"> <li>▶ if mains parameters ok - synchronize, run in parallel</li> </ul> <p>When deactivated:</p> <ul style="list-style-type: none"> <li>▶ unloading, of the gen-set, opening GCB</li> </ul>  |
| <b>FORCE PARALLEL</b> (PAGE 666)    | <p>When activated:</p> <ul style="list-style-type: none"> <li>▶ check mains parameters - if not ok no action, if ok the procedure follows</li> <li>▶ starts the gen-set, synchronize, parallel operation</li> <li>▶ in case of mains fail - gen-set is stopped (if AMF function is disabled, otherwise it goes to island operation)</li> </ul> <p>When deactivated:</p>   | <p>The gen-set is started anyway due to the TEST mode.</p> <p>When activated:</p> <ul style="list-style-type: none"> <li>▶ check mains parameters - if not ok no action, if ok the procedure follows</li> <li>▶ synchronize, parallel operation</li> </ul> <p>When deactivated:</p> <ul style="list-style-type: none"> <li>▶ unloading, of the gen-set, opening GCB</li> </ul> |

| Logical binary input | AUTO mode  | TEST mode |
|----------------------|--|-----------|
|                      | ▶ unloading, cooling and stopping of the gen-set |           |

Type of transfer of load between mains and gen-set and vice versa is adjusted via setpoints **Transfer BusGen To Mains (page 352)** and **Transfer Mains To Gen Bus (page 351)**.

### 5.3.7 Parallel to mains operation - MINT application

If the MCB is closed (**MCB FEEDBACK (PAGE 672)** is present) and the gen-set has been synchronized to the bus bar, the parallel to mains operation will follow. It consists of the following phases:

#### Ramping the power

##### Power up

The first phase of the parallel to mains operation is the ramping of the gen-set up to the desired power level derived from the **#System BaseLoad (page 235)** or up to the load given by load sharing with other gen-sets connected to the bus bar. The speed of the ramp is given by the setpoint **Load Ramp (page 353)**. The setpoint adjusts the ramp time for a change from 0% to 100% of nominal power.

##### Power down

When a stop command is received the gen-set load is ramped down before opening the GCB. The ramp speed is given by the setpoint **Load Ramp (page 353)** and the end level is given by **Unload MGCB Open LevelGenerator Unload GCB Open Level (page 352)**.

When the GCB button is pressed, the gen-set load is ramped down before opening the GCB as well. But after the GCB has been opened, the gen-set remains running until a stop command comes or the GCB is pressed again to reclose the GCB.

#### Load control

If **MCB FEEDBACK (PAGE 672)** is active (parallel to mains operation) the load of group of the gen-sets is controlled to reach the power defined by setpoint **#System BaseLoad (page 235)**. Each loaded gen-set takes equal part (relative to their nominal power) from **#System BaseLoad (page 235)** requested value. The load is regulated locally in each controller by load control regulation loop, load-sharing regulation loop is not active. The setpoint **#System BaseLoad (page 235)** is also used for determining which gen-sets have to run or not. Control is adjusted via setpoints **Load Gain (page 348)** and **Load Int (page 349)**.

#### PF control

If **MCB FEEDBACK (PAGE 672)** is active (parallel to mains operation) the value of PF (power factor) of group of the gen-sets is controlled to reach the PF defined by setpoint **#System Power Factor (page 236)**. The PF is regulated locally in each controller by PF control regulation loop, VAR-sharing regulation loop is not active. Control is adjusted via setpoints **PF Gain (page 356)** and **PF Int (page 357)**.

### 5.3.8 AMF operation

The “AMF function” represents the automatic start in the event that the mains have failed and stop after the mains have been restored. The automatic start can be enabled or disabled by binary inputs **AMF START BLOCK**

(PAGE 615) or MAINS FAIL BLOCK (PAGE 671).

**Note:** The AMF function works only in AUTO mode.

## Mains failure detection

The mains are considered as faulty when one or more of the following conditions are valid:

- ▶ The mains voltage is out of the limits given by the setpoints **Mains Undervoltage (page 321)** and **Mains Overvoltage (page 320)** for a time period longer than **Mains < > Voltage Delay (page 321)**.
- ▶ The mains frequency is out of the limits given by the setpoints **Mains Underfrequency (page 322)** and **Mains Overfrequency (page 322)** for a time period longer than **Mains < > Frequency Delay (page 323)**.
- ▶ The MCB close command was not successful and the alarm **Wrn MCB Fail (page 809)** was not reset.
- ▶ Phase rotation is incorrect.
- ▶ The mains import is higher than limit given by setpoints **Overload BOC (page 304)** for a time longer than **Overload Delay (page 304)**.
- ▶ The mains current is higher than limit given by setpoint **Short Circuit BOC (page 305)** for a time longer than **Short Circuit BOC MPR Delay (page 305)**.
- ▶ The IDMT protection is activated due to overcrossing the IDMT curve set by setpoints **IDMT Overcurrent Delay (page 306)**.

## Healthy mains detection

The mains are considered to be healthy when all of following conditions are valid:

- ▶ The mains voltage is within the limits given by the setpoints **Mains Undervoltage (page 321)** and **Mains Overvoltage (page 320)**.
- ▶ The mains frequency is within the limits given by the setpoints **Mains Underfrequency (page 322)** and **Mains Overfrequency (page 322)**.
- ▶ The alarm **Wrn MCB Fail (page 809)** is not active (if MCB feedback is active). This condition is not required if MCB is open (MCB feedback is inactive).
- ▶ Phase rotation is correct.

## The AMF procedure

When the mains failure is detected, the following steps are performed:

- ▶ If the setpoint **MCB Opens On (page 325)** is set to Mains Fail, the MCB is opened.
- ▶ The timer for automatic start of the gen-set **Emergency Start Delay (page 319)** begins to count down.
- ▶ After the timer has elapsed, the gen-set is started.

**Note:** The automatic start of the gen-set due to AMF function can be disabled by the binary inputs **AMF START BLOCK (PAGE 615)** or **MAINS FAIL BLOCK (PAGE 671)**.

- ▶ If the setpoint **MCB Opens On (page 325)** is set to Gen Run, the MCB is opened once the generator voltage is within limits (after **Minimal Stabilization Time (page 278)** elapses).

**Note:** If the mains are restored to health and the gen-set is still not connected to the load, the controller interrupts the startup process and closes back the MCB.

**Note:** Signal Gen Run is sent to IntelliMains controller through internal distributed signal.

- ▶ After **Open Transfer Min Break** (page 350) elapses, the GCB and MGCB (in case of MGCB application) is closed and the gen-set begins to supply the load.
- ▶ After the mains restored to normal, the timer **Mains Return Delay** (page 319) begins to count down.
- ▶ Transition of load back to mains is adjusted via setpoint **Transfer BusGen To Mains** (page 352). Behavior of transition is also affected by binary inputs **FORCE ISLAND** (PAGE 666), **FORCE PARALLEL** (PAGE 666) and **REMOTE START/STOP** (PAGE 677). See more in **Transfer of load in AUTO mode** (page 76) chapter.

**IMPORTANT: Controller has this behavior only in AUTO mode!**

### 5.3.9 Engine cool down and stop

The cool down phase follows after the stop command has been issued and the GCB has been opened.

- ▶ Duration of the cool down phase is determined by the setpoint **Cooling Time** (page 281).
- ▶ Cooling is performed either at nominal speed (generator voltage and frequency protections are evaluated) or at idle speed (generator voltage and frequency protections are not evaluated). Selection of the speed is done by the setpoint **Cooling Speed** (page 280).
- ▶ The cool down can be finished manually in MAN mode by pressing the STOP button.
- ▶ If a new start request comes, the cool down will be interrupted and the gen-set will go back to the stabilization phase. If the cooling was at nominal speed, the stabilization timers will not count down again so the GCB is ready to be closed (after 2 seconds delay).

When the cool down is finished, the output **FUEL SOLENOID** (PAGE 715) is de-energized and **STOP SOLENOID** (PAGE 738) is energized. The engine will stop within the time period determined by the setpoint **Stop Time** (page 281). If the engine does not stop within this time, the alarm **Wrn Stop Fail** (page 811) will be issued.

The output **STOP SOLENOID** (PAGE 738) is energized until the engine is stopped, but at least for the duration of **Stop Time** (page 281). If the **Stop Time** (page 281) has elapsed and the engine has still not stopped, the **STOP SOLENOID** (PAGE 738) is de-energized for 5 s and then energized again for **Stop Time** (page 281) and this repeats until the engine is stopped.

#### Stopped gen-set evaluation

The gen-set is considered as stopped when all of following conditions are valid:

- ▶ The engine speed is lower than 2 RPM.
- ▶ The generator voltage in all phases is lower than 10 V.
- ▶ None of **Additional running engine indications** (page 132) signals is active.

### 5.3.10 Power management

**IMPORTANT: Power management is relevant only for MINT application.**

**IMPORTANT: The gen-set will take part of the power management (= will be active) only if the controller is in AUTO mode!**

The Power management function decides how many gen-sets should run and selects particular gen-sets to run. The power management is applicable in cases multiple gen-sets run in parallel to mains or in the island operation. The function is based on the load evaluation in order to provide enough of available running power. Since it allows the system to start and stop gen-sets based on the load demand, it can vastly improve the system fuel efficiency. In other words, an additional gen-set starts when the load of the system raises above certain level. The additional gen-set stops, when the load of the system drops down below a certain level. The process of determining gen-set start and stop is done in each controller; there is no "master slave" system.

Therefore, the system is very robust and resistant to failures of any unit in the system. Each of the controllers can be switched off without influencing the whole system. Except the situation the respective gen-set is not available for the power management.

The power management evaluates so called load reserve. The load reserve is calculated as difference between actual load and nominal power of running gen-sets. The reserve is calculated as absolute value (in kW / kVA) or relatively to the nominal power of gen-set(s) (in %). The setpoint **#Power Management Mode (page 333)** is used to select the absolute or relative mode.

The automatic priority swapping function focuses on efficient run of gen-set in regards to running hours and gen-set size.

**IMPORTANT: The function of the controller is designed to handle the maximum sum of nominal power at 32000 kW (or 3200,0 with decimal number).**

**Example:** There are 20 gen-sets each with 1000 kW of nominal power. The sum of the nominal power is 20000 kW. Therefore the decimal power format in 0.1 kW cannot be used because the sum exceeds 32000. Therefore power format in kW needs to be chosen.

## Basic power management

The setpoint **Power Management (page 332)** enables and disables the gen-set to be active within the power management and makes automatic load dependent starts and stops. If the power management is disabled, the start and stop of the gen-set do not depend on the load of the group. If the gen-set remains in AUTO mode, the running condition depends only on the Logical binary inputs **REMOTE START/STOP (PAGE 677)**.

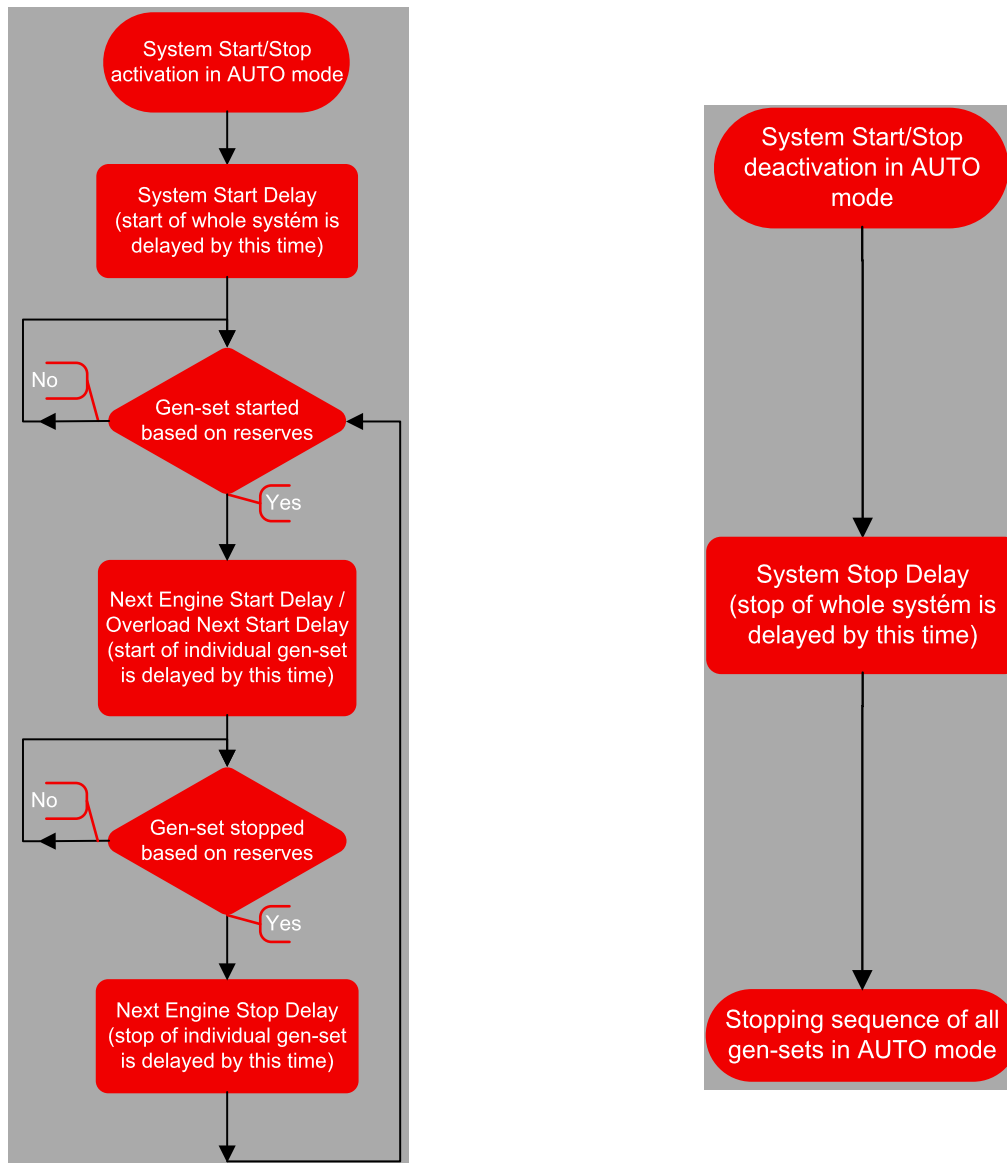
The Logical binary inputs **REMOTE START/STOP (PAGE 677)** requests the system to start or stop. If the input is not active, the system stops with delay **#System Stop Delay (page 335)** after the input has been deactivated and will not start again if in AUTO mode. If the input is activated again, the delay **#System Start Delay (page 334)** starts to count down. Once the delay elapsed, the system is activated and can be started by the power management. In other words, the power management is activated only if the Logical binary inputs **REMOTE START/STOP (PAGE 677)** is activated, the option of setpoint **Power Management (page 332) = ENABLED** and the AUTO mode is selected.

**Note:** The gen-set performs load and VAR sharing whenever it is connected to the bus bar i.e. it is independent on whether the controller is in AUTO or MAN mode or whether the power management is active or not.

Function of power management can be temporarily blocked after **REMOTE START/STOP (PAGE 677)** activation a count down of **#System Start Delay (page 334)**. The delay is given by setpoint **Power Management Delay (page 332)**. In this delay all gen-sets where power management is enabled are running. After this period elapses, only the gen-set(s) needed according to the Power Management calculation stay running and the rest is stopped.

## Principle of power management

Internal conditions based on remaining load reserves and priorities are evaluated once a delay is elapsed. If the load reserve is insufficient the gen-set is started after delay given by the setpoint **#Next Engine Start Delay (page 340)** is elapsed. Once the gen-set runs the controller evaluates stopping conditions based on load reserves and priorities. If the reserve is sufficient enough to stop a particular gen-set, it is stopped after delay given by the setpoint **#Next Engine Stop Delay (page 340)** is elapsed. All the time the system stop condition – i.e. the Logical binary inputs **REMOTE START/STOP (PAGE 677)** deactivated – is evaluated as well. Once the delay given by the setpoint **#System Stop Delay (page 335)** has elapsed all gen-sets in AUTO mode are stopped. Following figure depicts the system activation and deactivation logic.



Setpoint **#Overload Next Start Delay (page 341)** is used in case that **#Overload Next Start Protection (page 341)** is enabled and gen-sets are running at **#Overload Next Start Level (page 341)** or more of their nominal power.

## Load reserve

The power management is based on the load reserve concept. The load reserve is defined as a difference of the running nominal power of the group within power management and the total load of the system. There are two ways how to determine the load reserve. The absolute power management allows the system to keep the load reserve higher or equal to value in kW given by a relevant setpoint. The relative power management assures that load reserve is kept higher or equal to relative portion in % of the nominal power of group (i.e. running gen-sets active in power management) given by a relevant set-point. Depending of the situation, load reserves are calculated differently in two cases:

## Case #1

This case is used in island operation.

| Reserve     | Actual Reserve  | Start condition                  | Stop condition                  |
|-------------|---|----------------------------------|---------------------------------|
| Absolute kW | $AR_{strt} = \sum P_{g_{Nom}} - \sum P_{g_{Act}}$<br>$AR_{stp} = \sum P_{g_{Nom}}^* - \sum P_{g_{Act}}$   | $AR_{strt} <$<br>$\#LoadResStrt$ | $AR_{stp} >$<br>$\#LoadResStop$ |
| Relative %  | $RR_{strt} = [(\sum P_{g_{Nom}} - \sum P_{g_{Act}}) / \sum P_{g_{Nom}}] \cdot 100\%$<br>$RR_{stp} = [(\sum P_{g_{Nom}}^* - \sum P_{g_{Act}}) / \sum P_{g_{Nom}}^*] \cdot 100\%$ | $RR_{strt} <$<br>$\\#LdResStrt$  | $RR_{stp} >$<br>$\\#LdResStop$  |

## Case #2

This case is used in parallel to mains operation.

| Reserve     | Actual Reserve  | Start condition                  | Stop condition                  |
|-------------|---|----------------------------------|---------------------------------|
| Absolute kW | $AR_{strt} = \sum P_{g_{Nom}} - BaseLoad$<br>$AR_{stp} = \sum P_{g_{Nom}}^* - BaseLoad$   | $AR_{strt} <$<br>$\#LoadResStrt$ | $AR_{stp} >$<br>$\#LoadResStop$ |
| Relative %  | $RR_{strt} = [(\sum P_{g_{Nom}} - BaseLoad) / \sum P_{g_{Nom}}] \cdot 100\%$<br>$RR_{stp} = [(\sum P_{g_{Nom}}^* - BaseLoad) / \sum P_{g_{Nom}}^*] \cdot 100\%$ | $RR_{strt} <$<br>$\\#LdResStrt$  | $RR_{stp} >$<br>$\\#LdResStop$  |

List of abbreviations:

- ▶  $AR_{strt}$  .. Actual Absolute reserve in kW or kVA - for engine start calculation.
- ▶  $AR_{stp}$  .. Actual Absolute reserves in kW or kVA - for engine stop calculation.
- ▶  $RR_{strt}$  .. Actual Relative reserve in % - for engine start calculation.
- ▶  $RR_{stp}$  .. Actual Relative reserves in % - for engine stop calculation.
- ▶  $\sum P_{g_{Nom}}$  .. Sum of Nominal power of all gen-sets on the bus.
- ▶  $\sum P_{g_{Nom}}^*$  .. Sum of Nominal power of all gen-sets on the bus apart of the one, which is going to be stopped.
- ▶  $\sum P_{g_{Act}}$  .. Sum of Actual power of all gen-sets on the bus = system load.
- ▶  $BaseLd$  .. Baseload is given by the setpoint **#System BaseLoad (page 235)**

**Note:** System starting sequences may be very different due to their complexity (i.e. gen-sets which do not take part in power management, various nominal powers etc.). Each system should be considered individually.

## Starting sequence

As written above, the power management is based on the load evaluation in order to provide enough of available running power. An additional gen-set starts when the load of the system raises above certain level to keep the load reserve big enough. Following figure depicts the situation when an additional gen-set is requested to join the already running gen-set(s) to the bus.



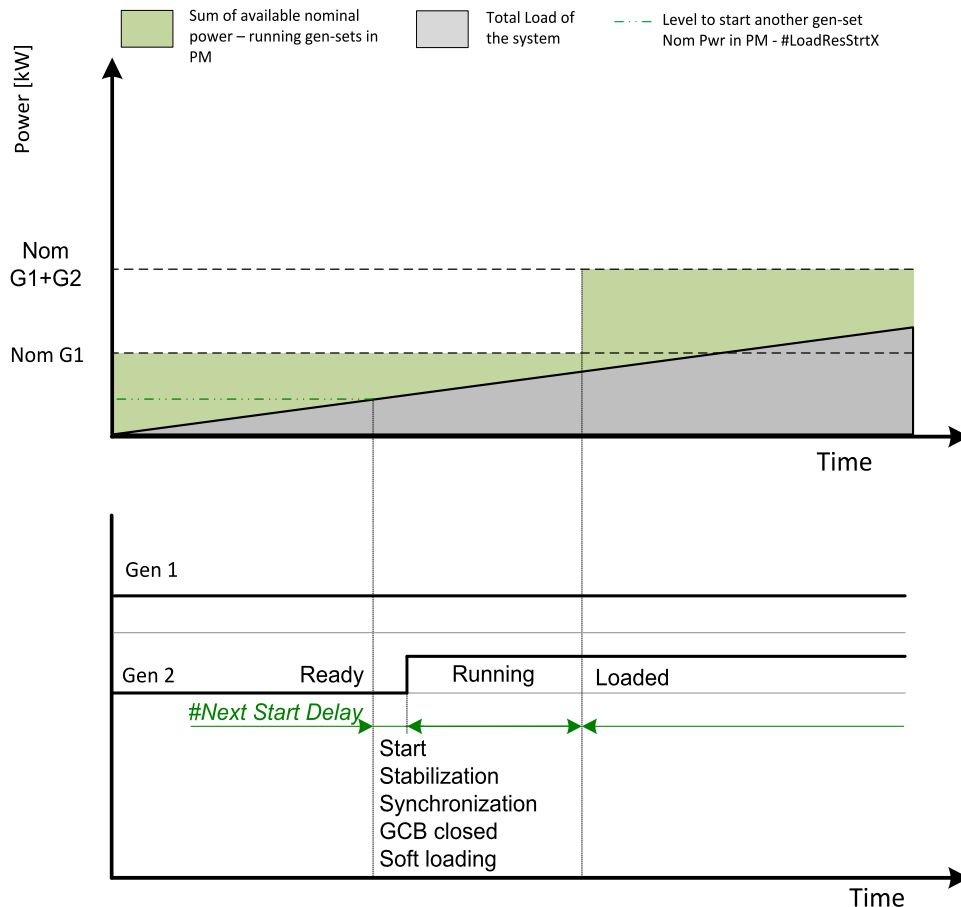


Image 5.18 Start sequence of power management

As shown above, the load of the system has increased above the level defined by the start condition – i.e. the load reserve is not sufficient as required by the appropriate setpoint. Further explanation is provided in chapters **Absolute power management (page 84)** and **Relative power management (page 87)**.

The level is illustrated by the green dashed line. If the load reserve keeps insufficient for longer time than defined by the setpoint **#Next Engine Start Delay (page 340)**, the next gen-set is actually started. The standard starting sequence follows. Once the synchronization procedure is done, the GCB breaker is closed and the gen-set power is ramping up. Once loaded, the system load reserve is raised and becomes sufficient again. Please note the sum of nominal power of all gen-sets on the bus is increased by the nominal power of the additional gen-set.

## Stopping sequence

As it is written above, the power management is based on the load evaluation in order to provide enough of available running power. An additional gen-set stops when the load of the system drops below certain level to avoid inefficient run of the gen-set. Following figure depicts the situation when a gen-set is requested to stop due to the power management.

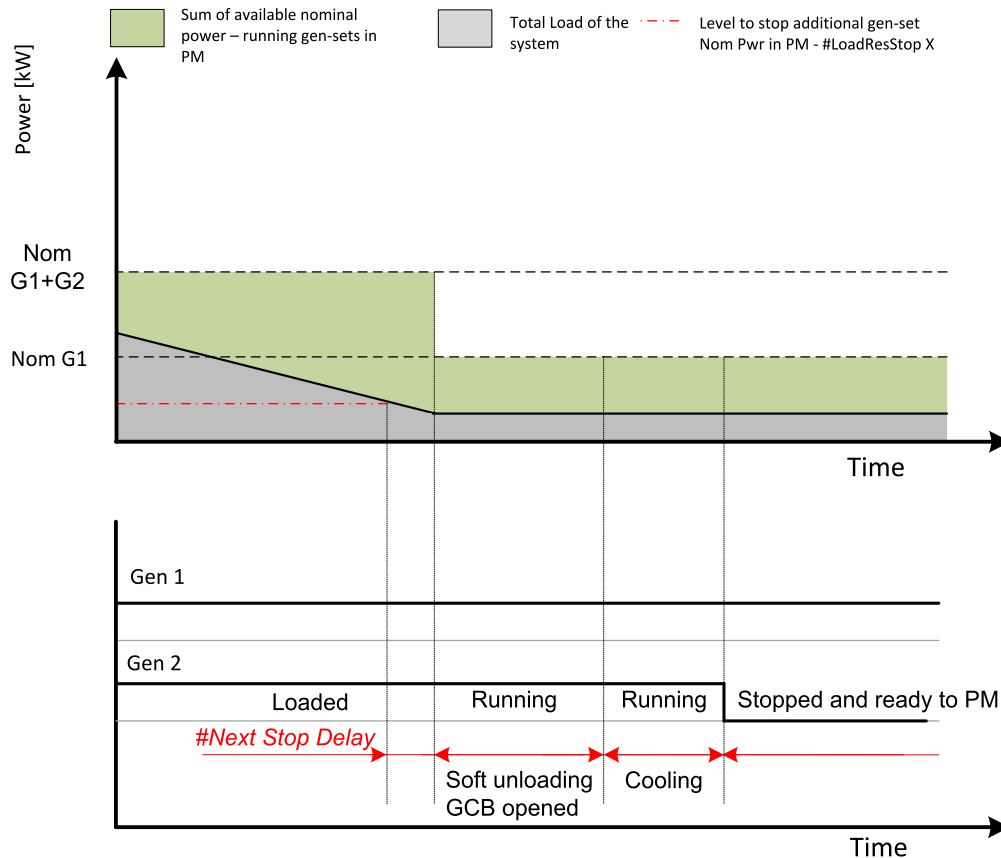


Image 5.19 Stopping sequence of power management

As shown above, the system load has decreased below the level defined by the stop condition – i.e. the load reserve is over a limit given by the appropriate setpoint. Further explanation is provided in chapters **Absolute power management (page 84)** and **Relative power management (page 87)**.

The level is illustrated by the red dashed line. If the load reserve keeps over this limit for longer time than defined by setpoint **#Next Engine Stop Delay (page 340)**, the next gen-set is actually requested to stop. Once the gen-set is unloaded, the GCB breaker is opened. Please note the sum of nominal power of all gen-sets on the bus is decreased by the nominal power of the stopped gen-set. The cooling sequence follows before the gen-set is actually stopped. The gen-set is ready to be started if the system load increases again.

## Absolute power management

The power management based on absolute load reserves can be successfully used in cases the load portions are similar to the gen-set capacity or even bigger. The goal of the absolute reserve mode is to provide the same load reserve all the time independently on how many gen-sets are currently running. The mode perfectly fits for industrial plants with large loads.

The absolute power management guarantees adjustable load reserve in kW. This mode is active when **#Power Management Mode (page 333)** is set to ABS [kW] mode.

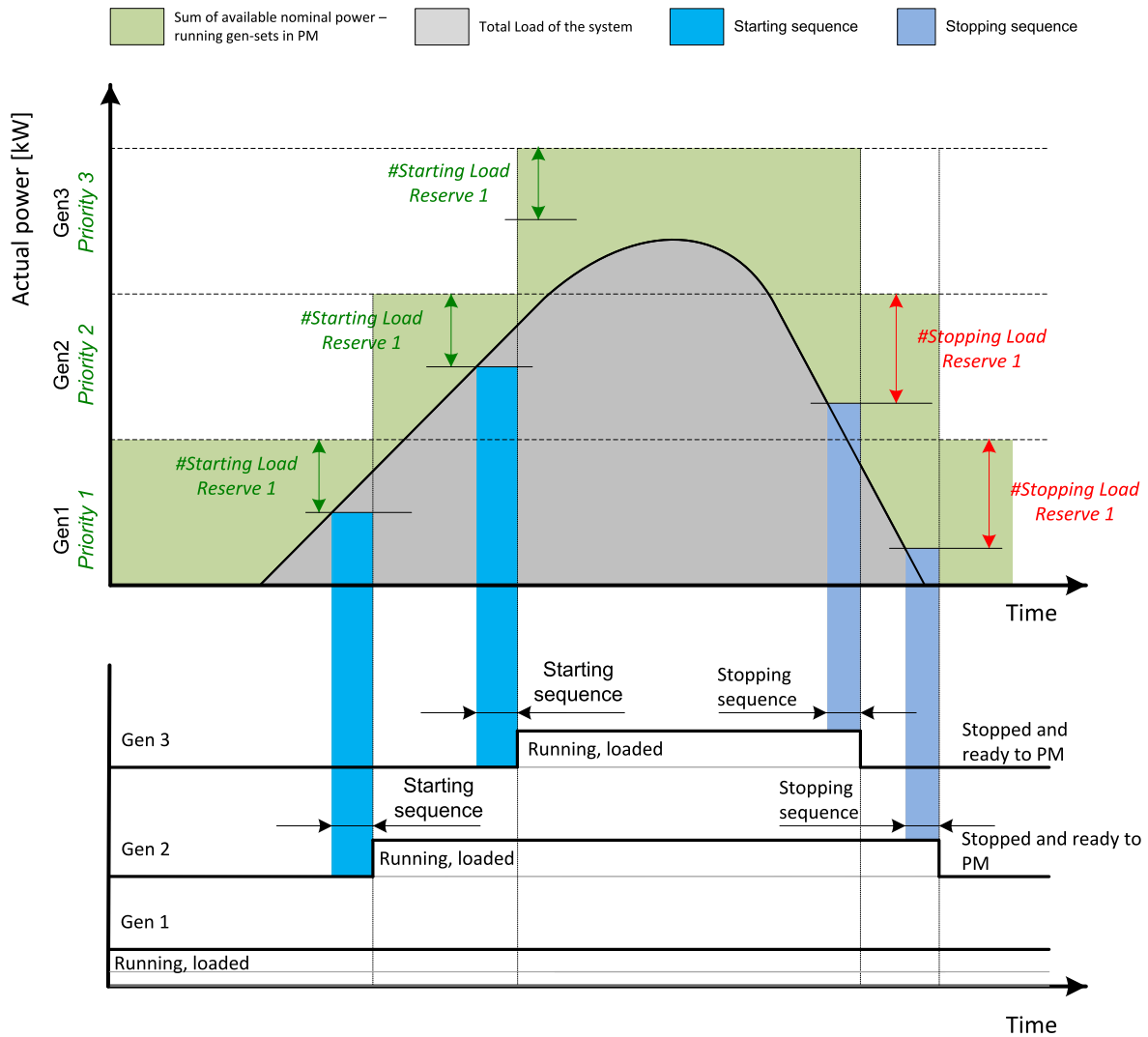


Image 5.20 Power management based on absolute load reserve

**Example:** An example of absolute power management is shown on the figure below. There are three gen-sets with following choice of setpoints:

| Gen-set    | Nominal power | Power management | #Power management mode | Priority | #Priority Auto Swap | #Starting Load Reserve X | #Stopping Load Reserve X |
|------------|---------------|------------------|------------------------|----------|---------------------|--------------------------|--------------------------|
| Gen-set #1 | 200 kW        | ENABLED          | ABS (kW)               | 1        | DISABLED            | 100 kW                   | 125 kW                   |
| Gen-set #2 | 500 kW        | ENABLED          | ABS (kW)               | 2        | DISABLED            | 100 kW                   | 125 kW                   |
| Gen-set #3 | 1 000 kW      | ENABLED          | ABS (kW)               | 3        | DISABLED            | 100 kW                   | 125 kW                   |

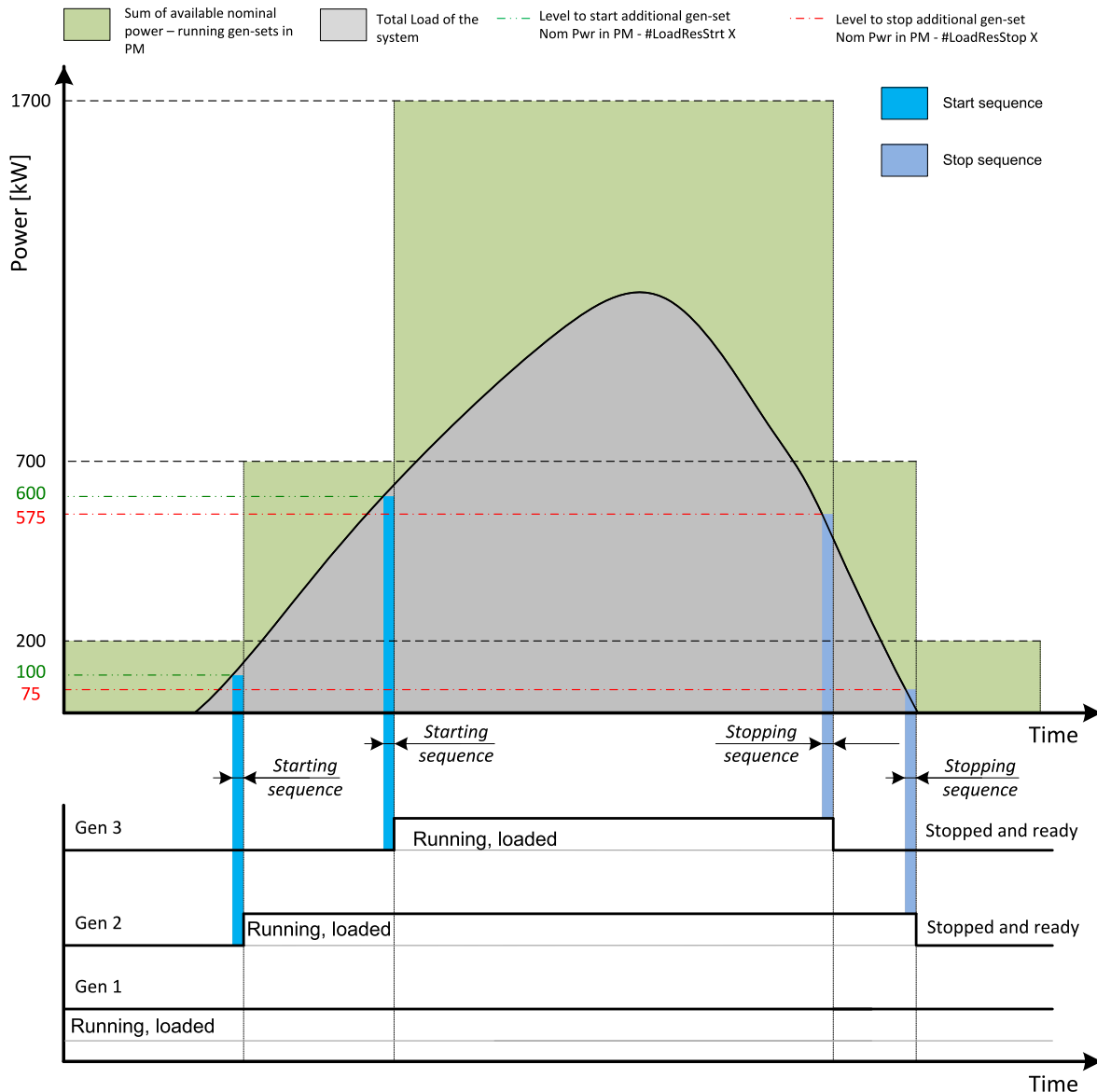


Image 5.21 Absolute power management example

As it is shown on both figures above, the additional gen-set is added once the actual load reserve is below the level given by the appropriate setpoint of load reserve. The additional gen-set is removed once the actual load reserve is above the level set by appropriate setpoint of load reserve.

The green dashed line depicts the value of load at which the additional gen-set is requested to start. This value of the load value is linked with the setpoint **#Starting Load Reserve 1 (page 335)** (or other selected reserve set) in following way:

Sum of nominal power for start - **#Starting Load Reserve 1 (page 335)** (or other selected reserve set) = value of load when additional gen-set requested to start (e.g.: 700 kW – 100 kW = 600 kW).

The red dashed line depicts the value of load at which the additional gen-set is requested to stop. This value of the load value is linked with the setpoint **#Stopping Load Reserve 1 (page 336)** (or other selected reserve set) in following way:

Sum of nominal power for stop - **#Stopping Load Reserve 1 (page 336)** (or other selected reserve set) = value of load when additional gen-set requested to stop (e.g.: 700 kW – 125 kW = 575 kW).

There are 2 sets of setpoints for starting and stopping gen-sets in absolute power management.

- ▶ **#Starting Load Reserve 1** (page 335) and **#Stopping Load Reserve 1** (page 336)
- ▶ **#Starting Load Reserve 2** (page 337) and **#Stopping Load Reserve 2** (page 338) considered if binary input **LOAD RES 2 ACTIVE** (PAGE 670) is activated

**Note:** All controllers cooperating together in Power management must have the same load reserve set selected.

## Relative power management

The power management based on relative load reserves perfectly fits to those applications with such load portions connected to the group at once are much lower than the gen-set nominal power. This mode helps to achieve the maximal lifetime of the gen-sets, as they can be operated within optimal load range. The maximal size of the load connected at once depends on number of actually working gen-sets. The more gen-sets are connected to the bus bar the bigger load portion can be connected at once.

The relative power management guarantees that the engines are not continuously loaded more than to a certain level. This mode is active when **#Power Management Mode** (page 333) is set to REL [%] mode.

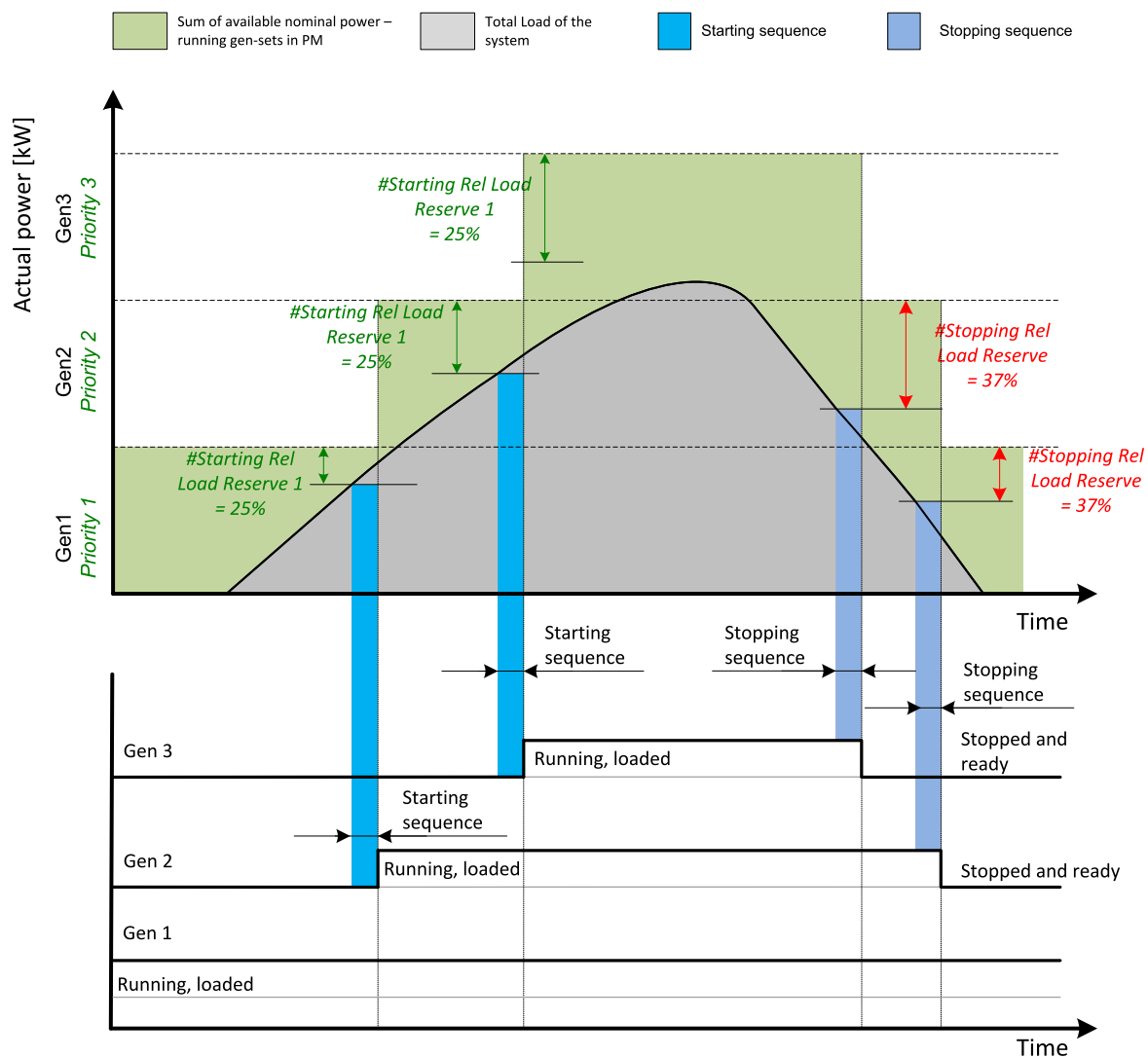


Image 5.22 Power management based on relative load reserve

**Example:** An example of relative power management is shown on the figure below. There are three gen-sets with following choice of setpoints:

| Gen-set    | Nominal power | Power management | #Power management mode | Priority | #Priority Auto Swap | #Starting Rel Load Reserve X | #Stopping Rel Load Reserve X |
|------------|---------------|------------------|------------------------|----------|---------------------|------------------------------|------------------------------|
| Gen-set #1 | 200 kW        | ENABLED          | REL (%)                | 1        | DISABLED            | 35 %                         | 40 %                         |
| Gen-set #2 | 500 kW        | ENABLED          | REL (%)                | 2        | DISABLED            | 35 %                         | 40 %                         |
| Gen-set #3 | 1 000 kW      | ENABLED          | REL (%)                | 3        | DISABLED            | 35 %                         | 40 %                         |

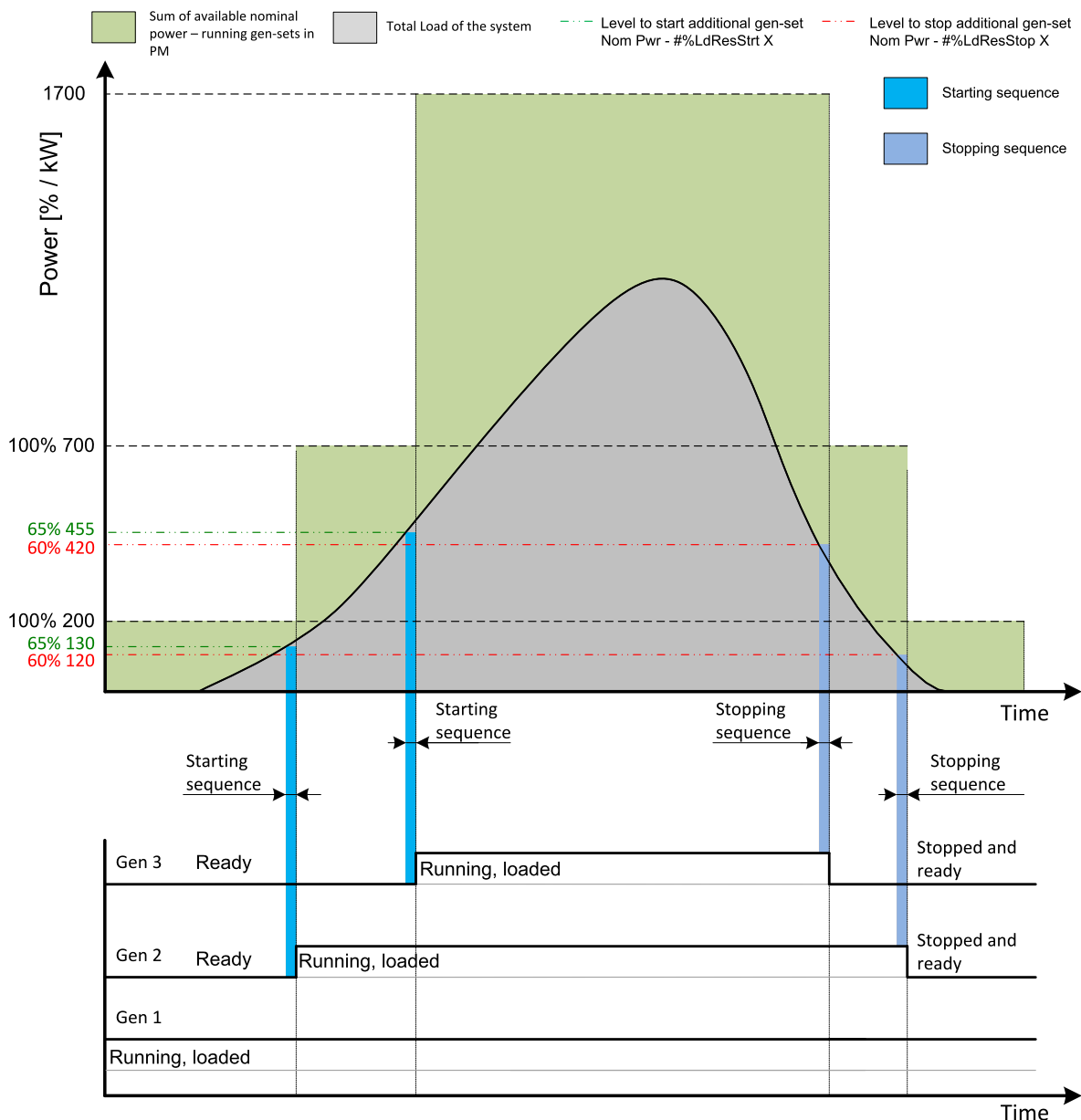


Image 5.23 Relative power management example

As it is shown on both figures above, the additional gen-set is added once the actual load reserve is below the level given by the appropriate setpoint of load reserve. The additional gen-set is removed once the actual load reserve is above the level set by appropriate setpoint of load reserve.

The green dashed line depicts the value of load at which the additional gen-set is requested to start. This value of the load value is linked with the setpoint **#Starting Rel Load Reserve 1 (page 336)** (or other selected reserve set) in following way:

$(100\% - \text{\#Starting Rel Load Reserve 1 (page 336) (or other selected reserve set)}) * \text{Sum of Nominal power} =$   
 Value of load when additional gen-set requested to start in kW (in % of nominal power), e.g.:  $(100\% - 35\%) * 700 \text{ kW} = 455 \text{ kW}$  (65 % of nominal power).

The red dashed line depicts the value of load at which the additional gen-set is requested to stop. This value of the load value is linked with the setpoint **#Stopping Rel Load Reserve 1 (page 337)** (or other selected reserve set) in following way:

$(100\% - \text{\#Stopping Rel Load Reserve 1 (page 337) (or other selected reserve set)}) * \text{Sum of Nominal power} =$   
 Value of load when additional gen-set requested to stop in kW (in % of nominal power), e.g.:  $(100\% - 40\%) * 700 \text{ kW} = 420 \text{ kW}$  (60 % of nominal power).

There are 2 sets of setpoint for starting and stopping gen-sets in relative power management.

- ▶ **#Starting Rel Load Reserve 1 (page 336)** and **#Stopping Rel Load Reserve 1 (page 337)**
- ▶ **#Starting Rel Load Reserve 2 (page 338)** and **#Stopping Rel Load Reserve 2 (page 339)** considered if binary input **LOAD RES 2 ACTIVE (PAGE 670)** is activated

**Note:** All controllers cooperating together in Power management must have the same load reserve set selected.

## Priorities

The priority of the gen-set within the group is given by the setpoint **Priority (page 333)**. Lower number represents "higher" priority, i.e. a gen-set with lower number starts before another one with higher number. In other words, the setpoint **Priority (page 333)** means order in which gen-sets are started and connected to the bus. An example is shown on the figure below. There are four gen-sets with following choice of setpoints:

| Gen-set    | Nominal power | Power management | #Power management mode | Priority | #Priority Auto Swap | #Starting Load Reserve X | #Stopping Load Reserve X |
|------------|---------------|------------------|------------------------|----------|---------------------|--------------------------|--------------------------|
| Gen-set #1 | 200 kW        | ENABLED          | ABS (kW)               | 4        | DISABLED            | 50 kW                    | 70 kW                    |
| Gen-set #2 | 200 kW        | ENABLED          | ABS (kW)               | 3        | DISABLED            | 50 kW                    | 70 kW                    |
| Gen-set #3 | 200 kW        | ENABLED          | ABS (kW)               | 2        | DISABLED            | 50 kW                    | 70 kW                    |
| Gen-set #4 | 200 kW        | ENABLED          | ABS (kW)               | 1        | DISABLED            | 50 kW                    | 70 kW                    |

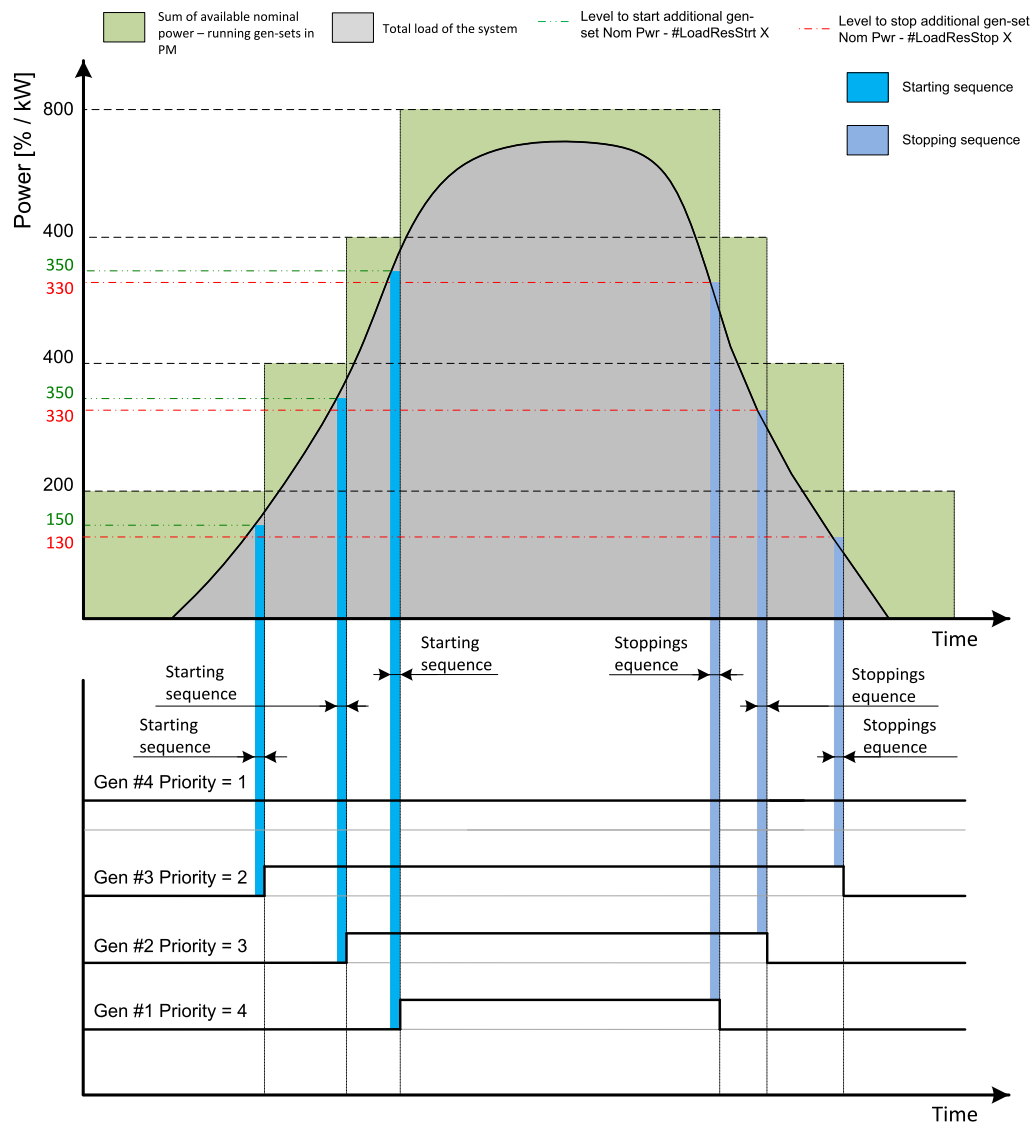


Image 5.24 Example of priorities in power management

By choosing the setpoint **Priority (page 333) = 1**, the gen-set #4 is running all the time in the example shown on the figure above (AUTO mode selected, Power management enabled and LBI **REMOTE START/STOP (PAGE 677)** activated).

The LBI **TOP PRIORITY (PAGE 680)** can be used to force priority 0 into the setpoint **Priority (page 333)**. Priority 0 is the "highest" one, which means the gen-set will be running all the time while the power management is switched on.

If more than one gen-set have the same priority, they will act as "one big" gen-set. There are methods of automatic optimization of the priorities to achieve specific behavior of the group such as equalizing engine hours of the gen-sets or selection of optimal gen-sets to run according to their size and current load demand.

### Priority auto swap

As stated in the chapter **Priorities (page 89)**, the operator is able to select the order of gen-set starting. There is also the option of automatic priority selection. The controllers are sharing data concerning the running hours and all important information relevant to the actual load. Thanks to the Automatic priority swapping function the controllers choose the gen-set(s) to be running with consideration of their running hours and the actual load.



The running hours equalization function keeps a constant maximal difference of gen-set's running hours. The efficient function keeps running only the gen-sets with suitable nominal power to avoid inefficient fuel consumption or gen-set overload.

**Note:** The Automatic priority swapping function does not change the setpoint **Priority** (page 333). The function sets the order of gen-sets by virtual values "engine priority".

## Run hours equalization

The gen-sets engine priorities are automatically swapped to balance engine running hours. In other words, the controllers compare running hours of each gen-set and select gen-set(s) to run in order to maintain constant maximal difference of running hours. Up to 32 controllers are supported. This function is activated via setpoint **#Priority Auto Swap** (page 334) = RUN HOURS.

The value of running hours which is used in run hours equalization is calculated by following formula:

$$\text{RHE} = \text{Running Hours (page 585)} - \text{Run Hours Base (page 342)}$$

RHE is considered value for running hours equalization, **Running Hours** (page 585) is a cumulative sum of run hours available in statistic values of the controller, **Run Hours Base** (page 342) is a setpoint. This setpoint may be used in the case of gen-sets with different runs hours are intended to be set at the same initial point (e.g. a new gen-set and a used gen-set after retrofit maintenance inspection).

The Running hours equalization function compares RHE value of each controller in the group. Once the difference between RHE of individual controllers is higher than **#Run Hours Max Difference** (page 342) (i.e. **#Run Hours Max Difference** (page 342) + 1), the gen-set(s) with the lowest RHE is/are started.

**Example:** The system structure and its settings is shown on the figure below.

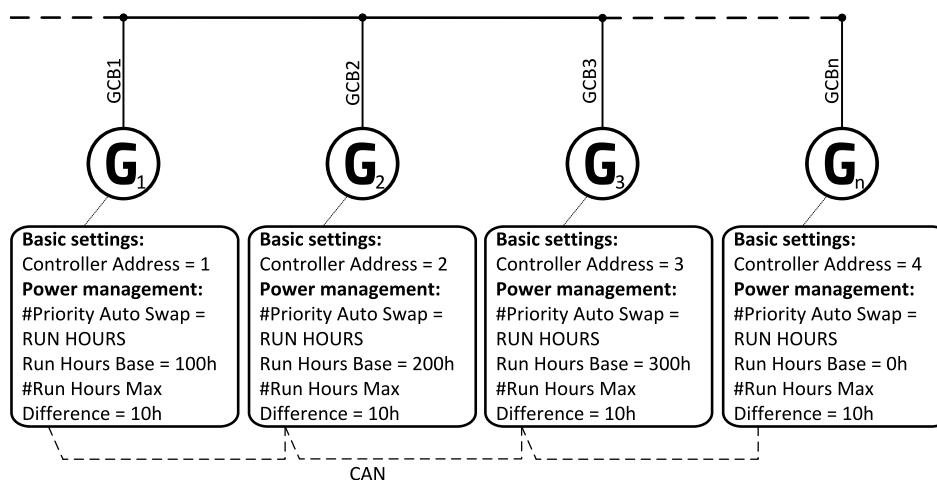


Image 5.25 Example of the system

3 cases are considered:

- ▶ Case #1: 2 gen-gets available
- ▶ Case #2: 3 gen-gets available with same initial RHE.
- ▶ Case #3: 3 gen-gets available with different initial RHE.

### Case #1:

- ▶ Gen-set 1 running hours = 250 -> running hours considered in RHE = 100 (150 - **Run Hours Base** (page 342))

- ▶ Gen-set 2 running hours = 450 -> running hours considered in RHE = 200 (250 - Run Hours Base (page 342))

Both gen-sets have the same nominal power of 700 kW. Originally, priority of gen-sets was G1 = 2, G2 = 1. Load demand in this example is constant and it is 500 kW (i.e. only one engine is running at any time). In this case, the controllers set the engine priority of the gen-set 1 to 1 because it has the lowest considered RHE and the difference between RHE2 (i.e. considered RHE of gen-set 2) and RHE1 is higher than **#Run Hours Max Difference (page 342)** that is set to 10h.

|            | Run hours | #RunHoursBase | RHE |
|------------|-----------|---------------|-----|
| Gen-set #1 | 250       | 150           | 100 |
| Gen-set #2 | 450       | 250           | 200 |

The gen-set 1 runs for 100 hours to equalize the RHE of both gen-sets. The gen-set 1 keeps running until the difference between RHE1 and RHE2 exceeds **#Run Hours Max Difference (page 342)** (i.e. 10h). The gen-set 1 runs  $100 + \text{\#Run Hours Max Difference (page 342)} + 1 = 100 + 10 + 1 = 111$  hours. After 111 hours the gen-sets 2 has the lowest RHE and the difference between RHE1 and RHE2 is higher than **#Run Hours Max Difference (page 342)**. The gen-set 2 runs 11 hours to equalize the RHE of both gen-sets and then additional **#Run Hours Max Difference (page 342) + 1** hours (i.e.  $11 + 10 + 1 = 22$  hours). The evolution of RHE1 and RHE2 is shown on the figure below.

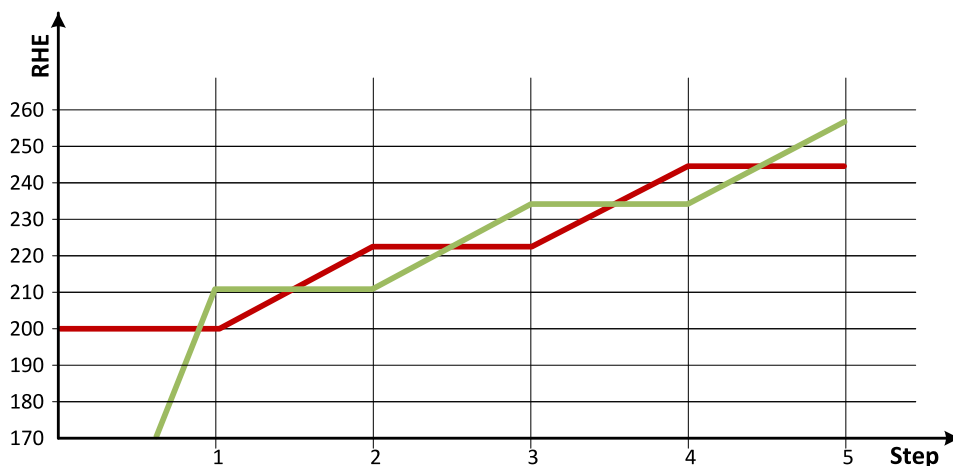


Image 5.26 Run hours equalization - case #1

| Step                    | 0   | 1   | 2   | 3   | 4   | 5   |
|-------------------------|-----|-----|-----|-----|-----|-----|
| RHE1                    | 100 | 211 | 211 | 233 | 233 | 255 |
| RHE2                    | 200 | 200 | 222 | 222 | 244 | 244 |
| Run G1 ( $\Delta$ RHE1) | 0   | 111 | 0   | 22  | 0   | 22  |
| Run G2 ( $\Delta$ RHE2) | 0   | 0   | 22  | 0   | 22  | 0   |

From the example of the case #1, it can be concluded that the gen-sets are swapped after the duration determined by following formula:

**SwapTime = Second lowest considered running hours – Current lowest considered running hours + #Run Hours Max Difference (page 342) + 1**

### Case #2:

- ▶ Gen-set 1 running hours = 0 -> running hours considered in RHE = 0 (0-RunHoursBase)
- ▶ Gen-set 2 running hours = 0 -> running hours considered in RHE = 0 (0-RunHoursBase)
- ▶ Gen-set 3 running hours = 0 -> running hours considered in RHE = 0 (0-RunHoursBase)

Each gen-set has the same RHE = 0 h. By applying the SwapTime formula, we get the run time of gen-set 1 before next swapping:

$$\text{SwapTimeG1} = 0 - 0 + 10 + 1 = 11$$

Similar way, we get the run time of gen-set 2 before next swapping:

$$\text{SwapTimeG2} = 11 - 11 + 10 + 1 = 11$$

Finally, we get the run time of gen-set 3 before next swapping:

$$\text{SwapTimeG2} = 11 - 0 + 10 + 1 = 22$$

Please refer to figure below to understand the evolution of RHE of gen-sets in this particular case.

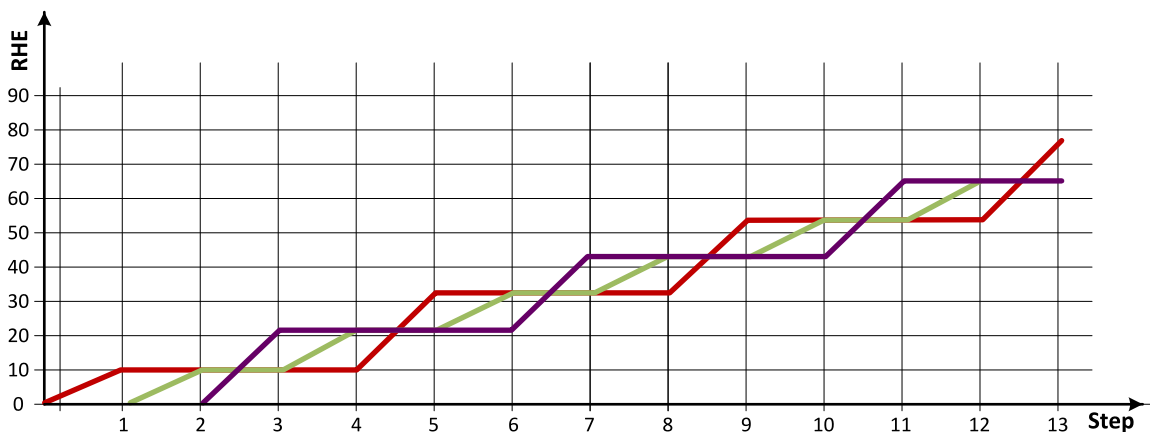


Image 5.27 Run hours equalization - case #2

| step                    | 0 | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 |
|-------------------------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
| RHE1                    | 0 | 11 | 11 | 11 | 11 | 33 | 33 | 33 | 33 | 55 | 55 | 55 | 55 | 77 |
| RHE2                    | 0 | 0  | 11 | 11 | 22 | 22 | 33 | 33 | 44 | 44 | 55 | 55 | 66 | 66 |
| RHE3                    | 0 | 0  | 0  | 22 | 22 | 22 | 22 | 44 | 44 | 44 | 44 | 66 | 66 | 66 |
| Run G1 ( $\Delta$ RHE1) | 0 | 11 | 0  | 0  | 0  | 22 | 0  | 0  | 0  | 22 | 0  | 0  | 0  | 22 |
| Run G2 ( $\Delta$ RHE2) | 0 | 0  | 11 | 0  | 11 | 0  | 11 | 0  | 11 | 0  | 11 | 0  | 11 | 0  |
| Run G3 ( $\Delta$ RHE3) | 0 | 0  | 0  | 22 | 0  | 0  | 0  | 22 | 0  | 0  | 0  | 22 | 0  | 0  |

### Case #3:

- ▶ Gen-set 1 running hours = 250 -> running hours considered in RHE = 100 (150-RunHoursBase)
- ▶ Gen-set 2 running hours = 450 -> running hours considered in RHE = 200 (250-RunHoursBase)
- ▶ Gen-set 3 running hours = 750 -> running hours considered in RHE = 250 (500-RunHoursBase)

The gen-set 1 has the lowest RHE1 = 100 h. By applying the SwapTime formula, we get the run time of gen-set 2 before next swapping:

$$\text{SwapTimeG1} = 200 - 100 + 10 + 1 = 111$$

Till the step 5, the evolution of the gen-set swapping is the same as in the case #1, just gen-set 1 and gen-set 2 involve. In the step 6 the gen-set 2 can run only 17 hours (previously 22 hours) because the gen-set 3 involves. The evolution of RHE1, RHE2 and RHE3 is shown on the figure below.

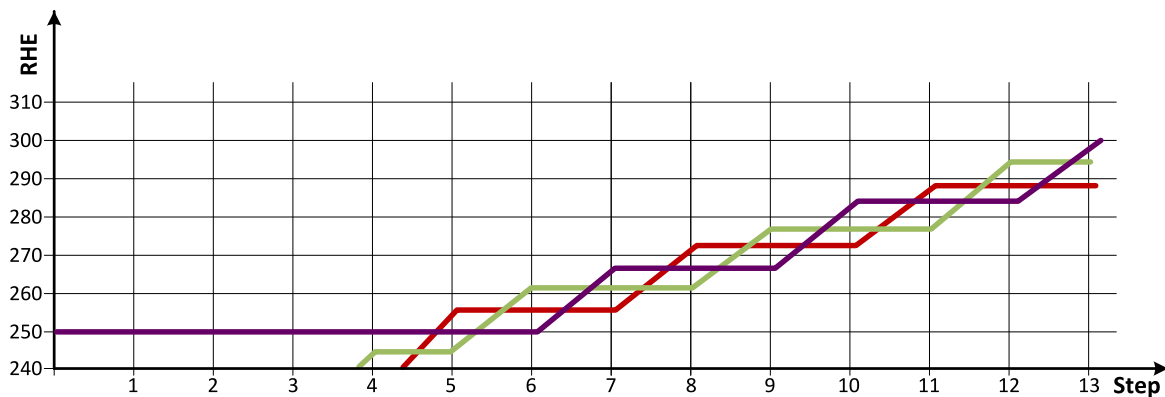


Image 5.28 Run hours equalization - case #3

| step                       | 0   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| RHE1                       | 100 | 211 | 211 | 232 | 233 | 255 | 255 | 255 | 272 | 272 | 272 | 288 | 288 | 288 |
| RHE2                       | 200 | 200 | 222 | 222 | 244 | 244 | 261 | 261 | 261 | 277 | 277 | 277 | 294 | 294 |
| RHE3                       | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 266 | 266 | 266 | 283 | 283 | 283 | 299 |
| Run G1<br>( $\Delta$ RHE1) | 0   | 111 | 0   | 22  | 0   | 22  | 0   | 0   | 17  | 0   | 0   | 16  | 0   | 0   |
| Run G2<br>( $\Delta$ RHE2) | 0   | 0   | 22  | 0   | 22  | 0   | 17  | 0   | 0   | 16  | 0   | 0   | 17  | 0   |
| Run G3<br>( $\Delta$ RHE3) | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 16  | 0   | 0   | 17  | 0   | 0   | 16  |

**Note:** Setting #Run Hours Max Difference (page 342) = 5 does not mean that gen-sets swap every 5 hours. The Swap time is determined by the formula stated above. Please read the entire chapter Running hours equalization for better understanding.

**Note:** In the case #Run Hours Max Difference (page 342) is set to 0 and all gen-set in the group are at the same initial point (RHE are equal), the gen-set swapping happens every hour.

## Efficiency

The gen-sets engine priorities are automatically swapped to best fit to the actual load demand (load demand swap - LDS). Also engine running hours are taken to the calculation (run hours equalization - RHE). This function is activated via setpoint #Priority Auto Swap (page 334) = Efficiency.

Algorithm of function:

- ▶ In the first step, the gen-sets are sorted according to their nominal power.
- ▶ In the second step, the gen-sets with the same nominal power are sorted according to their RHE
- ▶ The gen-set(s) with nominal power which fits the most actual load demand are chosen. From those with same nominal power, the gen-set(s) with lowest RHE are chosen. Selection formula:

- **#Power Management Mode (page 333) = ABS (kW)**
    - Nominal power of gen-set > actual load demand + **#Starting Load Reserve 1 (page 335)**
  - **#Power Management Mode (page 333) = REL (%)**
    - Nominal power of gen-set > (actual load demand × 100)/(100 - **#Starting Rel Load Reserve 1 (page 336)**)
- ▶ If two or more gen-sets are available for taking over the load always the one with the lowest CAN address is chosen.
- ▶ If load demand is higher than nominal power of the biggest gen-set, this one is fixed and the whole process repeats from point the third bullet.
- Example:** The system structure and its settings is shown on the figure below.

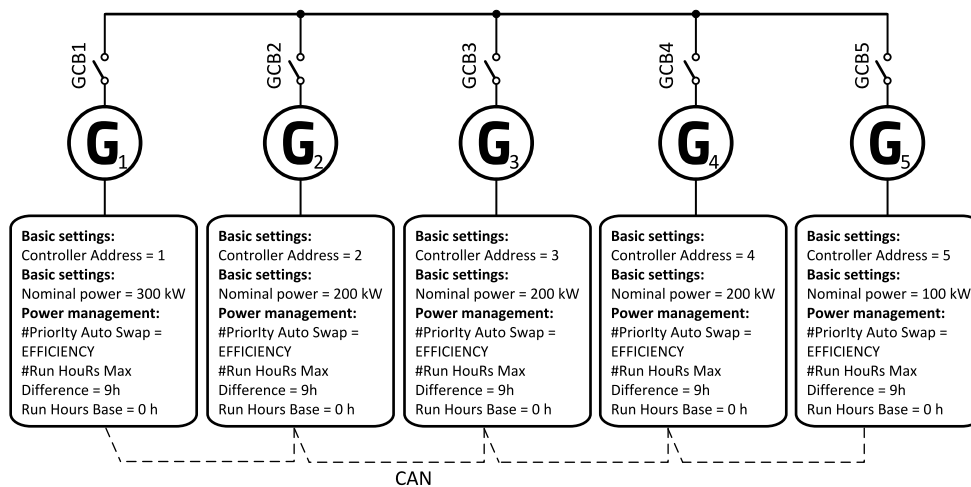


Image 5.29 Example of the system

Following table provide an example of gen-set selection in function of system load evolution. The table is an example of Efficiency priority optimization function (**#Power Management Mode (page 333) = ABS (kW)** and **#Starting Load Reserve 1 (page 335) = 20 kW**).

| System Load [kW] | Running gen-sets   |                   | Description | Total Running power within PM [kW] | Relative load of gen-sets [%] |
|------------------|--------------------|-------------------|-------------|------------------------------------|-------------------------------|
| 40               | 5                  |                   |             | 100                                | 40                            |
| 60               | 5                  |                   |             | 100                                | 60                            |
| 80               | 5<br>2 [0h]        | 2 start<br>5 stop | LDS Swap    | 300                                | 26                            |
| 100              | 2 [10h]            |                   |             | 200                                | 50                            |
| 120              | 2 [20h]            |                   |             | 200                                | 60                            |
| 120              | 2 [30h]<br>3 [10h] | 3 start<br>2 stop | RHE Swap    | 400                                | 30                            |
| 120              | 3 [20h]            |                   |             | 200                                | 60                            |
| 140              | 3 [30h]            |                   |             | 200                                | 70                            |
| 180              | 3 [40h]<br>1       | 1 start<br>3 stop | LDS Swap    | 500                                | 36                            |

| System Load [kW] | Running gen-sets       |                   | Description       | Total Running power within PM [kW] | Relative load of gen-sets [%] |
|------------------|------------------------|-------------------|-------------------|------------------------------------|-------------------------------|
| 200              | 1                      |                   |                   | 300                                | 67                            |
| 240              | 1                      |                   |                   | 300                                | 80                            |
| 280              | 1<br>5                 | 5 start           | Gen#5 joins (LDS) | 400                                | 70                            |
| 340              | 1<br>5                 |                   |                   | 400                                | 85                            |
| 380              | 1<br>5<br>4 [20h]      | 4 start<br>5 stop | LDS + RHE Swap    | 600                                | 63                            |
| 400              | 1<br>4                 |                   |                   | 500                                | 80                            |
| 440              | 1<br>4                 |                   |                   | 500                                | 88                            |
| 480              | 1<br>4<br>5            | 5 start           | Gen#5 joins (LDS) | 600                                | 80                            |
| 540              | 1<br>4<br>5            |                   |                   | 600                                | 90                            |
| 580              | 1<br>4<br>5<br>2 [30h] | 2 start<br>5 stop | LDS Swap          | 800                                | 73                            |
| 600              | 1<br>4<br>2            |                   |                   | 700                                | 86                            |
| 640              | 1<br>4<br>2            |                   |                   | 700                                | 91                            |
| 680              | 1<br>4<br>2<br>5       | 5 start           | Gen#5 joins (LDS) | 800                                | 85                            |
| 740              | 1<br>4<br>2<br>5       |                   |                   | 800                                | 93                            |
| 780              | 1<br>4<br>2<br>5       | 3 start<br>5 stop | LDS Swap          | 1000                               | 78                            |

| System Load [kW] | Running gen-sets      | Description                  | Total Running power within PM [kW] | Relative load of gen-sets [%] |
|------------------|-----------------------|------------------------------|------------------------------------|-------------------------------|
|                  | 3 [40h]               |                              |                                    |                               |
| 800              | 1<br>4<br>2<br>3      |                              | 900                                | 89                            |
| 840              | 1<br>4<br>2<br>3      |                              | 900                                | 93                            |
| 880              | 1<br>4<br>2<br>3<br>5 | 5 start<br>Gen#5 joins (LDS) | 1000                               | 88                            |
| 940              | 1<br>4<br>2<br>3<br>5 |                              | 1000                               | 94                            |

### Minimal running power

Minimum Running Power function is used to adjust a minimum value of the sum of nominal power of all running gen-sets. If the function is active, then the gen-sets would not be stopped, although the reserve for stop is fulfilled. Function is activated via logical binary input **Min Run Power Active** (page 673).

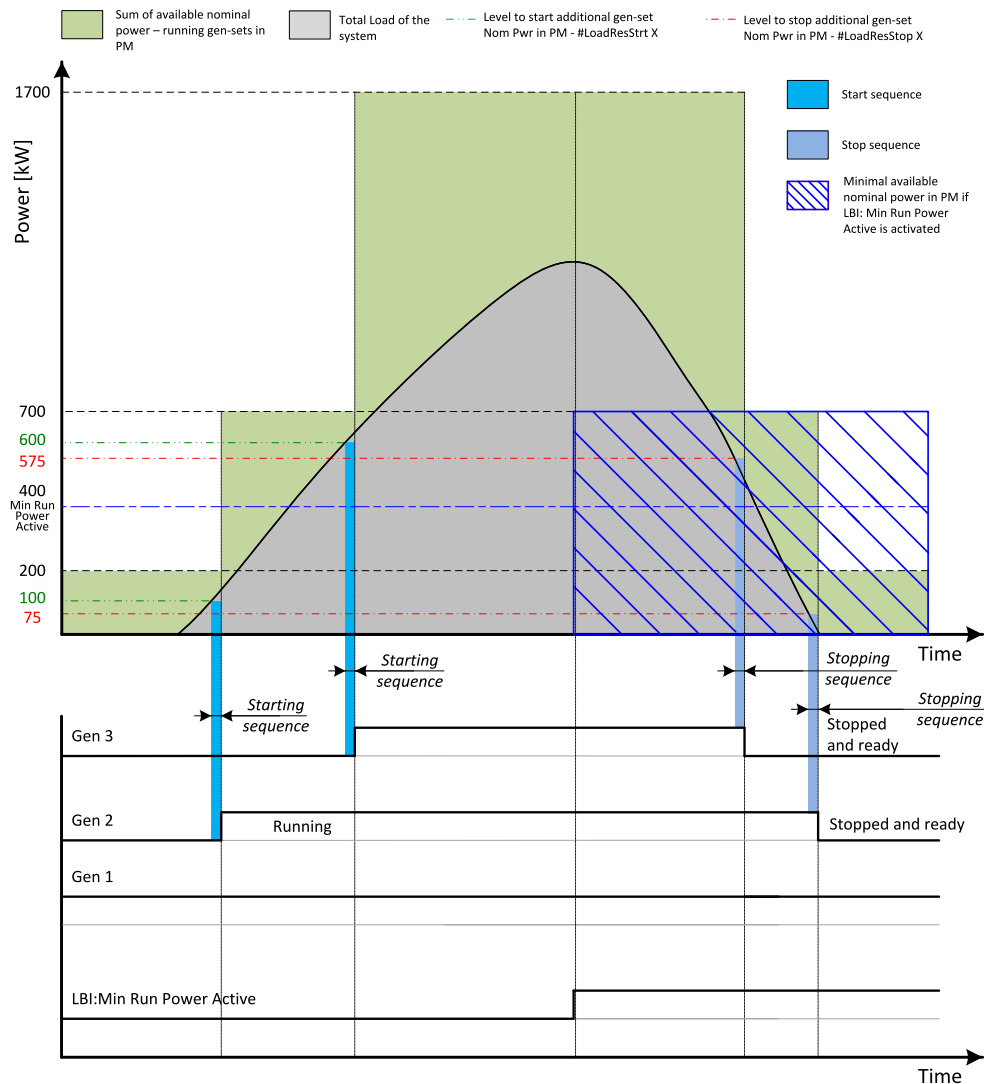


Image 5.30 Minimal running power

Setpoint **#Min Run Power** (page 339) is adjusted to 400 kW. Once the **MIN RUN POWER ACTIVE** (PAGE 673) is activated, the available nominal running power has to be equal or higher to 400 kW. Even if the load reserve is big enough to stop the gen-set #2 (nominal power 500 kW), the gen-set keeps running as at least 400 kW has to be available. The gen-set#1 (nominal power 200 kW) is not enough.

### 5.3.11 Control groups

The physical group of the gen-sets (i.e. the site) can be separated into smaller logical groups, which can work independently even if they are interconnected by the CAN2 bus. The logical groups are intended to reflect the real topology of the site when the site is divided into smaller gen-set groups separated from each other by bus-tie breakers. If the bus-tie breakers are closed the sub-groups have to work as one large group and if the bus-tie breakers are open, the sub-groups have to work independently.

- ▶ The group which the particular controller belongs to is adjusted by the setpoint **Control Group** (page 344). Use the default setting 1 with all controllers, if there is no bus-tie breaker.
- ▶ The information which groups are currently linked together is being distributed via the CAN. Each controller can provide information about one BTB breaker. The breaker position is detected by the input function *GroupLink* (i.e. this input is to be connected to the breaker feedback).



- ▶ The two groups which are connected together by the BTB, are defined with parameters **Group Link L** (page 344) and **Group Link R** (page 345).
- ▶ Controller sends via CAN2 bus information that controllers from groups *Group Link L* and *Group Link R* are linked together, if the *Group link* function (signal associated with the function) is active. It sends information that the groups are separated, if the *Group link* function is not active.

**Note:** The "group link" function is independent on the group, where the controller itself belongs to. The controller can provide "group link" information about any two groups and it may not belong to one of the groups.

- ▶ All gensets/controllers in linked groups cooperate with each other and perform load sharing, VAR sharing and power management together. These functionalities are performed independently in each group, when the groups are separated.

**Example:**

4 gen-sets separated by a BTB breaker into two groups of 2. The BTB position is detected by the controllers 2 and 3. The reason, why there are 2 controllers used for detection of the BTB position, is to have a backup source of the group link information, if the primary source (controller) is switched off.

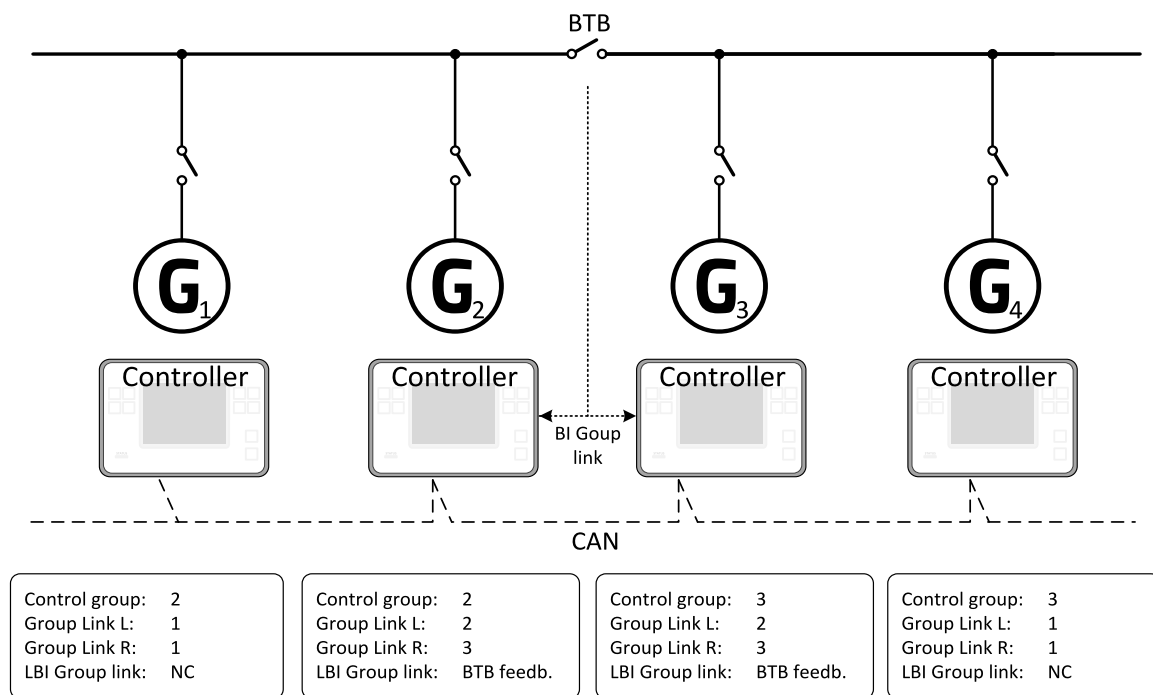


Image 5.31 Example of control groups

Once the BTB breaker is closed, the control groups 2 and 3 become new group 2+3. Power management, load sharing and VAR sharing are performed within newly established group 2+3. Merging of the groups may result with a genset stopping, if power management evaluates that available Actual Reserve is high enough to stop a genset.

### 5.3.12 Distributed power management signals

Sharing of multiple Logical Binary Input (LBI) functions is critical for power management system operation, because several power management functionality require simultaneous activation of LBI functions in controllers, which are involved in power management operation. It can be done either automatically using CAN2 bus link between controllers or using dedicated LBI functions.

These LBI functions are shared automatically:

- ▶ System Start/Stop
- ▶ Min Run Power Act
- ▶ Load Res 2 Active
- ▶ MCB Feedback

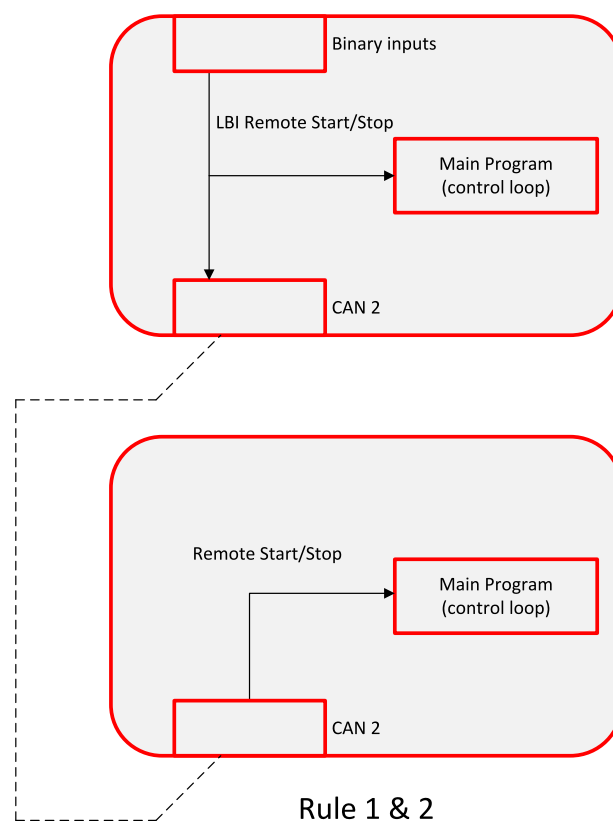
These rules applies to the automatic sharing of the selected signals:

1. LBI state is automatically shared via CAN2 bus, if corresponding LBI function is configured in a controller.

**Example:** Logical input Remote Start/Stop is configured with a controller. State of the signal is automatically transmitted to other controllers via CAN2 bus as System Start/Stop.

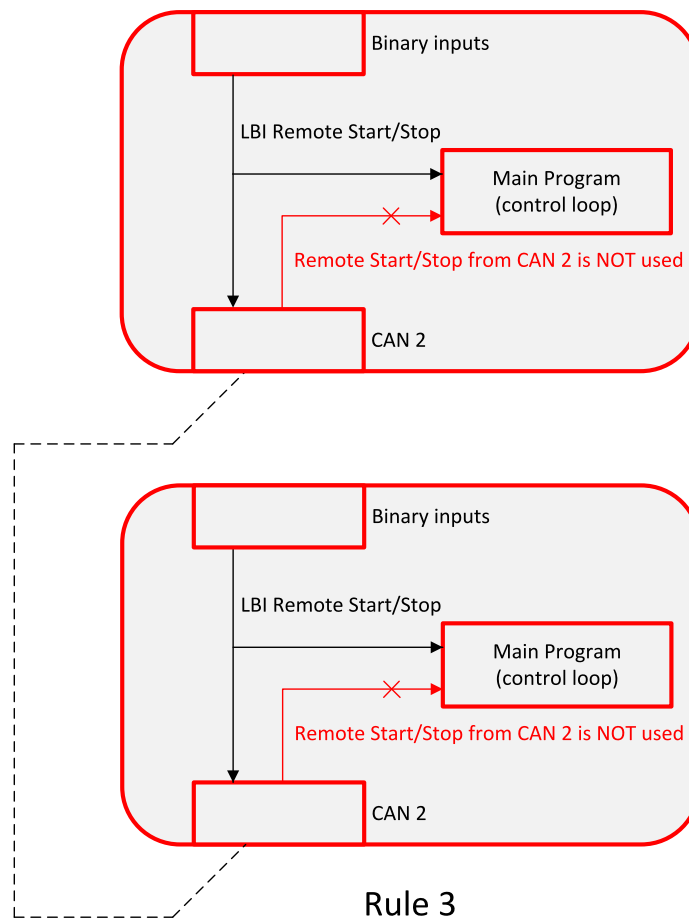
2. LBI state received from CAN2 bus is automatically used, if corresponding LBI function is not configured in a controller.

**Example:** LBI Remote Start/Stop is not configured with a controller, but automatically shared System Start/Stop is received from CAN2 bus. Controller follows state of the shared LBI signal then.

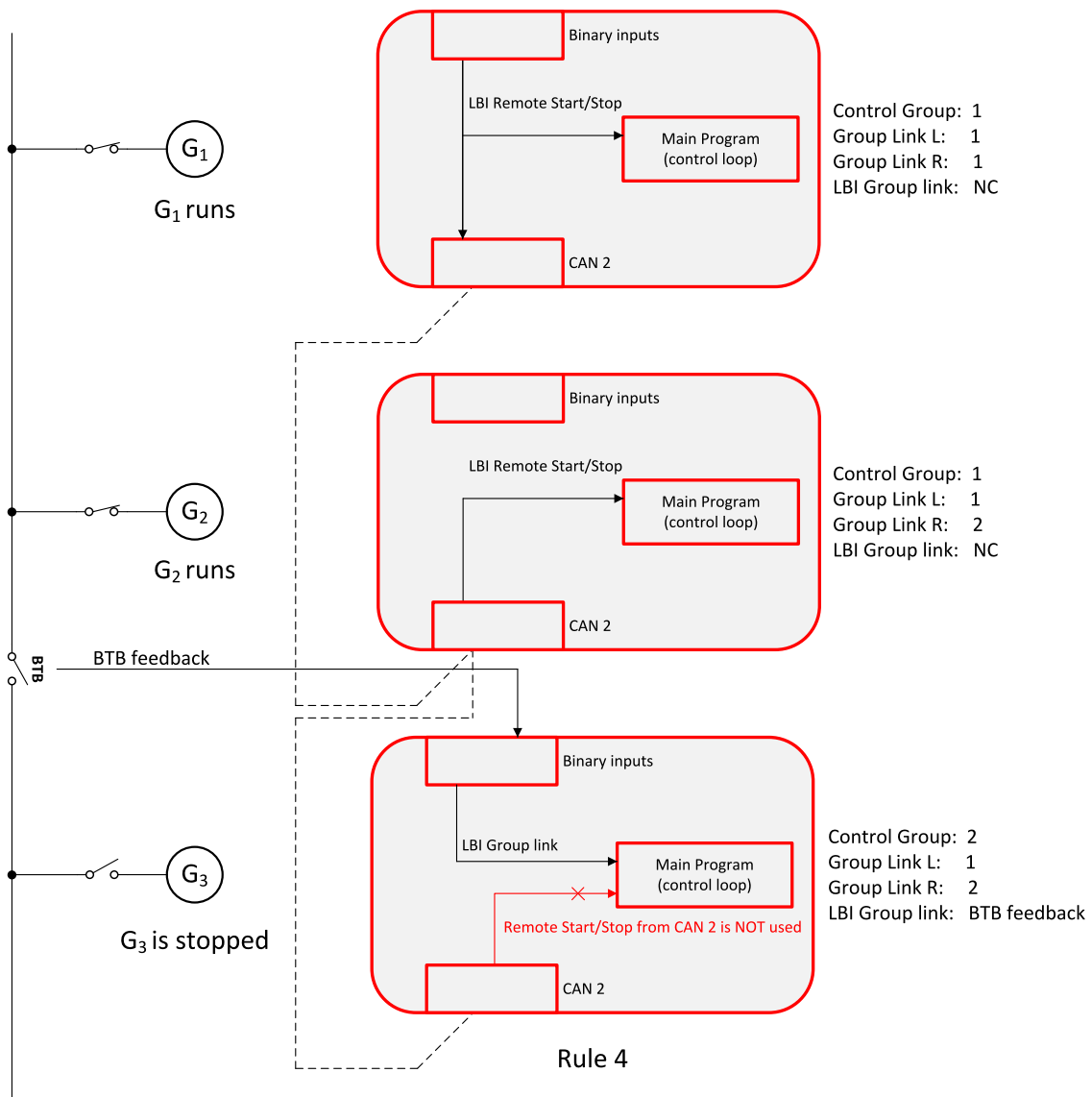


3. LBI state received from CAN2 bus is not used, if corresponding LBI function is configured in a controller.

**Example:** LBI Remote Start/Stop is configured with a controller. Controller follows only state of signal linked with the Remote Start/Stop function. The function is not activated by a shared System Start/Stop signal.



4. LBI function state transmitted via CAN2 bus is used only by controllers, which are in the same group as controller, which is source of the shared signal. Signal coming from controller in a different group is accepted only if the “source controller” group is linked with the “receiving controller” group.



- LBI function can be configured with multiple controllers, which transmit through CAN2 bus state of the function. OR function applies to the function evaluation in controllers, in which the function is not configured. It means that function is activated by shared signal coming from any controller (rule 4. applies).

### 5.3.13 Regulation loops

#### Regulation loops overview

##### Regulation loops overview

| Loop type    | Related applications  | Related setpoints   |
|--------------|-----------------------|---|
| Frequency    | MINT, SPtM, MCB, MGCB | Frequency Gain (page 347), Frequency Int (page 348)       |
| Load sharing | MINT                  | Load Sharing Gain (page 349), Load Sharing Int (page 349) |
| Load         | MINT, SPtM, MCB, MGCB | Load Gain (page 348), Load Int (page 349)                 |
| Voltage      | MINT, SPtM, MCB, MGCB | Voltage Gain (page 356), Voltage Int (page 356)           |

| Loop type        | Related applications  | Related setpoints                                       |
|------------------|-----------------------|---|
| VAr sharing      | MINT                  | VAr Sharing Gain (page 357), VAr Sharing Int (page 357) |
| PF control       | MINT, SPtM, MCB, MGCB | PF Gain (page 356), PF Int (page 357)                   |
| Angle regulation | MINT, SPtM, MCB, MGCB | Angle Gain (page 348)                                   |

Speed, Frequency, Load sharing, Load regulation loops have one common output = Speed request. The value of this output is always composed from the contribution of each of the regulation loops.

Voltage, PF, VAr sharing have one common output = Voltage request. The value of this output is always composed from the contribution of each of the regulation loop.

Each of the regulation loops is active in some certain time during the process, which is given by the state of the automat. If no regulation loop is active the speed governor output is kept on the level given by setpoint **Speed Governor Bias (page 346)** or **Voltage Regulator Bias (page 354)** in case of voltage regulator output.

**Note:** All regulation loops are PID, but only PI components are visible as setpoints.

### MINT regulation loops

| Loop type        | Description  |
|------------------|--|
| Frequency        | The frequency loop is active in the first phase of synchronization when the generator frequency is regulated to match the mains/bus frequency.   |
| Load sharing     | The load sharing loop is active in multiple-island operation.  |
| Load             | The load regulation loop is active when single gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa. This regulation loop is also active when multiple gen-sets are running in parallel with Mains. |
| Voltage          | The voltage regulation loop gets active after <b>Minimal Stabilization Time (page 278)</b> . The loop is deactivated at the beginning of cooling sequence.   |
| VAr sharing      | The VAr sharing loop is active in multiple-island operation.   |
| PF control       | The PF control loop is active when single gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa. This regulation loop is also active when multiple gen-sets are running in parallel with Mains.      |
| Angle regulation | The differential angle control loop is active during the synchronization when phase match type of synchronization is used.   |

### SPtM regulation loop

| Loop type  | Description   |
|------------|---|
| Frequency  | The frequency regulation loop gets active after <b>Minimal Stabilization Time (page 278)</b> . The loop is deactivated at the beginning of cooling sequence. Loop is not active in parallel operation. In parallel operation PF control loop is used. |
| Load       | The load regulation loop is active when gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa.  |
| Voltage    | The voltage regulation loop gets active after <b>Minimal Stabilization Time (page 278)</b> . The loop is deactivated at the beginning of cooling sequence. Loop is not active in parallel operation. In parallel operation PF control loop is used.   |
| PF control | The PF control loop is active when gen-set is running in parallel with mains and during   |

| Loop type        | Description  |
|------------------|--|
|                  | load transfers from mains to generator or vice versa.  |
| Angle regulation | The differential angle control loop is active during the synchronization when phase match type of synchronization is used. |

## Adjustment of regulation loops

The regulation loops have two adjustable factors: P-factor and I-factor (except angle regulation loop, which has P-factor only). The P-factor (gain) influences the stability and overshoot of the regulation loop and the I-factor (int) influences the steady-state error as well as the settling time. See the picture below for typical responses of a PI regulation loop.

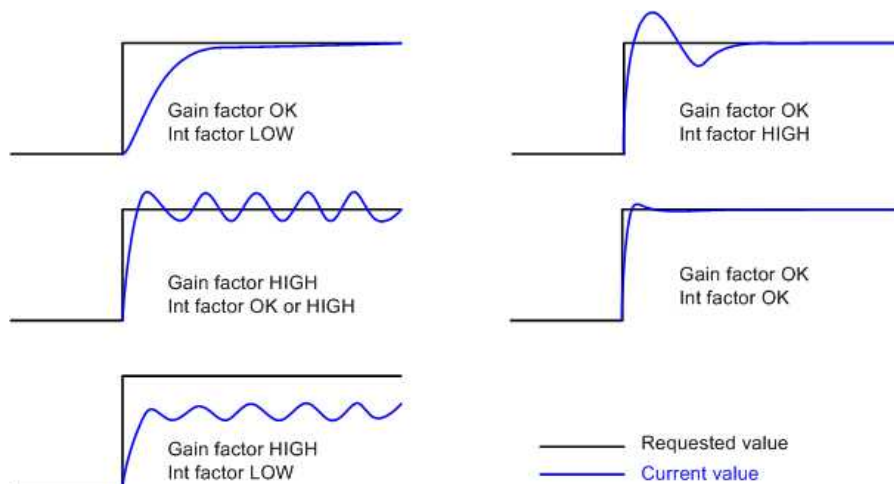


Image 5.32 Typical responses of PI regulator

For manual tuning of a control loop use following method:

- ▶ Set both the I-factor and P-factor to 0.
- ▶ Increase the P-factor slightly until the system starts to oscillate.
- ▶ Adjust the P-factor back to approx. one half of the value where the oscillations started.
- ▶ Increase the I-factor slightly to achieve optimal resulting response.

**IMPORTANT: Be ready to press emergency stop button in case the regulation loop would start to behave unacceptable while it is being adjusted.**

### 5.3.14 Speed/Load control

The speed control output is used to control the speed or the power of the engine. The frequency regulation, load regulation and load sharing are realized through the speed control. The speed request is internal value of the regulator. This value is transformed to range -10 .. 10 V based on setpoints **Speed Governor Low Limit (page 346)** and **Speed Governor High Limit (page 346)**. This value of speed request is then transformed to request which comes out of the controller. There are several ways how to send this request to gen-set:

- ▶ Analog output (speed governor output)
- ▶ ECU speed control
- ▶ Binary pulse control

## Speed control outputs

### Analog Output (speed governor output)

The speed regulator of the engine is controlled by the analog signal from controller. Please see the chapter **Speed governor interface (page 49)** for more information about speed governor.

The direction of speed regulation required by Speed regulator of the engine is given by the setpoint **Speed Regulator Character (page 345)**. A full range change of the speed governor output (from **Speed Governor Low Limit (page 346)** to **Speed Governor High Limit (page 346)**) should cause 5-10% change of the engine speed (**Speed Governor Low Limit (page 346)** ~ 95% Nominal RPM (page 248), **Speed Governor Bias (page 346)** ~ 100% Nominal RPM (page 248), **Speed Governor High Limit (page 346)** ~ 105% Nominal RPM (page 248)).

**IMPORTANT: Speed governor has to be adjusted for optimum performance before Speed/Load control adjusting. Check generator phase sequence before the first GCB connection.**

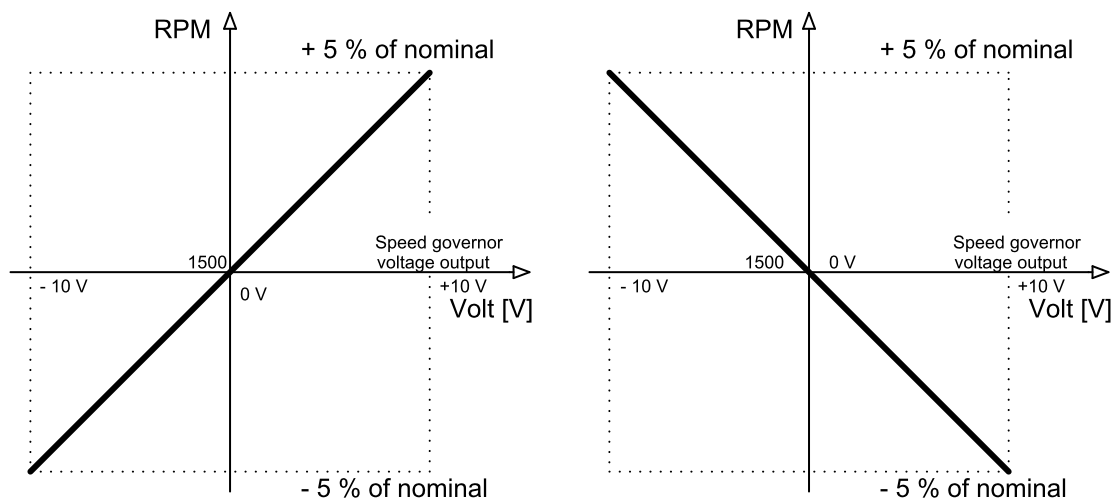


Image 5.33 Example of speed governor curve

### ECU speed control

In case that ECU with speed control support is configured, then the speed is controlled via ECU.

### Binary pulse control

The internal speed request is transformed to Up/Down pulse control. These pulses get out of the controller via binary outputs **SPEED UP (PAGE 736)** and **SPEED DOWN (PAGE 736)**. Length of pulses **SPEED UP (PAGE 736)** and **SPEED DOWN (PAGE 736)** depends on the difference of actual RPM and requested RPM (actual power and requested power, actual frequency and requested frequency) and on the parameter **Tau Speed Governor Actuator (page 347)**. **Tau Speed Governor Actuator (page 347)** defines the pulse duration which is needed for the speed controller to travel from minimal position to the maximal position. The Maximum length of pulses is limited to 5 s, the minimal length of pulses is limited to 150 ms and minimal length between the pulses is 200 ms.

## Speed/Load control adjustment

### Synchronization adjustment

- ▶ Start the engine in MAN Mode.
- ▶ Set the engine RPM by speed trim on the speed governor or by **Speed Governor Bias (page 346)**, **Speed Governor Low Limit (page 346)** and **Speed Governor High Limit (page 346)** to achieve frequency according to setpoint **Nominal Frequency (page 247)**.
- ▶ To start the synchronization press GCB ON/OFF button. GCB LED starts to flash to indicate synchronization. To stop synchronization press again GCB ON/OFF .
- ▶ Adjust **Frequency Gain (page 347)** to unstable speed control and decrease value by 30 % to insure stable performance.
- ▶ Adjust **Frequency Int (page 348)** to stable (fast and smooth) slip control. Synchroscope movement on the controller measure screen should slow down and stop (in any position, because **Angle Gain (page 348)** control is off).
- ▶ Set **Angle Gain (page 348)**. Synchroscope on the controller measure screen should move slowly and stop in “up” position. Set **Angle Gain (page 348)** to unstable value (synchroscope swings) and decrease value by 30 % to insure stable performance.

### Load control adjustment

**IMPORTANT: Prior to Speed/Load control adjustment, the Voltage/PF control has to be adjusted.**

#### MINT application

Load control loop is active in parallel to mains mode only (MCB feedback closed). Switch off other engines while adjusting.

1. Set **#System BaseLoad (page 235)** setpoint to 30 % of one gen-set.
2. Set **Load Gain (page 348)** to the same value as **Angle Gain (page 348)**. Set **Load Int (page 349)** to zero.
3. Start the gen-set in MAN Mode, press GCB ON/OFF button to synchronize and close gen-set to mains.
4. When GCB is closed, gen-set load slowly increases to **#System BaseLoad (page 235)** value. Check that gen-set power is positive (CT polarity).
5. Increase **Load Int (page 349)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 349)** factor is set to zero gen-set load can differ from required **#System BaseLoad (page 235)**.
6. To adjust and optimize **Load Int (page 349)** change **#System BaseLoad (page 235)** several times between 30 and 70 % of **Nominal Power (page 242)**. Usually setting **Load Int (page 349)** to 100 % gives optimal performance.
7. When gen-set is running under full load check if
  - a. Speed governor output voltage value is not limited (it does not reach **Speed Governor Low Limit (page 346)** or **Speed Governor High Limit (page 346)**)
  - b. Speed governor actuator is not mechanically limited or operates in a small section of the throttle range.

#### SPTM application

Load control loop is active in parallel to mains mode only (MCB feedback closed).

1. Set **Load Control PTM (page 230)** = BASELOAD, set **Baseload (page 233)** setpoint to 30 % **Nominal Power (page 242)** of gen-set.



2. Set **Load Gain (page 348)** to the same value as **Angle Gain (page 348)**. Set **Load Int (page 349)** to zero.
3. Start the gen-set in MAN Mode, press GCB ON/OFF button to synchronize and close gen-set to mains.
4. When GCB is closed, gen-set load slowly increases to **Baseload (page 233)** value. Check that gen-set power is positive (CT polarity).
5. Increase **Load Gain (page 348)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 349)** factor is set to zero gen-set load can differ from required **Baseload (page 233)**.
6. To adjust and optimize **Load Int (page 349)** change **Baseload (page 233)** several times between 30 and 70 % of **Nominal Power (page 242)**. Usually setting **Load Int (page 349)** to 100% gives optimal performance.
7. When gen-set is running under full load check if
  - a. Speed governor output voltage value is not limited (it does not reach **Speed Governor Low Limit (page 346)** or **Speed Governor High Limit (page 346)**)
  - b. Speed governor actuator is not mechanically limited or operates in a small section of the throttle range.

### 5.3.15 Voltage/PF control

The voltage control output is used to control the voltage or the power factor of the engine. The voltage regulation, PF regulation and VAR sharing are realized through the voltage control. The voltage request is internal value of the regulator. This value is transformed to range -10 .. 10 V based on setpoints **Voltage Regulator Low Limit (page 355)** limit and **Voltage Regulator High Limit (page 355)**. This value of voltage request is then transformed to request which comes out of the controller. There are several ways how to send this request to gen-set:

- ▶ Analog output (integrated AVR interface)
- ▶ Binary pulse control

#### Voltage control outputs

##### Analog output (integrated AVR interface)

The voltage regulator of the engine is controlled by the analog signal from controller. Please see the chapter **AVR Interface (page 49)** for more information about AVR.

The direction of speed regulation required by Speed regulator of the engine is given by the setpoint **Voltage Regulator Character (page 354)**. A full range change of the AVR output (from **Voltage Regulator Low Limit (page 355)** to **Voltage Regulator High Limit (page 355)**) should cause 5-10% change of the voltage (**Voltage Regulator Low Limit (page 355)** ~ 95% **Nominal Voltage Ph-N (page 246)**, **Voltage Regulator Bias (page 354)** ~ 100% **Nominal Voltage Ph-N (page 246)**, **Voltage Regulator High Limit (page 355)** ~ 105% **Nominal Voltage Ph-N (page 246)**).

##### Binary pulse control

The internal voltage request is transformed to Up/Down pulse control. These pulses get out of the controller via binary outputs **AVR UP (PAGE 706)** and **AVR DOWN (PAGE 706)**. Length of pulses **AVR UP (PAGE 706)** and **AVR DOWN (PAGE 706)** depends on the difference of actual voltage and requested voltage (actual reactive power and requested reacted power, actual PF and requested PF) and on the parameter **Tau Voltage Governor Actuator (page 355)**. **Tau Voltage Governor Actuator (page 355)** defines the pulse duration which is needed for the voltage controller to travel from minimal position to the maximal position. The Maximum length of pulses is limited to 5s, the minimal length of pulses is limited to 150 ms and minimal length between the pulses is 200 ms.

## Voltage/PF control adjustment

### Voltage adjustment

- ▶ Set **Voltage Gain** (page 356), **Voltage Int** (page 356) to zero and **Voltage Regulator Bias** (page 354) to 50%.
- ▶ Start the gen-set in MAN Mode to without load.
- ▶ Adjust generator voltage to **Nominal Voltage Ph-N** (page 246) by change of **Voltage Regulator Bias** (page 354).
- ▶ Change **Voltage Regulator Bias** (page 354) to 0% and 100% to check generator voltage control range (typically  $\pm 10\%$  of **Nominal Voltage Ph-N** (page 246)).
- ▶ Set **Voltage Regulator Bias** (page 354) to again reach **Nominal Voltage Ph-N** (page 246) on the generator.
- ▶ When gen-set is running unloaded increase carefully **Voltage Gain** (page 356) to unstable point and then decrease value by 30 % to insure stable performance.
- ▶ Adjust **Voltage Int** (page 356) (usually setting to 100% gives optimal performance).

### PF adjustment

#### MINT application

Power factor control loop is active in parallel to mains mode only (MCB feedback closed). Switch off other engines while adjusting.

- ▶ Set the same values to **PF Gain** (page 356) and **PF Int** (page 357) as in the chapter **Voltage adjustment** (page 108) for parameters **Voltage Gain** (page 356) and **Voltage Int** (page 356).
- ▶ Set **#System BaseLoad** (page 235) = 30 % of **Nominal Power** (page 242) and **#System Power Factor** (page 236) = 1.0.
- ▶ Start and synchronize the gen-set in MAN Mode by pressing GCB ON/OFF.
- ▶ When running in parallel to mains loaded on 30%, increase slowly **PF Gain** (page 356) to unstable point and then decrease the value by 30 % to insure stable performance.
- ▶ Adjust **PF Int** (page 357) (usually setting to 100% gives optimal performance).

**Note:** To judge optimal adjusting of the power factor induce generator power jumps by **Voltage Regulator Bias** (page 354) change or by **#System BaseLoad** (page 235) change.

#### SPtM application

Power factor control loop is active in parallel to mains mode only (MCB feedback closed).

- ▶ Set the same values to **PF Gain** (page 356) and **PF Int** (page 357) as in the chapter **Voltage adjustment** (page 108) for parameters **Voltage Gain** (page 356) and **Voltage Int** (page 356).
- ▶ Set **Baseload** (page 233) = 30 % of **Nominal Power** (page 242) and **Base Power Factor** (page 233) = 1.0.
- ▶ Start and synchronize the gen-set in MAN Mode by pressing GCB ON/OFF.
- ▶ When running in parallel to mains loaded on 30%, increase slowly **PF Gain** (page 356) to unstable point and then decrease the value by 30 % to insure stable performance.
- ▶ Adjust **PF Int** (page 357) (usually setting to 100% gives optimal performance).

**Note:** To judge optimal adjusting of the power factor induce generator power jumps by **Voltage Regulator Bias** (page 354) change or by **Baseload** (page 233) change.

## 5.3.16 Gen-set operation states

### Engine state machine

|                  |  |
|------------------|--|
| <b>Init</b>      | Autotest during controller power on.   |
| <b>Not ready</b> | Gen-set is not ready to start.<br><b>Example:</b> When shutdown alarm is active or unit is in OFF mode.  |
| <b>Ready</b>     | Gen-set is ready to run.   |
| <b>Prestart</b>  | Prestart sequence in process, <b>PRESTART (PAGE 732)</b> output is closed.<br><b>Example:</b> Usually used for preheating or processes executed prior gen-set start. |
| <b>Cranking</b>  | Engine is cranking, <b>STARTER (PAGE 737)</b> output is closed   |
| <b>Pause</b>     | Pause between start attempts.  |
| <b>Starting</b>  | Starting speed is reached and the Idle timer is running.   |
| <b>Running</b>   | Gen-set is running at nominal speed.   |
| <b>Soft load</b> | Gen-set power is ramping up  |
| <b>Loaded</b>    | Gen-set is running at nominal speed and <b>GCB CLOSE/OPEN (PAGE 716)</b> is closed.  |
| <b>Soft unld</b> | Gen-set power is ramping down  |
| <b>Cooling</b>   | Gen-set is cooling before stop.  |
| <b>Stop</b>      | Stop.<br><b>Example:</b> Automatic or manual stop command was issued, engine is stopping.  |
| <b>Shutdown</b>  | Shut-down alarm activated.   |
| <b>Ventil</b>    | Gas engine - ventilation of unburned fuel when stop command comes during cranking with gas   |
| <b>SDVentil</b>  | Gas engine - ventilation of unburned fuel after unsuccessful start attempt   |
| <b>EmergMan</b>  | <b>EMERGENCY MAN (PAGE 665)</b> gen-set operation.<br><b>Example:</b> Used for bypass the controller and engine manual start.  |

### Engine started conditions

- ▶ Engine speed (RPM) > **Starting RPM (page 273)** or
- ▶ Oil pressure > **Starting Oil Pressure (page 274)** or
- ▶ Binary input **OIL PRESSURE (PAGE 674)** is in logical 0 or
- ▶ D+ terminal active (reached 80% of supply voltage) for minimum 1 s or
- ▶ Generator voltage > 25% of **Nominal Voltage Ph-N (page 246)** or **Nominal Voltage Ph-Ph (page 246)** (any phase)

**Note:** Any of these condition will disconnect starter of the engine, however for transition to next state RPM needs to be higher than **Starting RPM (page 273)**.

### Engine running conditions

- ▶ Engine speed (RPM) > **Starting RPM (page 273)** or
- ▶ Oil pressure > **Starting Oil Pressure (page 274)** or

- ▶ Binary input **OIL PRESSURE (PAGE 674)** is in logical 0 or
- ▶ Generator voltage > 25% of **Nominal Voltage Ph-N (page 246)**

### Still engine conditions

- ▶ Engine speed (RPM) < **Starting RPM (page 273)** or
- ▶ Oil pressure < **Starting Oil Pressure (page 274)** or
- ▶ Binary input **OIL PRESSURE (PAGE 674)** is in logical 1 or
- ▶ Generator voltage < 50 V (any phase)

**Note:** When the engine was running before and all above conditions are fulfilled, additional 2 s delay is necessary to confirm “still engine”.

When any engine running conditions are appeared on still engine than the **Wrm Stop Fail (page 811)** is activated with following delay:

- ▶ for generator voltage from 10 V to < 50 % of nominal voltage, Wrm Stop Fail has delay 1 s
- ▶ for generator voltage > 50 % of nominal voltage, Wrm Stop Fail has delay 200 ms
- ▶ Oil pressure > **Starting Oil Pressure (page 274)**, Wrm Stop Fail has delay 1 s
- ▶ Binary input **OIL PRESSURE (PAGE 674)** is in logical 0, Wrm Stop Fail has delay 1 s
- ▶ for detected RPM, there is no delay.

### Stop engine conditions

If no engine running conditions are validated than the controller will wait extra 12 s before leaving the Machine state Stop and than it will release the **STOP SOLENOID (PAGE 738)** output.

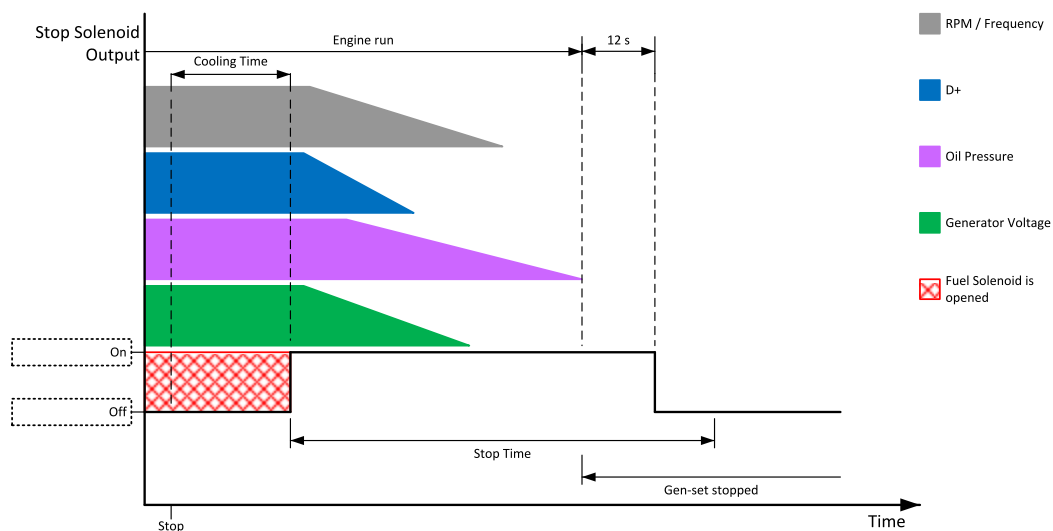


Image 5.34 Engine stops in **Stop Time (page 281)**

When the total time of stopping will exceed setpoint **Stop Time (page 281)** than the **Wrm Stop Fail (page 811)** and binary outputs are activated. The controller will continuously try to stop the engine.

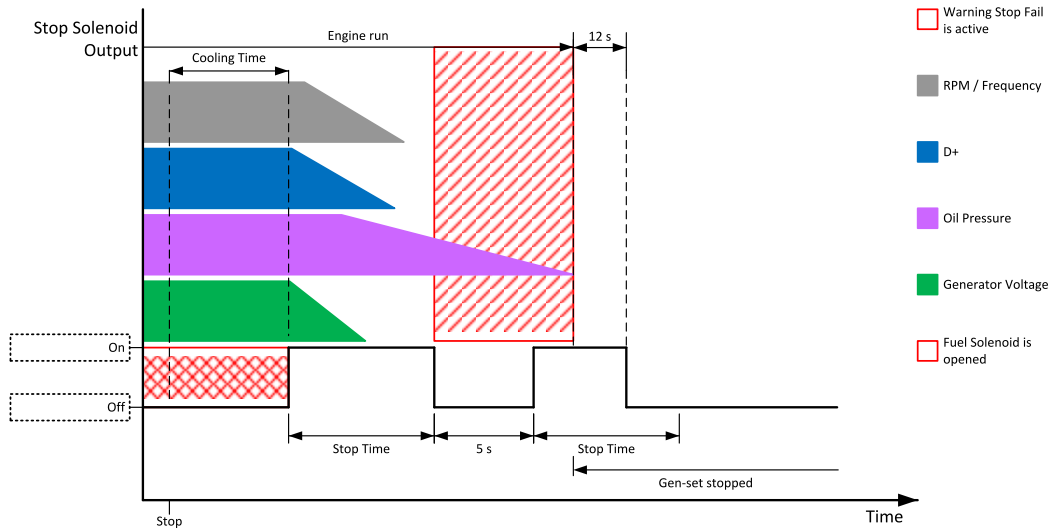


Image 5.35 Engine stops after first **Stop Time** (page 281)

## Electric state machine

|                  |  |
|------------------|--|
| <b>MainsOper</b> | Mains is present and all its values are within limits.<br><span style="color: blue;">■</span> <b>Example:</b> MCB is closed, GCB is opened |
| <b>MainsFit</b>  | Mains fails  |
| <b>IslOper</b>   | Island operation<br><span style="color: blue;">■</span> <b>Example:</b> MCB is opened, GCB is closed                                       |
| <b>MainsRet</b>  | Mains recover  |
| <b>Synchro</b>   | Gen-set is synchronizing (MCB is closed, GCB is opened)  |
| <b>ParalOper</b> | Gen-set is in parallel with mains (MCB is closed, GCB is closed)   |
| <b>BrksOff</b>   | GCB, MCB opened  |

### 5.3.17 Alarm management

The controller evaluates two levels of alarms. Level 1 – yellow alarm – is a pre-critical alarm that is only informative and does not take any action regarding gen-set control. Level 2 – red alarm – represents a critical situation, where an action must be taken to prevent damage of the gen-set or technology.

- ▶ One alarm of any type can be assigned to each binary input.
- ▶ Two alarms (one yellow and one red type) can be assigned to each analog input.
- ▶ There are also **Built-in alarms** (page 115) with fixed alarm types.
- ▶ Each alarm is written to the **Alarmlist** (page 115).
- ▶ Each alarm causes a record to be written into the history log.
- ▶ Each alarm activates the Alarm and Horn output.
- ▶ Each alarm can cause sending of a SMS message or an email.

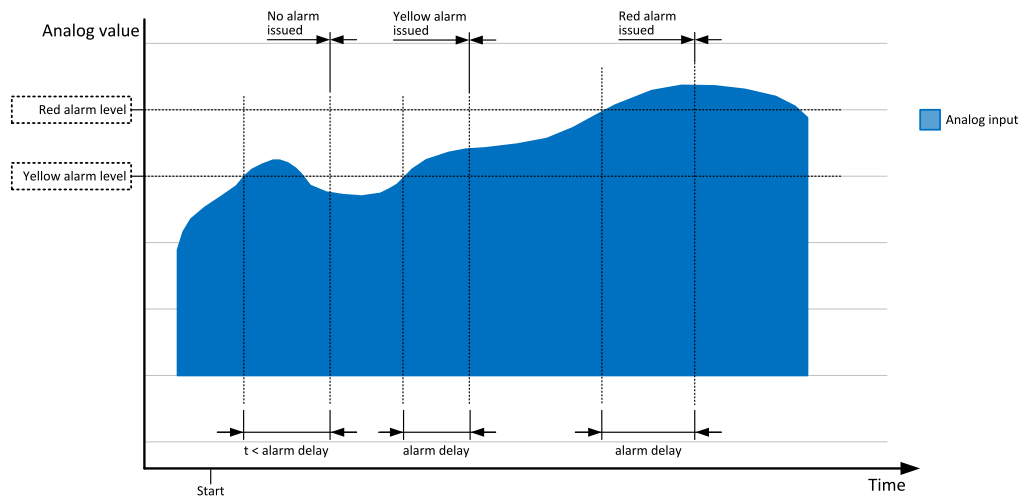


Image 5.36 Analog input alarm evaluation principle

## Alarm handling

There are three different alarm categories regarding the period when the alarms are evaluated. The category is selectable for alarms assigned to binary/analog inputs and fixed for built-in alarms. The categories are the following:

- ▶ The alarm is evaluated all the time when the controller is switched on.
- ▶ The alarm is evaluated only when the engine is running. This type should be used for e.g. oil pressure. These alarms begin to be evaluated after the engine has been started with the delay given by the setpoint **Protection Hold Off (page 279)**.
- ▶ The alarm is evaluated only when the generator is excited. These alarms begin to be evaluated after the engine has been started and **Maximal Stabilization Time (page 279)** has elapsed or the GCB has been closed. They remain evaluated until cooling has finished. Only Generator under/overvoltage and Generator under/overfrequency belong to this category. This category is not configurable to binary and analog input alarms.

If an alarm is being evaluated and the appropriate alarm condition is fulfilled, the delay of evaluation will start to run. The delay is adjustable by a setpoint (in the case of built-in alarms, analog input alarms) or is adjusted via configuration window in IntelliConfig (in the case of binary input alarms). If the conditions persist, the alarm will activate. The alarm will not activate if the condition is dismissed while the delay is still running.

After pressing the Fault reset button or activating the binary input **FAULT RESET BUTTON (PAGE 665)**, all active alarms change to confirmed state. Confirmed alarms will disappear from the Alarmlist as soon as the respective condition dismisses. If the condition is dismissed before acknowledging the alarm, the alarm will remain in the Alarmlist as Inactive.

**Note:** The input **SD OVERRIDE (PAGE 680)** can be used for temporary disabling of red alarms to shutdown the engine. This input may be used in situations where providing the power is extremely important – e.g. if the gen-set drives pumps for fire extinguishers (sprinklers).

## Alarm states

An alarm can have following states:

- ▶ Active alarm: the alarm condition persists, alarm delay has elapsed.
- ▶ Inactive alarm: the alarm condition has disappeared, but the alarm has not been confirmed.
- ▶ Confirmed alarm: the alarm condition persists, but the alarm has already been confirmed.

## Alarm types - Level 1

The level 1 alarm indicates that a value or parameter is out of normal limits, but has still not reached critical level. This alarm does not cause any actions regarding the gen-set control.

### Warning (Wrn)

The alarm appears in the Alarmlist and is recorded into the history log. Activates the output **AL COMMON WRN (PAGE 687)** as well as the standard alarm outputs (**HORN (PAGE 722)** and **ALARM (PAGE 695)**).

### Alarm indication (AL Indic)

The event is only indicated in the Alarmlist. It disappears for the alarmist automatically as soon as the cause disappears. Standard alarm outputs (**HORN (PAGE 722)** and **ALARM (PAGE 695)**) are not activated.

### History record only (HistRecOnl)

The event is recorded into the history. Standard alarm outputs (**HORN (PAGE 722)** and **ALARM (PAGE 695)**) are not activated.

## Alarm types - Level 2

The level 2 level alarm indicates that a critical level of the respective value or parameter has been reached.

**Note:** *It is not possible to start the engine if any red level protection is active or not confirmed.*

**IMPORTANT: The gen-set can start by itself after acknowledging the alarms if there is no longer an active red alarm and the controller is in AUTO or TEST mode!**

### Shutdown (Sd)

The alarm appears in the alarmlist and is recorded into the history log. It causes immediate stop of the Gen-set without unloading and cooling phase. Also GCB breaker is open. The gen-set cannot be started again while there is a shutdown alarm in the alarmlist. Activates the output **AL COMMON SdMPR (PAGE 687)** as well as the standard alarm outputs (**HORN (PAGE 722)** and **ALARM (PAGE 695)**).

### Breaker open and cool down (BOC)

The event appears in the alarmlist and is recorded into the history log. It causes immediate opening of the GCB (without unloading) and then the standard stop sequence with cooling follows. The gen-set cannot be started again while there is a BOC alarm in the alarmlist. Activates the output **AL COMMON BOC (PAGE 686)** as well as the standard alarm outputs (**HORN (PAGE 722)** and **ALARM (PAGE 695)**).

### Slow stop (Stp)

The alarm appears in the alarmlist and is recorded into the history log. It causes stop of the gen-set by the standard stop sequence, i.e. including unloading and cooling phase. The gen-set cannot be started again while there is a slow stop alarm in the alarmlist. Activates the output **AL COMMON STP (PAGE 687)** as well as the standard alarm outputs (**HORN (PAGE 722)** and **ALARM (PAGE 695)**).

## Sensor fail detection (FLS)

If the measured resistance on an analog input exceeds the valid range, a sensor fail will be detected and a sensor fail message will appear in the **Alarmlist (page 115)**. The valid range is defined by the most-left (RL) and most-right (RH) points of the sensor characteristic  $\pm 12.5\%$  from RH-RL.

**Note:** Sometimes there can be problem with lower limit of valid range which can be counted as negative number. In this case the lower limit is set as one half of the RL point of the sensor curve characteristic.

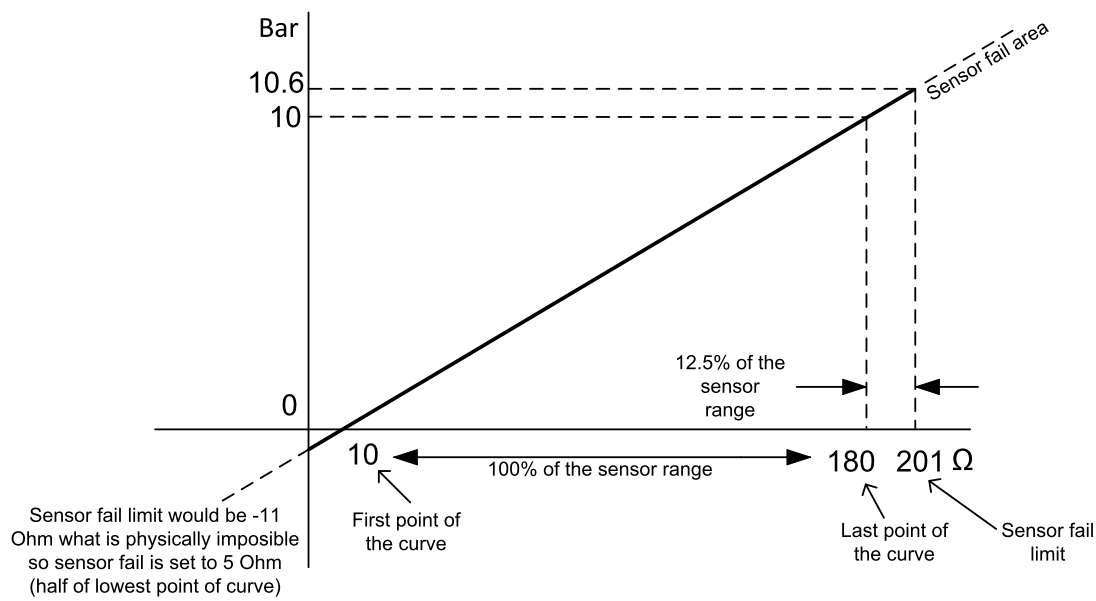


Image 5.37 Sensor fail detection principle

## Remote alarm messaging

If communication plug-in module is connected to the controller, the controller can send SMS messages and emails at the moment when a new alarm appears in the **Alarmlist (page 115)** or new event is written in **History log (page 118)**. The message will contain a copy of the **Alarmlist (page 115)** or reasons from **History log (page 118)**. To enable this function, adjust setpoints **Event Message (page 485)**, **Wrn Message (page 485)**, **BOC Message (page 485)** and **Sd Messages (page 486)** to ON. Also enter a valid GSM phone number or email address to the setpoints **Telephone Number 1 (page 486)**, **Email Address 1 (page 481)**.

The list of all supported terminals shows the table below:

| Terminal     | Event SMS | Warning SMS | BOC SMS | Shutdown SMS | Event email | Warning email | BOC email | Shutdown email |
|--------------|-----------|-------------|---------|--------------|-------------|---------------|-----------|----------------|
| CM-RS232-485 | no        | no          | no      | no           | no          | no            | no        | no             |
| USB          | no        | no          | no      | no           | no          | no            | no        | no             |
| Ethernet     | no        | no          | no      | no           | yes         | yes           | yes       | yes            |
| CM-GPRS      | yes       | yes         | yes     | yes          | yes*        | yes*          | yes*      | yes*           |
| CM-4G-GPS    | yes       | yes         | yes     | yes          | yes*        | yes*          | yes*      | yes*           |

**Note:** \* Only with enabled Mode (page 479).



## Alarmlist

Alarmlist is a container of active and inactive alarms. It will appear automatically on the controller display, if a new alarm occurs, or can be displayed manually from the display menu.

Active alarms are shown as inverted, not yet confirmed alarms are marked with asterisk before them.

Alarmlist contains three types of alarms:

- ▶ Controller built-in alarms
- ▶ User configured alarms on binary or analog inputs
- ▶ ECU alarms

### Controller built-in alarms

An alarm message in the alarmlist begins with a prefix, which represents the alarm type (e.g. Wrn, Sd, BOC, Stp, MP, MPR). Then the alarm name follows. In some cases the prefix can be omitted.

### User configured alarms

An alarm message in the alarmlist begins with a prefix, which represents the alarm type (e.g. Wrn, Sd, BOC, MP, MPR). Alarm type is selected by user during the configuration of binary or analog input as alarm. Then the alarm name follows. Name is adjusted by user during the configuration of binary or analog input as alarm.

### ECU alarms

The ECU alarms are received from the ECU. The alarms are represented by the Diagnostic Trouble Code, which contains information about the subsystem where the alarm occurred, the alarm type and the alarm occurrence counter.

The most common fault codes are translated into text form. Other fault codes are displayed as a numeric code and the engine fault codes list must be used to determine the reason.

## Built-in alarms

| Events specification | Protection type | Description  |
|----------------------|-----------------|--|
| Analog Input 1 Wrn   | WRN             | Value measured on analog input 1 is </> than <b>Analog Protection 1 Wrn (page 366)</b> setpoint. |
| Analog Input 1 Sd    | SD              | Value measured on analog input 1 is </> than <b>Analog Protection 1 Sd (page 366)</b> setpoint.  |
| Analog Input 2 Wrn   | WRN             | Value measured on analog input 2 is </> than <b>Analog Protection 2 Wrn (page 368)</b> setpoint. |
| Analog Input 2 Sd    | SD              | Value measured on analog input 2 is </> than <b>Analog Protection 2 Sd (page 369)</b> setpoint.  |
| Analog Input 3 Wrn   | WRN             | Value measured on analog input 3 is </> than <b>Analog Protection 3 Wrn (page 371)</b> setpoint. |
| Analog Input 3 Sd    | SD              | Value measured on analog input 3 is </> than <b>Analog Protection 3 Sd (page 372)</b> setpoint.  |
| Analog Input 4 Wrn   | WRN             | Value measured on analog input 4 is </> than <b>Analog Protection 4 Wrn (page 374)</b> setpoint. |
| Analog Input 4 Sd    | SD              | Value measured on analog input 4 is </> than <b>Analog Protection 4</b>                          |

| Events specification                             | Protection type | Description  |
|--|-----------------|--|
|  |                 | <b>Sd (page 375)</b> setpoint.   |
| Wrm Battery Voltage                              | WRN             | Battery voltage is out of limits given by <b>Battery Undervoltage (page 301)</b> and <b>Battery Overvoltage (page 301)</b> setpoints.  |
| Binary input                                     |                 | Configurable Warning/BOC/Shutdown alarms on the binary inputs.   |
| Sd Battery Flat                                  | SD              | If the controller switches off during starting sequence ( <b>STARTER (PAGE 737)</b> output is active) it doesn't try to start again and activates this protection (controller assumes bad battery condition).  |
| Sd Start Fail                                    | SD              | Gen-set start failed. All crank attempts were tried without success.   |
| Parameters Fail                                  | NONE            | Wrong check-sum of parameters. Happens typically after downloading new firmware or changing of the parameter. The controller stays in INIT mode. Check all parameters, change value of at least one parameter.   |
| Sd Gen Lx >V<br>BOC Gen Lx <V<br>(where x=1,2,3) | SD<br>BOC       | The generator voltage is out of limits given by Gen <V BOC and Gen >V Sd setpoints.  |
| BOC Gen V Unbalance                              | BOC             | The generator voltage is unbalanced more than the value of <b>Voltage Unbalance BOC (page 309)</b> setpoint.   |
| BOC Gen >,<br><Frequency                         | BOC             | The generator frequency is out of limits given by <b>Generator Overfrequency BOC (page 310)</b> and <b>Generator Underfrequency BOC (page 311)</b> setpoints.  |
| BOC Current Unbalance                            | BOC             | The generator current is unbalanced more than the value of <b>Current Unbalance BOC (page 307)</b> setpoint.   |
| BOC Current IDMT                                 | BOC             | Generator current exceeds the limit for IDMT protection given by <b>Nominal Current (page 243)</b> and <b>IDMT Overcurrent Delay (page 306)</b> setpoints.   |
| BOC Overload                                     | BOC             | The load is greater than the value given by <b>Overload BOC (page 304)</b> setpoint.   |
| Sd Earth Fault                                   | SD              | This alarm is activated when Earth Fault value exceeds <b>Earth Fault Sd (page 491)</b> limit for at least <b>Earth Fault Delay (page 490)</b> period.   |
| Sd Overspeed                                     | SD              | The protection comes active if the speed is greater than <b>Overspeed Sd (page 285)</b> setpoint.  |
| Sd Underspeed                                    | SD              | During starting of the engine when the RPM reach the value of <b>Starting RPM (page 273)</b> setpoint the starter is switched off and the speed of the engine can drop under <b>Starting RPM (page 273)</b> again. Then the Underspeed protection becomes active. Protection evaluation starts 5 seconds after reaching <b>Starting RPM (page 273)</b> . |
| Emergency Stop                                   | SD              | If the input Emergency Stop is opened shutdown is immediately activated.   |
| GCB Fail   | SD              | Failure of generator circuit breaker.  |
| MCB Fail   | WRN             | Failure of mains circuit breaker.  |

| Events specification         | Protection type | Description  |
|------------------------------|-----------------|--|
| Sd RPM Measurement Fail      | SD              | Failure of magnetic pick-up sensor for speed measurement. This alarm appears, if starter was disengaged for other reason than overcrossing <b>Starting RPM (page 273)</b> (like oil pressure or D+) and at the end of timer <b>Maximum Cranking Time (page 272)</b> there are no RPMs > <b>Starting RPM (page 273)</b> detected. |
| Wrm Stop Fail                | WRN             | Gen-set stop failed. See description at Gen-set Operation States chapter.  |
| Wrm Maintenance 1            | WRN             | The period for servicing is set by the <b>Maintenance Timer 1 (page 302)</b> setpoint. The protection comes if counter reaches zero.   |
| Wrm Maintenance 2            | WRN             | The period for servicing is set by the <b>Maintenance Timer 2 (page 303)</b> setpoint. The protection comes if counter reaches zero.   |
| Wrm Maintenance 3            | WRN             | The period for servicing is set by the <b>Maintenance Timer 3 (page 303)</b> setpoint. The protection comes if counter reaches zero.   |
| Charge Alternator Fail       | WRN             | Failure of alternator for charging the battery.  |
| Sd Override                  | WRN             | The protection is active if the output Sd Override is closed.  |
| Mains CCW Rot                | WRN             | Mains voltage phases are not wired correctly. MCB closing is prohibited by controller.   |
| Generator CCW Rot            | WRN             | Genset voltage phases are not wired correctly. GCB closing is prohibited by controller.  |
| Stp Synchronization Fail     | STP             | If the synchronization timeout gets elapsed (forward synchronization).   |
| Wrm Reverse synchro Fail     | WRN             | If the synchronization timeout gets elapsed (reverse synchronization).   |
| BOC Reverse Power            | BOC             | The reverse power is higher than limit adjusted via setpoint <b>Reverse Power Level (page 312)</b> .   |
| BOC Excitation Loss          | BOC             | The reactive power is higher than limit adjusted via setpoint <b>Excitation Loss Level (page 312)</b> .  |
| Wrm Voltage Regulation Limit | WRN             | The AVR output stays close to one of the limit values for more than 2 seconds.   |
| Wrm Speed Regulation Limit   | WRN             | The speed governor output stays close to one of the limit values for more than 2 seconds.  |

**Note:** This table does not contain all alarms in controller. It is only list of the most common alarms.

## 5.3.18 History log

The history log is an area in the controller’s non-volatile memory that records “snapshots” of the system at moments when important events occur. The history log is important especially for diagnostics of failures and problems. When the history file is full, the oldest records are removed.

Each record has the same structure and contains:

- The event which caused the record (e.g. “Overspeed alarm” or “GCB closed”)
- The date and time when it was recorded
- All important data values like RPM, kW, voltages, etc. from the moment that the event occurred.

### Record structure

| Name                | Abbreviation | Description   |
|---------------------|--------------|---|
| Number              | No.          | Row number (0 corresponds to the last record, -1 to the previous one, etc.) |
| Reason              | Reason       | Reason for history record (any event or alarm related to the gen-set)       |
| Time                | Time         | Time  |
| Date                | Date         | Date  |
| RPM                 | RPM          | Engine rotations per minute   |
| Power               | Pwr          | Generator active power  |
| Reactive power      | Q            | Generator reactive power  |
| Power Factor        | PF           | Generator power factor  |
| Load Character      | LChr         | Generator load character  |
| Generator Frequency | Gfrq         | Generator Frequency   |
| Generator Voltage   | Vg1          | Generator voltage Ph1   |
| Generator Voltage   | Vg2          | Generator voltage Ph2   |
| Generator Voltage   | Vg3          | Generator voltage Ph3   |
| Generator Voltage   | Vg12         | Generator voltage Ph12  |
| Generator Voltage   | Vg23         | Generator voltage Ph23  |
| Generator Voltage   | Vg31         | Generator voltage Ph31  |
| Generator Current   | IL1          | Generator current Ph1   |
| Generator Current   | IL2          | Generator current Ph2   |
| Generator Current   | IL3          | Generator current Ph3   |
| Mains Frequency     | Mfrq         | Mains Frequency   |
| Mains Voltage       | Vm1          | Mains voltage Ph1   |
| Mains Voltage       | Vm2          | Mains voltage Ph2   |
| Mains Voltage       | Vm3          | Mains voltage Ph3   |
| Mains Voltage       | Vm12         | Mains voltage Ph12  |
| Mains Voltage       | Vm23         | Mains voltage Ph23  |
| Mains Voltage       | Vm31         | Mains voltage Ph31  |

|                         |        |   |
|-------------------------|--------|---|
| Voltage Battery         | VBat   | Voltage of battery                      |
| Analog Input 1          | Ain1   | Analog input 1                          |
| Analog Input 2          | Ain2   | Analog input 2                          |
| Analog Input 3          | Ain3   | Analog input 3                          |
| Analog Input 4          | Ain4   | Analog input 4                          |
| Binary Inputs           | BIN    | Controller binary inputs                |
| E-Stop                  | E-Stop | State of dedicated E-Stop input         |
| Binary Outputs          | BOUT   | Controller binary outputs               |
| Speed regulator         | SRO    | Speed regulator output                  |
| Voltage regulator       | VRO    | Voltage regulator output                |
| Running nominal power   | TRPN   | Nominal power of all running gen-sets   |
| Available nominal power | APN    | Available nominal power of all gen-sets |
| Controller Mode         | Mode   | Controller mode                         |

**Note:** When some setpoint is changed, in history log is written its number of communication object.

**Note:** Some additional columns can be added due to actual controller configuration (ECU, modules, etc.).

### 5.3.19 Breaker control

The following power switches are controlled by the controller:

- ▶ The master generator circuit breaker or contactor – MGCB

It is possible to use either a motorized circuit breaker or contactor. Below is a list of available control outputs that should fit all types of contactors or breakers. The following rules must be kept to when designing the wiring of power switches:

- ▶ The control outputs must be configured and wiring of the power switches must be provided in such a way, that the controller has full control over the breakers – i.e. the controller can open and close the breaker at any time.
- ▶ The breaker must respond within max. 2 seconds to a close and open command. Special attention should be paid to opening of motorized circuit breakers, as it could take more than 2 seconds on some types. In such cases it is necessary to use an undervoltage coil for fast opening.
- ▶ After opening the breaker, there is internal delay for another closing of breaker. Delay is 6 seconds - 5 seconds for OFF coil and 1 second for UV coil. After these 6 seconds, breaker can be closed again. For opening of breaker there is no delay.

## Breaker control outputs

|                   |   |
|-------------------|---|
| <b>Close/Open</b> | An output for control of a contactor. Its state represents the breaker position requested by the controller. The breaker must react within 2 seconds to a close or open command, otherwise an alarm is issued.  |
| <b>ON coil</b>    | An output giving a 2 second pulse in the moment the breaker has to be closed. The output is intended for control of close coils of circuit breakers.  |
| <b>OFF coil</b>   | An output giving a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 2 seconds. The output is intended for control of open coils of circuit breakers.  |
| <b>UV coil</b>    | The GCB UV coil output is active the whole time the gen-set is running (not in idle or cooling). The output is deactivated for at least 2 seconds in the moment the breaker has to be switched off. The output is intended for control of undervoltage coils of circuit breakers. |

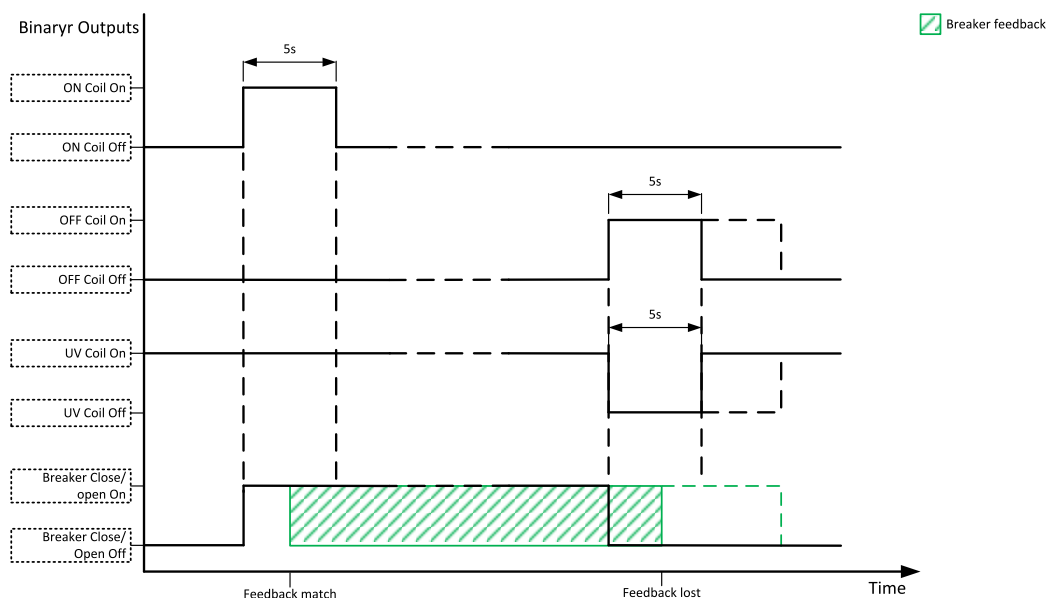


Image 5.38 Breaker control outputs

## MCB special requirements

- ▶ If a contactor is used on the MCB position, it is recommended that the wiring be provided in such a way that the contactor will be normally closed and will open if the logical binary output **MCB CLOSE/OPEN** (PAGE 726) closes. This behavior is called “negative logic” and can be adjusted by the setpoint **MCB Logic** (page 323). The negative logic will prevent accidental opening of the MCB when the controller is switched off.
- ▶ If a contactor is used on the MCB position, it will open itself immediately after the mains have failed, because it will lose power for the coil. That is why the following adjustment is necessary to prevent triggering the **Wrn MCB Fail** (page 809) alarm: **MCB Opens On** (page 325) = Mains Fail, **Mains < > Voltage Delay** (page 321) ≤ 1.
- ▶ If a 230 V motor driven circuit breaker is used on the MCB position and an undervoltage coil is not fitted, it is not possible to open the breaker after the mains have failed, because there is no power for the motor drive until the gen-set is started and providing voltage. Adjusting the setpoint **MCB Opens On** (page 325) = Gen Run will prevent triggering the **Wrn MCB Fail** (page 809) alarm.

## Breaker fail detection

Breaker fail detection is based on binary output breaker close/open comparing with binary input breaker feedback.

**IMPORTANT: It is necessary to configure breaker feedback to use this function.**

**IMPORTANT: Also it is possible to use breakers without feedbacks. In this case there is no check of breaker real state.**

There are three different time delays for breaker fail detection – see following diagrams.

**IMPORTANT: When controller is synchronizing, there is only 2 seconds delay for breaker fail detection.**

When binary output breaker close/open is in steady state and breaker feedback is changed the breaker fail is detected immediately (no delay).

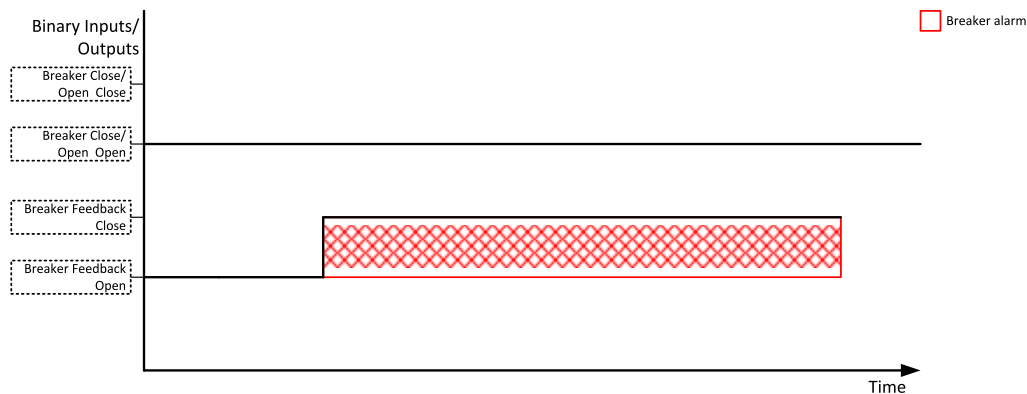


Image 5.39 Breaker fail - breaker close/open in steady position - open

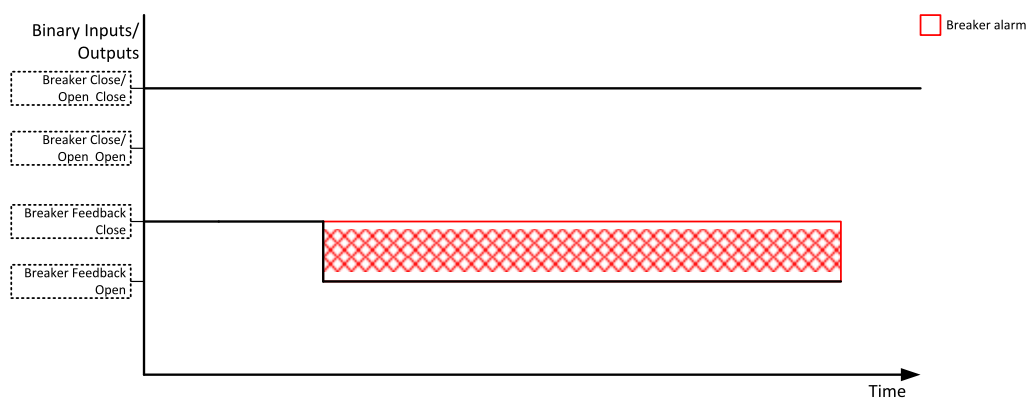


Image 5.40 Breaker fail - breaker close/open in steady position - close

When binary output breaker close/open opens there is 2 sec delay for breaker fail detection.

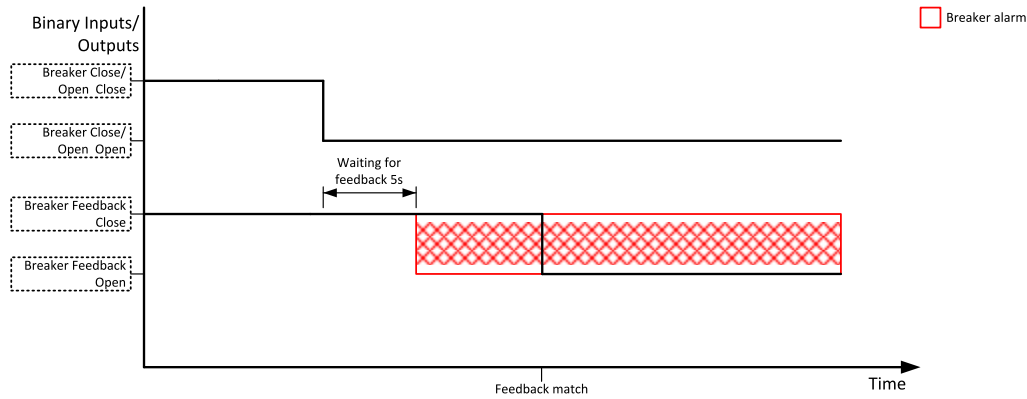


Image 5.41 Breaker fail - breaker close/open opens

When binary output breaker close/open closes there is 2 sec delay for breaker fail detection.

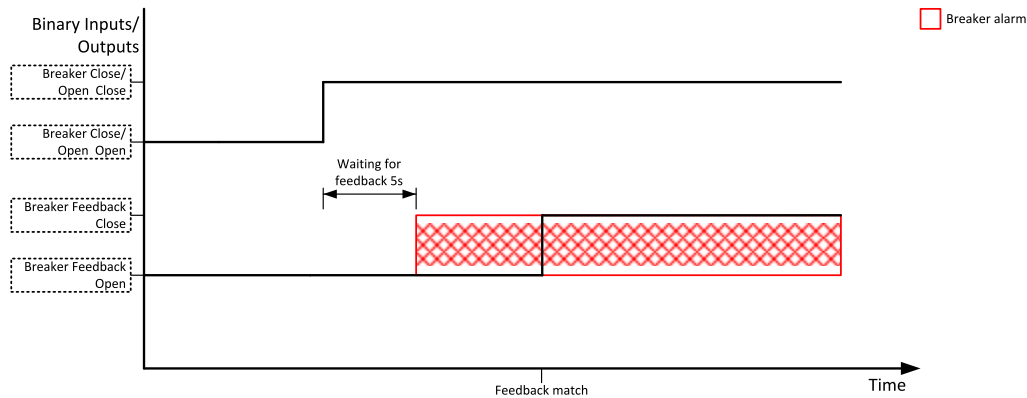


Image 5.42 Breaker fail - breaker close/open closes

### 5.3.20 Exercise timer

The exercise (general-purpose) timer in controller intended for scheduling of any operations such as e.g. periodic tests of the gen-set, scheduled transfer of the load to the gen-set prior to an expected disconnection of the mains etc.

Related setpoints for timer 1 are:

- ▶ **Timer 1 Function (page 428)**
- ▶ **Timer 1 Day (page 432)**
- ▶ **Timer 1 Repetition (page 429)**
- ▶ **Timer 1 Repeated Day In Week (page 433)**
- ▶ **Timer 1 First Occur. Date (page 429)**
- ▶ **Timer 1 Repeat Day In Month (page 433)**
- ▶ **Timer 1 First Occur. Time (page 429)**
- ▶ **Timer 1 Repeat Week In Month (page 434)**
- ▶ **Timer 1 Duration (page 430)**
- ▶ **Timer 1 Refresh Period (page 431)**
- ▶ **Timer 1 Repeated (page 430)**
- ▶ **Timer 1 Weekends (page 432)**
- ▶ **Timer 1 Repeat Day (page 433)**



Related setpoints for timer 2 are:

- ▶ [Timer 2 Function \(page 435\)](#)
- ▶ [Timer 2 Repetition \(page 436\)](#)
- ▶ [Timer 2 First Occur. Date \(page 436\)](#)
- ▶ [Timer 2 First Occur. Time \(page 436\)](#)
- ▶ [Timer 2 Duration \(page 437\)](#)
- ▶ [Timer 2 Repeated \(page 437\)](#)
- ▶ [Timer 2 Repeat Day \(page 440\)](#)
- ▶ [Timer 2 Day \(page 439\)](#)
- ▶ [Timer 2 Repeated Day In Week \(page 440\)](#)
- ▶ [Timer 2 Repeat Day In Month \(page 440\)](#)
- ▶ [Timer 2 Repeat Week In Month \(page 441\)](#)
- ▶ [Timer 2 Refresh Period \(page 438\)](#)
- ▶ [Timer 2 Weekends \(page 439\)](#)

### Available modes of timer:

|                     |   |
|---------------------|---|
| <b>Once</b>         | This is a single shot mode. The timer will be activated only once at preset date/time for preset duration.  |
| <b>Daily</b>        | The timer is activated every "x-th" day. The day period "x" is adjustable. Weekends can be excluded. E.g. the timer can be adjusted to every 2nd day excluding Saturdays and Sundays.   |
| <b>Weekly</b>       | The timer is activated every "x-th" week on selected weekdays. The week period "x" is adjustable. E.g. the timer can be adjusted to every 2nd week on Monday and Friday.  |
| <b>Monthly</b>      | The timer is activated every "x-th" month on the selected day. The requested day can be selected either as "y-th" day in the month or as "y-th" weekday in the month. E.g. the timer can be adjusted to every 1st month on 1st Tuesday. |
| <b>Short period</b> | The timer is repeated with adjusted period (hh:mm). The timer duration is included in the period.   |

### Once mode

#### Set-up via IntelliConfig

To set-up timer via IntelliConfig go to the setpoint ribbon, setpoint group scheduler and setpoint *Timer 1 Setup*.

**Note:** First of all function of timer has to be adjusted via setpoint *Timer 1 Function (page 428)*.

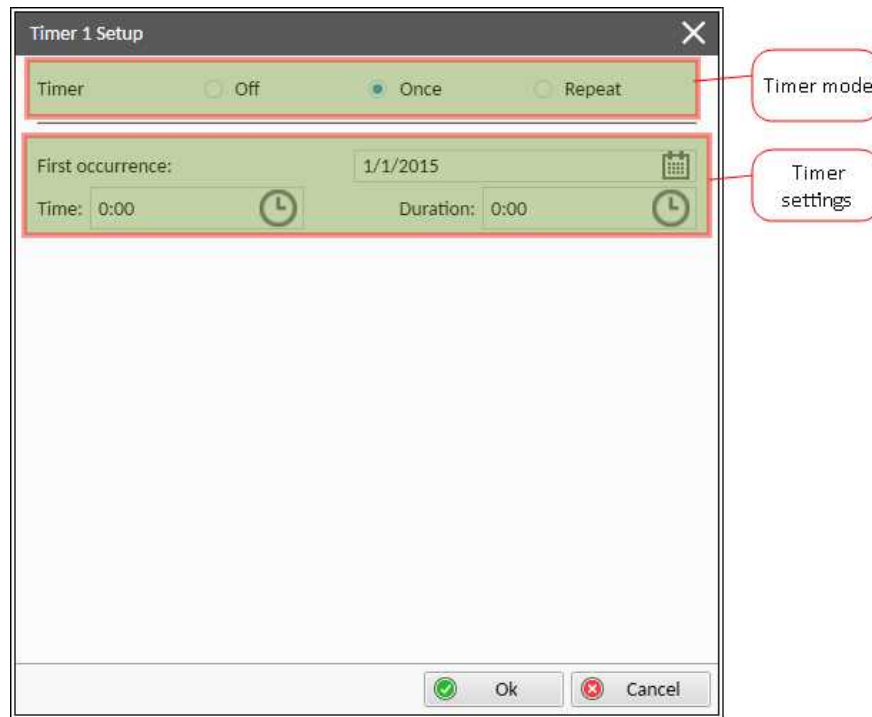


Image 5.43 Once mode - IntelliConfig

In timer mode select Once. In timer settings adjust date and time of occurrence of timer. Also adjust the duration of timer.

### Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 428)** setpoint. Then go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 429)** setpoint select Once mode. Then adjust **Timer 1 First Occur. Date (page 429)**, **Timer 1 First Occur. Time (page 429)** and **Timer 1 Duration (page 430)**.

**Note:** Use left and right buttons to move between timer setpoints.

## Daily mode

### Set-up via IntelliConfig

To set-up timer via IntelliConfig go to the setpoint ribbon, setpoint group scheduler and setpoint *Timer 1 Setup*.

**Note:** First of all function of timer has to be adjusted via setpoint **Timer 1 Function (page 428)**.

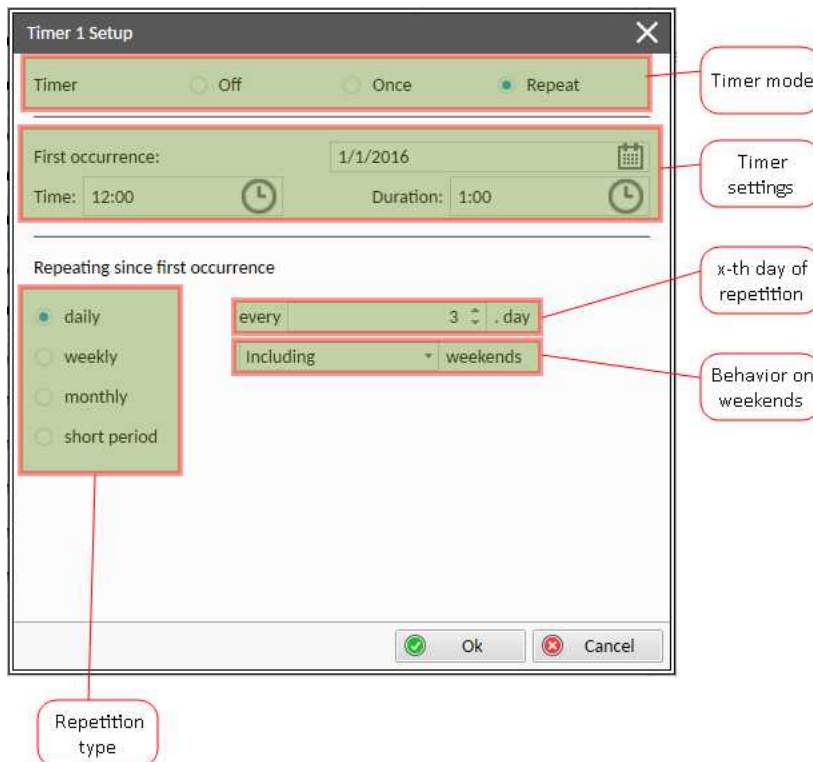


Image 5.44 Daily mode - IntelliConfig

In timer mode select Repeat. In repetition type select Daily. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the x-th day of repetition (**Timer 1 Refresh Period (page 431)**) and behavior of timer on weekends (**Timer 1 Weekends (page 432)**).

**Example:** On image example first start of timer will be 1/1/2016 at 12:00. Duration will be 1 hour. Timer will be again activated every 3rd day at 12:00 for 1 hour including weekends.

### Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 428)** setpoint. Then go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 429)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 429)**, **Timer 1 First Occur. Time (page 429)** and **Timer 1 Duration (page 430)**. In setpoint **Timer 1 Repeated (page 430)** select Daily and adjust **Timer 1 Refresh Period (page 431)** (x-th day of repetition) and **Timer 1 Weekends (page 432)** (behavior of timer on weekends).

**Note:** Use left and right buttons to move between timer setpoints.

## Weekly mode

### Set-up via IntelliConfig

To set-up timer via IntelliConfig go to the setpoint ribbon, setpoint group scheduler and setpoint *Timer 1 Setup*.

**Note:** First of all function of timer has to be adjusted via setpoint **Timer 1 Function (page 428)**.

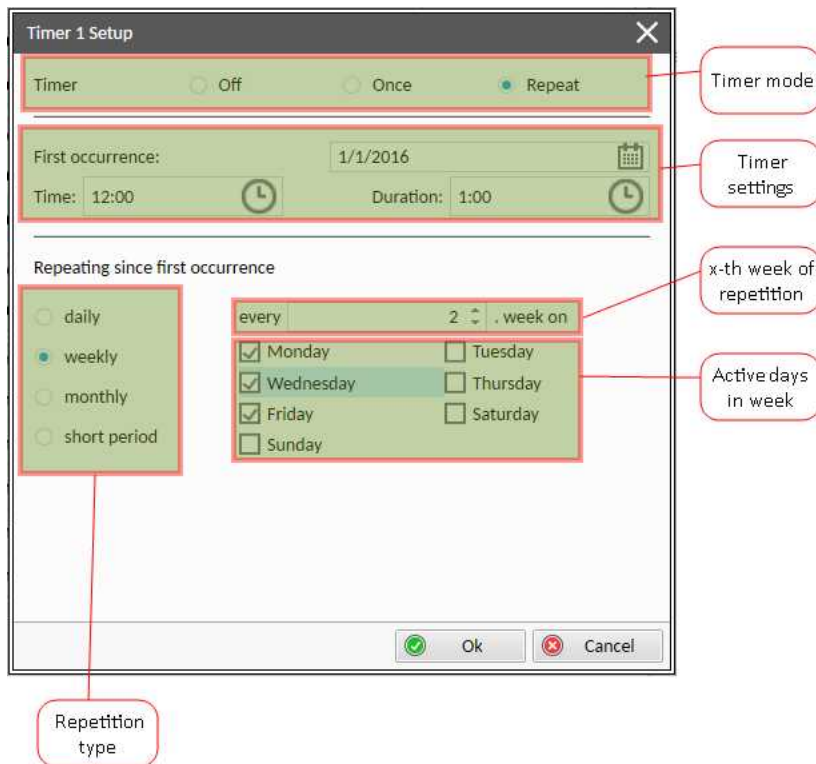


Image 5.45 Weekly mode - IntelConfig

In timer mode select Repeat. In repetition type select Weekly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Than select the x-th week of repetition (**Timer 1 Refresh Period (page 431)**) and days when timer should be active (**Timer 1 Day (page 432)**).

**Example:** On image example first start of timer will be 1/1/2016 at 12:00. Duration will be 1 hour. Timer will be again activated every 2nd week on Monday, Wednesday and Friday at 12:00 for 1 hour.

### Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 428)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 429)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 429)**, **Timer 1 First Occur. Time (page 429)** and **Timer 1 Duration (page 430)**. In setpoint **Timer 1 Repeated (page 430)** select Weekly and adjust **Timer 1 Day (page 432)** (days when timer should be active) and **Timer 1 Refresh Period (page 431)** (x-th week of repetition).

**Note:** Use left and right buttons to move between timer setpoints.

## Monthly mode

### Set-up via IntelConfig

To set-up timer via IntelConfig go to the setpoint ribbon, setpoint group scheduler and setpoint *Timer 1 Setup*.

**Note:** First of all function of timer has to be adjusted via setpoint **Timer 1 Function (page 428)**.

There are two types of monthly repetition. First of them is based on repeating one day in month.

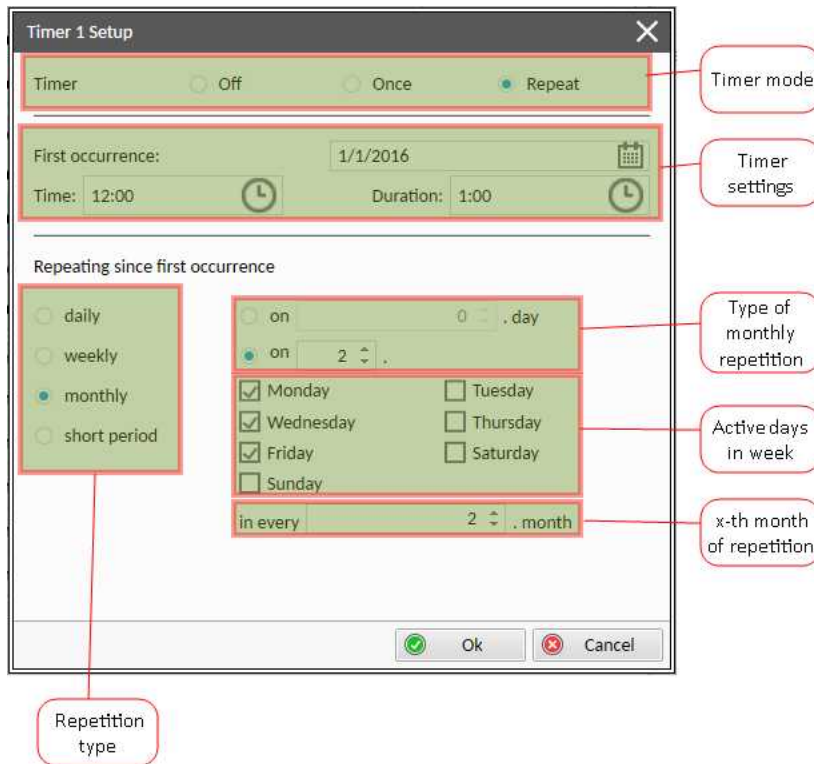


Image 5.46 Monthly mode - IntelConfig

In timer mode select Repeat. In repetition type select Monthly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Than select the type of monthly repetition and the x-th day of repetition (**Timer 1 Repeat Day In Month (page 433)**). Than select the x-th month of repetition.

**Example:** On image example first start of timer will be 1/1/2016 at 12:00. Duration will be 1 hour. Timer will be again activated every 2nd day in 2nd month at 12:00 for 1 hour.

Second type of monthly repetition is based on repeating days in week in month.

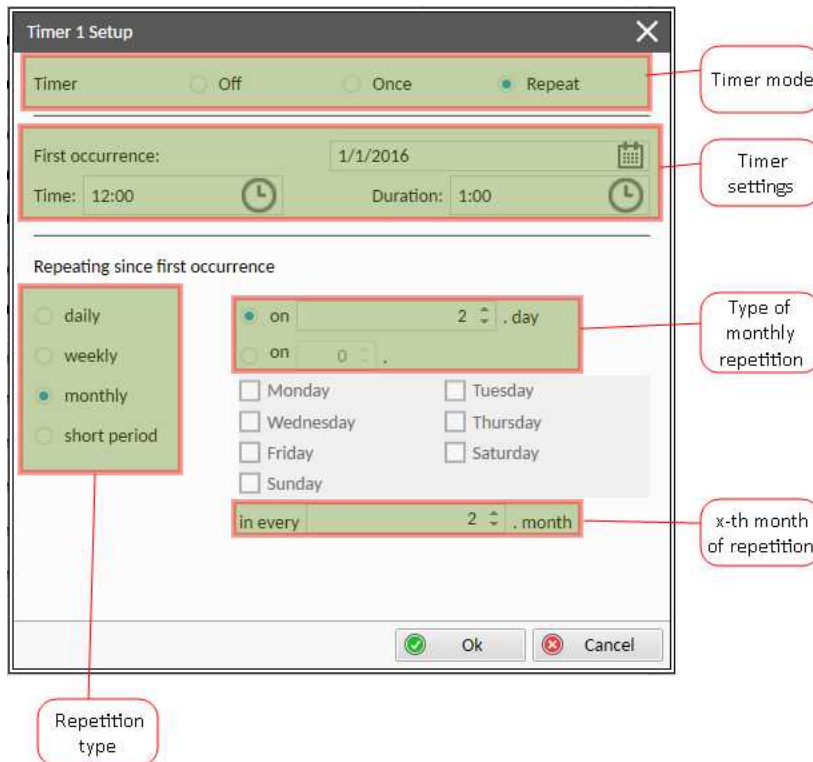


Image 5.47 Monthly mode - IntelConfig

In timer mode select Repeat. In repetition type select Monthly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the type of monthly repetition, the x-th week of repetition and days in week. Then select the x-th month of repetition.

**Example:** On image example first start of timer will be 1/1/2016 at 12:00. Duration will be 1 hour. Timer will be again activated every 2nd week in 2nd month on Monday, Wednesday and Friday at 12:00 for 1 hour.

### Set-up via controller interface

There are two types of monthly repetition. First of them is based on repeating one day in month.

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 428)** setpoint. Then go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 429)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 429)**, **Timer 1 First Occur. Time (page 429)** and **Timer 1 Duration (page 430)**. In setpoint **Timer 1 Repeated (page 430)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 433)**, **Timer 1 Refresh Period (page 431)** (x-th month of repetition) and **Timer 1 Repeat Day In Month (page 433)** (concrete day in repeated months).

Second type of monthly repetition is based on repeating days in week in month.

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 428)** setpoint. Then go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 429)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 429)**, **Timer 1 First Occur. Time (page 429)** and **Timer 1 Duration (page 430)**. In setpoint **Timer 1 Repeated (page 430)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 433)**, **Timer 1 Refresh Period (page 431)** (x-th month of repetition), **Timer 1 Repeated Day In Week (page 433)** (days in week when timer is active) and **Timer 1 Repeat Week In Month (page 434)** (concrete week in repeated months).

**Note:** Use left and right buttons to move between timer setpoints.

## Short period mode

### Set-up via IntelliConfig

To set-up timer via IntelliConfig go to the setpoint ribbon, setpoint group scheduler and setpoint *Timer 1 Setup*.

**Note:** First of all function of timer has to be adjusted via setpoint *Timer 1 Function* (page 428).

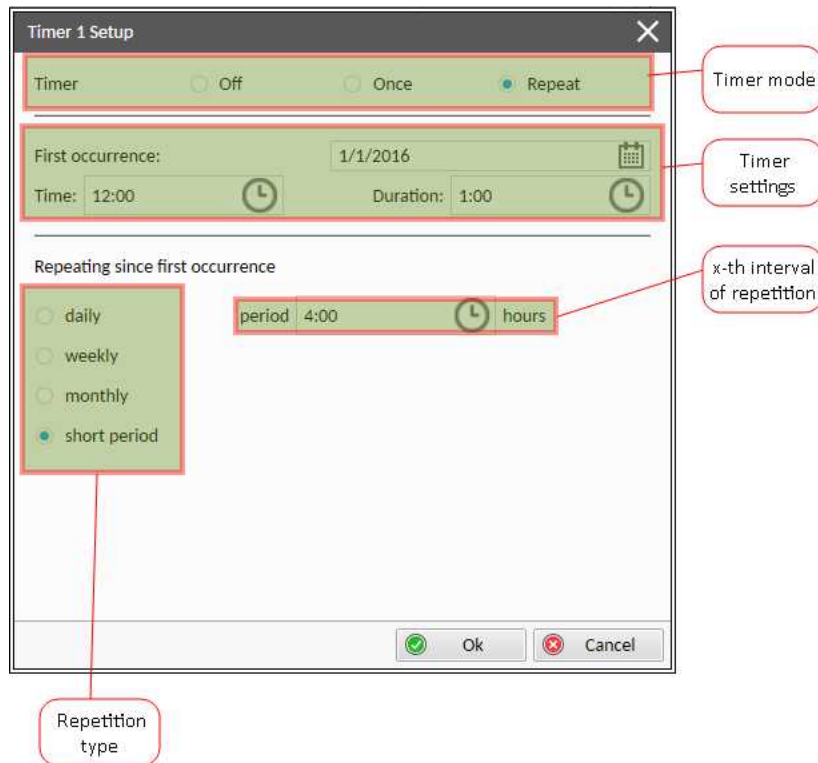


Image 5.48 Short period mode - IntelliConfig

In timer mode select Repeat. In repetition type select Short period. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the interval of repetition (shorter than 1 day).

**Example:** On image example first start of timer will be 1/1/2016 at 12:00. Duration will be 1 hour. Timer will be again activated every 4th hour for 1 hour.

### Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function** (page 428) setpoint. Then go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition** (page 429) setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date** (page 429), **Timer 1 First Occur. Time** (page 429) and **Timer 1 Duration** (page 430). In setpoint **Timer 1 Repeated** (page 430) select Short Period and adjust **Timer 1 Refresh Period** (page 431) (interval of repetition).

**Note:** Use left and right buttons to move between timer setpoints.

## 5.3.21 Rental Timers

In controller are two timers which are designed like rental timer. Rental timers will stop gen-set after their elapse.

## How to set-up rental timer

This is a short guide for settings of rental timers. Please see following few steps how to set up rental timers:

- ▶ Choose the type of rental timer
  - **Rental Timer 1 (page 441)** (based on engine running hours)
  - **Rental Timer 2 (page 443)** (based on date)
- ▶ Adjust the length of chosen timer
- ▶ Adjust the warning for user **Rental Timer 1 Wrn (page 443)** or **Rental Timer 2 Wrn (page 445)**(warning will be displayed in alarmlist before elapsing of rental timer)
- ▶ Adjust **Rental Timer BOC (page 445)** - common for both timers (if engine is still running after rental timer counts down, this timer will starts count down and after elapse of timer the gen-set will be cooled down and stop)

### 5.3.22 Service timers

#### Running hours counters

Service timers are used as maintenance interval counters. Counters can be set by setpoints - **Maintenance Timer 1 (page 302)**, **Maintenance Timer 2 (page 303)** and **Maintenance Timer 3 (page 303)**. All of them work the same way - their values are decremented every hour when the gen-set is running.

Actual value of counters is located either as the same setpoints **Maintenance Timer 1 (page 302)**, **Maintenance Timer 2 (page 303)** and **Maintenance Timer 3 (page 303)** or as values **Maintenance 1 (page 583)**, **Maintenance 2 (page 584)** and **Maintenance 3 (page 584)**.

When the value of counter reaches 0, the alarm **Wrn Maintenance 1 (page 808)** or **Wrn Maintenance 2 (page 808)** or **Wrn Maintenance 3 (page 809)** is active until the respective counter is readjusted back to nonzero value.

Unused counter has to be adjusted to maximal value 10000 (Disabled).

### 5.3.23 Analog switches

There are logical analog function dedicated for analog switches. Each analog switch has setpoints for level ON and level OFF and logical binary output.

| Analog switch                   | Setpoints   | Binary output                  |
|---------------------------------|---|--------------------------------|
| <b>AIN SWITCH 01 (PAGE 764)</b> | <b>Analog Switch 1 On (page 367)</b><br><b>Analog Switch 1 Off (page 368)</b> | <b>AIN SWITCH01 (PAGE 696)</b> |
| <b>AIN SWITCH 02 (PAGE 764)</b> | <b>Analog Switch 2 On (page 370)</b><br><b>Analog Switch 2 Off (page 371)</b> | <b>AIN SWITCH02 (PAGE 696)</b> |
| <b>AIN SWITCH 03 (PAGE 764)</b> | <b>Analog Switch 3 On (page 373)</b><br><b>Analog Switch 3 Off (page 374)</b> | <b>AIN SWITCH03 (PAGE 697)</b> |
| <b>AIN SWITCH 04 (PAGE 765)</b> | <b>Analog Switch 4 On (page 376)</b><br><b>Analog Switch 4 Off (page 377)</b> | <b>AIN SWITCH04 (PAGE 697)</b> |
| <b>AIN SWITCH 05 (PAGE 765)</b> | <b>Analog Switch 5 On (page 379)</b><br><b>Analog Switch 5 Off (page 380)</b> | <b>AIN SWITCH05 (PAGE 698)</b> |



| <b>Analog switch</b>            | <b>Setpoints</b>  | <b>Binary output</b>           |
|---------------------------------|---|--------------------------------|
| <b>AIN SWITCH 06 (PAGE 765)</b> | Analog Switch 6 On (page 382)<br>Analog Switch 6 Off (page 383)   | <b>AIN SWITCH06 (PAGE 698)</b> |
| <b>AIN SWITCH 07 (PAGE 766)</b> | Analog Switch 7 On (page 385)<br>Analog Switch 7 Off (page 386)   | <b>AIN SWITCH07 (PAGE 699)</b> |
| <b>AIN SWITCH 08 (PAGE 766)</b> | Analog Switch 8 On (page 388)<br>Analog Switch 8 Off (page 389)   | <b>AIN SWITCH08 (PAGE 699)</b> |
| <b>AIN SWITCH 09 (PAGE 766)</b> | Analog Switch 9 On (page 391)<br>Analog Switch 9 Off (page 392)   | <b>AIN SWITCH09 (PAGE 700)</b> |
| <b>AIN SWITCH 10 (PAGE 767)</b> | Analog Switch 10 On (page 394)<br>Analog Switch 10 Off (page 395) | <b>AIN SWITCH10 (PAGE 700)</b> |
| <b>AIN SWITCH 11 (PAGE 767)</b> | Analog Switch 11 On (page 397)<br>Analog Switch 11 Off (page 398) | <b>AIN SWITCH11 (PAGE 701)</b> |
| <b>AIN SWITCH 12 (PAGE 767)</b> | Analog Switch 12 On (page 400)<br>Analog Switch 12 Off (page 401) | <b>AIN SWITCH12 (PAGE 701)</b> |
| <b>AIN SWITCH 13 (PAGE 768)</b> | Analog Switch 13 On (page 403)<br>Analog Switch 13 Off (page 404) | <b>AIN SWITCH13 (PAGE 702)</b> |
| <b>AIN SWITCH 14 (PAGE 768)</b> | Analog Switch 14 On (page 406)<br>Analog Switch 14 Off (page 407) | <b>AIN SWITCH14 (PAGE 702)</b> |
| <b>AIN SWITCH 15 (PAGE 768)</b> | Analog Switch 15 On (page 409)<br>Analog Switch 15 Off (page 410) | <b>AIN SWITCH15 (PAGE 703)</b> |
| <b>AIN SWITCH 16 (PAGE 769)</b> | Analog Switch 16 On (page 412)<br>Analog Switch 16 Off (page 413) | <b>AIN SWITCH16 (PAGE 703)</b> |
| <b>AIN SWITCH 17 (PAGE 769)</b> | Analog Switch 17 On (page 415)<br>Analog Switch 17 Off (page 416) | <b>AIN SWITCH17 (PAGE 704)</b> |
| <b>AIN SWITCH 18 (PAGE 769)</b> | Analog Switch 18 On (page 418)<br>Analog Switch 18 Off (page 419) | <b>AIN SWITCH18 (PAGE 704)</b> |
| <b>AIN SWITCH 19 (PAGE 770)</b> | Analog Switch 19 On (page 421)<br>Analog Switch 19 Off (page 422) | <b>AIN SWITCH19 (PAGE 705)</b> |
| <b>AIN SWITCH 20 (PAGE 770)</b> | Analog Switch 20 On (page 424)<br>Analog Switch 20 Off (page 425) | <b>AIN SWITCH20 (PAGE 705)</b> |

The behavior of the switch depends on the adjustment of the setpoints.

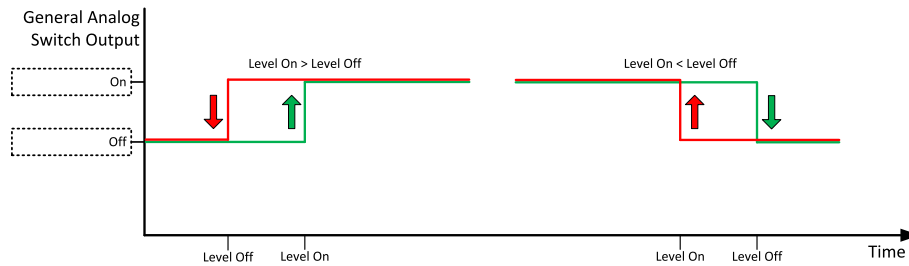


Image 5.49 Principle of analog switch

### 5.3.24 Additional running engine indications

It is helpful to have information other than speed (RPM), whether the engine is rotating or not, especially if RPM is measured from the generator frequency instead of magnetic pickup. The generator frequency measurement can be unreliable at very low speeds and/or may have a delayed reaction to sudden and big changes (i.e. in the moment that the engine has just started...).

The following conditions are evaluated as additional running engine indication:

- ▶ Voltage on the D+ input is higher than 80% of battery voltage. Connect this input to the D+ (L) terminal of the charging alternator and enable the D+ function by the setpoint D+ Function. If D+ terminal is not available, leave the input unconnected and disable the function.
- ▶ The pickup is not used and frequency is not detected on the pickup input. Connect the pickup input to the W terminal of the charging alternator if you do not use pickup and the W terminal is available. If not, leave the input unconnected.
- ▶ Oil pressure > **Starting Oil Pressure (page 274)** setpoint. The oil pressure is evaluated from the analog input or from the ECU if an ECU is configured.
- ▶ Binary input **OIL PRESSURE (PAGE 674)** is in logical 0.
- ▶ At least one phase of generator voltage is >25% of nominal voltage.

These signals are used during start for powering down the starter motor even if still no RPM is measured and also during stop in order to evaluate if the engine is really stopped.

### 5.3.25 Voltage phase sequence detection

Controller detects phase sequence on both voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. The phase sequence is adjusted via setpoint **Phase Rotation (page 252)**. When the phases are connected in different order, following alarms are detected:

- ▶ **Generator CCW Rotation (page 814)**
- ▶ **Bus CCW Rotation**
- ▶ **Mains CCW Rotation (page 815)**

### 5.3.26 Sensor curves

#### Background of the sensor calibration

To correct measuring error of each analog input (pressure, temperature, level, etc.) calibrating constants should be set. Calibration is made by adding the value of setpoint **CU AIN1 Calibration (page 451)**, or **Description (page 452)**, or **CU AIN3 Calibration (page 452)**, or **CU AIN4 Calibration (page 453)** directly to the calculated value at analog input.

**Note:** The calibration must be done at the operational point of the analog input (e.g. 80°C, 4.0Bar etc..)

## Default sensor curves

There are 16 default resistive curves available. The following table provides information on minimum/maximum values of respective sensors. Actual values especially of temperature curves may differ. Meaning is to prolong curve to the lower temperature values, so the cold engine will not raise alarm fail sensor.

| Curve                | Min [Ohm] | Max [Ohm] | Units |
|----------------------|-----------|-----------|-------|
| VDO 10 Bar 0-2400ohm | 0         | 2400      | Bar   |
| VDO40-120°C0-2400ohm | 0         | 2400      | °C    |
| VDOLevel%0-2400ohm   | 0         | 2400      | %     |
| General line 1       | 0         | 1000      | ohm   |
| General line 2       | 0         | 1000      | ohm   |
| General line 3       | 0         | 1000      | ohm   |
| General line 4       | 0         | 1000      | ohm   |
| General line 5       | 0         | 1000      | ohm   |
| General line 6       | 0         | 1000      | ohm   |
| General line 7       | 0         | 1000      | ohm   |
| General line 8       | 0         | 1000      | ohm   |
| General line 9       | 0         | 1000      | ohm   |
| General line 10      | 0         | 1000      | ohm   |
| General line 11      | 0         | 1000      | ohm   |
| General line 12      | 0         | 1000      | ohm   |
| General line 13      | 0         | 1000      | ohm   |

**Note:** Curves can be modified via IntelliConfig. In IntelliConfig are also prepared some standard curves.

**IMPORTANT:** For right behavior of function, curve for this analog input has to be in percentage.

## Sensor curve HW configuration

IntelliGen 500 analog inputs allows you to select Input HW type. Three HW configuration options are available:

- ▶ 0-15 kΩ
- ▶ 0-10 V
- ▶ 0-20 mA passive

Setup controller analog input in this way to use other than the default HW configuration (0-15 kΩ):

1. Start with a sensor configuration and select requested HW configuration

Configuration Setpoints Controller I/O **Sensors**

Sensors Add line Delete line Open Save

|                     |                                    |
|---------------------|------------------------------------|
| StarterKit OilPress | HW configuration                   |
| StarterKit CoolTemp | 0-10 V                             |
| StarterKit FuelLev  | Sensor Name<br>StarterKit OilPress |
| General line 1      | Resolution<br>0,1                  |
| General line 2      | Dim<br>Bar                         |
| General line 3      | 0-10 V                             |
| General line 4      | Bar                                |
| General line 5      | 0 0,000 0,0                        |
|                     | 1 1,000 10,0                       |

2. Use the adjusted sensor with an analog input and the requested HW configuration will be used with the analog input automatically. There is no need to use a jumper, configured Input HW type is used by controller automatically.

Configuration Setpoints **Controller I/O** Sensors Modules PLC Editor Others

Binary Inputs

Binary Outputs

Analog Inputs

Analog Input 1

Function: Oil Pressure

History abbreviation: OiP

Sensor: StarterKit OilPress

Bargraph 0%: 0,0

Bargraph 100%: 10,0

Input HW type: 0-10 V

Protection type: Wrn+Sd

Oil Pressure Delay: 3 s

Oil Pressure Sd: 1,0 Bar

Oil Pressure Wrn: 2,0 Bar

Protection active: Under Limit

Engine running only:

### 5.3.27 PLC

PLC Editor is powerful tool which helps you to create your own PLC scheme. It has graphical interface to have user interface easy to use.

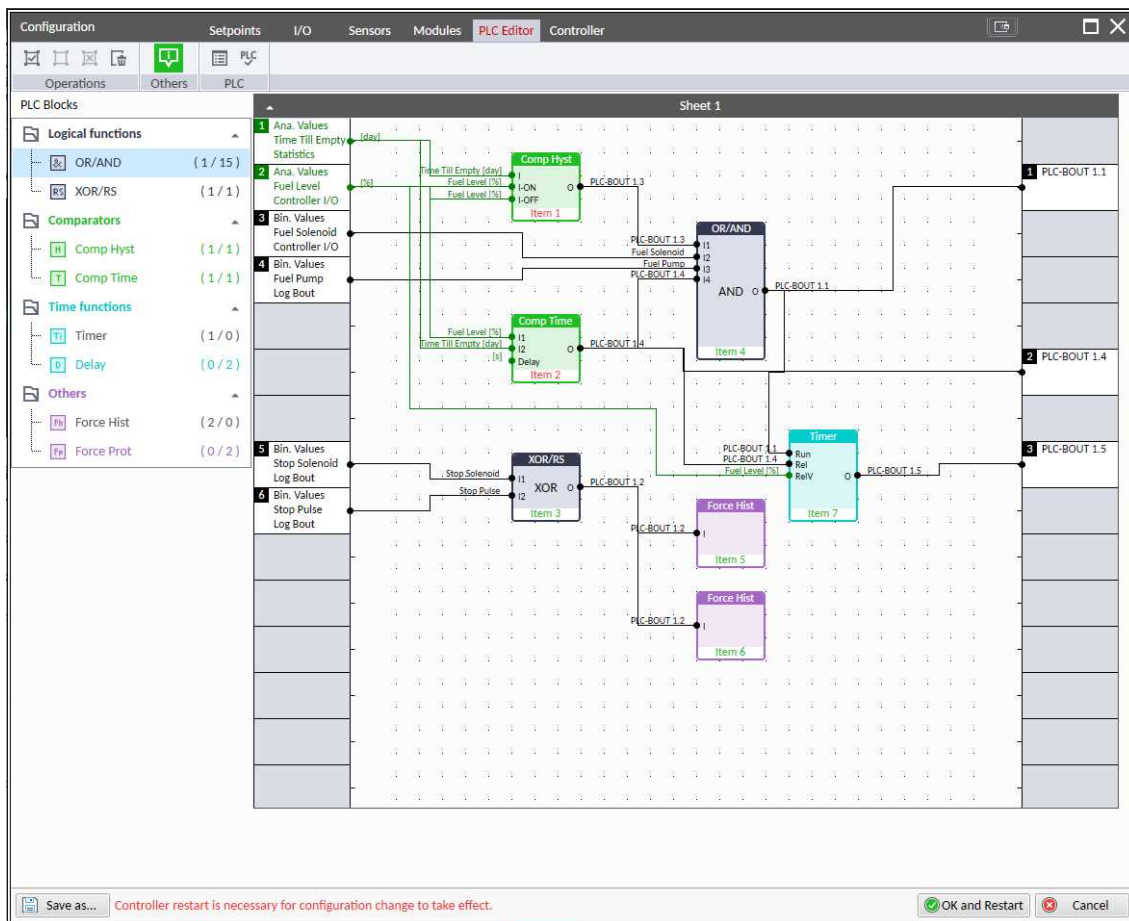


Image 5.50 PLC Editor main page

#### List of available PLC blocks

| PLC block                              | Number of blocks |
|--|------------------|
| OR/AND                                 | 32               |
| XOR/RS                                 | 8                |
| Comparator with hysteresis (Comp Hyst) | 4                |
| Comparator with delay (Comp Time)      | 4                |
| Timer                                  | 1                |
| Delay                                  | 8                |
| Force history record (Force Hist)      | 4                |
| Force protection (Force Prot)          | 4                |
| Counter                                | 1                |

## Working with the editor

If the currently opened archive does not contain any PLC program, then an empty drawing is created automatically when you select the PLC Editor. The procedure of creation of a PLC drawing (program) contains following essential steps:

- ▶ Adjust the sheet to your needs. See **Working with sheets (page 136)** for more information.
- ▶ Add PLC blocks into the sheets. See **Adding PLC blocks (page 136)** for more information.
- ▶ Define inputs and outputs of the PLC program. See **Define inputs and outputs (page 137)** for more information.
- ▶ Create connections between inputs, blocks and outputs. See **Creating wires (page 140)** for more information.
- ▶ Adjust properties of the blocks. See **List of PLC blocks (page 777)** for more information about blocks.

## Working with sheets

Drag the sheet edges to re-size the sheet according to your needs.

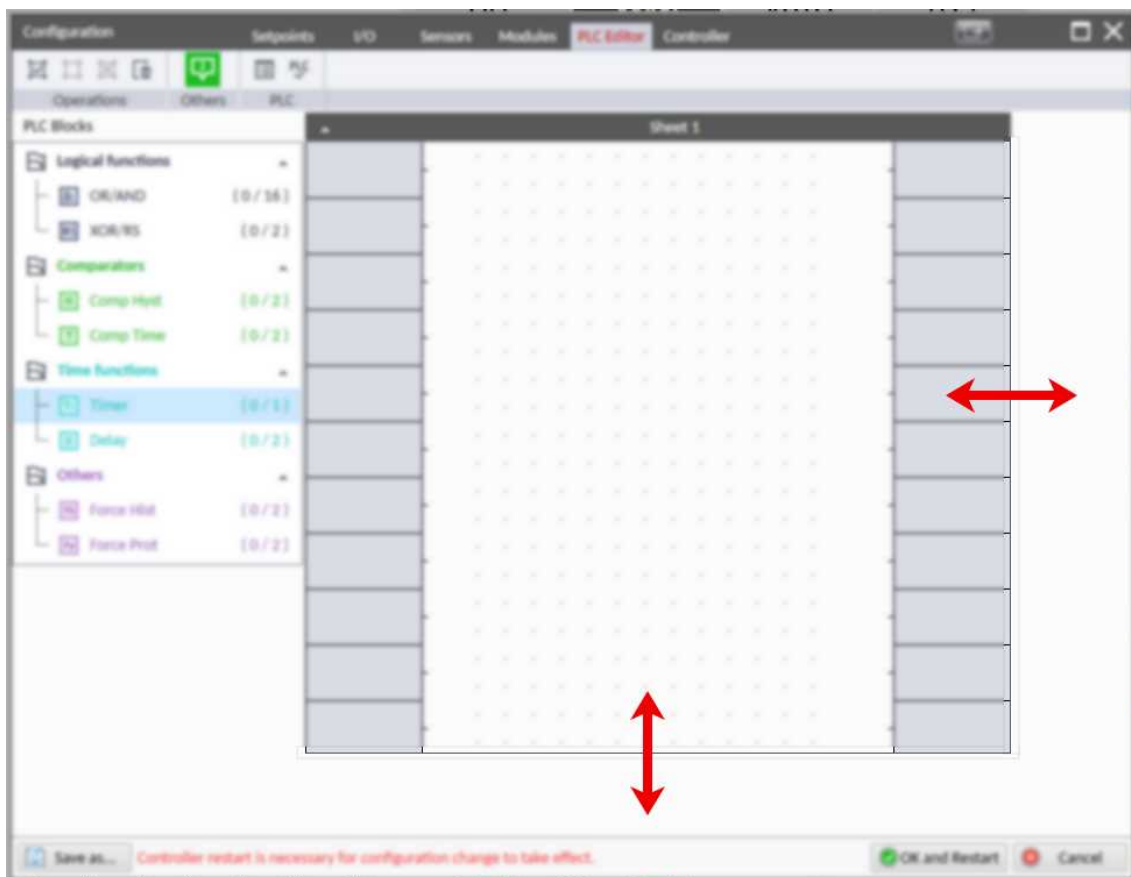


Image 5.51 Adjusting PLC sheet

## Adding PLC blocks

Adding PLC block is simple and intuitive. Follow the procedure below to add PLC block.

- ▶ Select required block from the list of available PLC blocks at the left and drag it into the sheet.
- ▶ Double-click on the block and adjust properties of the block. See **List of PLC blocks (page 777)** for more information about blocks.

- ▶ Connect the block inputs and outputs by drawing wires in the sheet. See **Define inputs and outputs** (page 137) for more information. It is also possible to connected inputs and outputs via properties of selected PLC block.

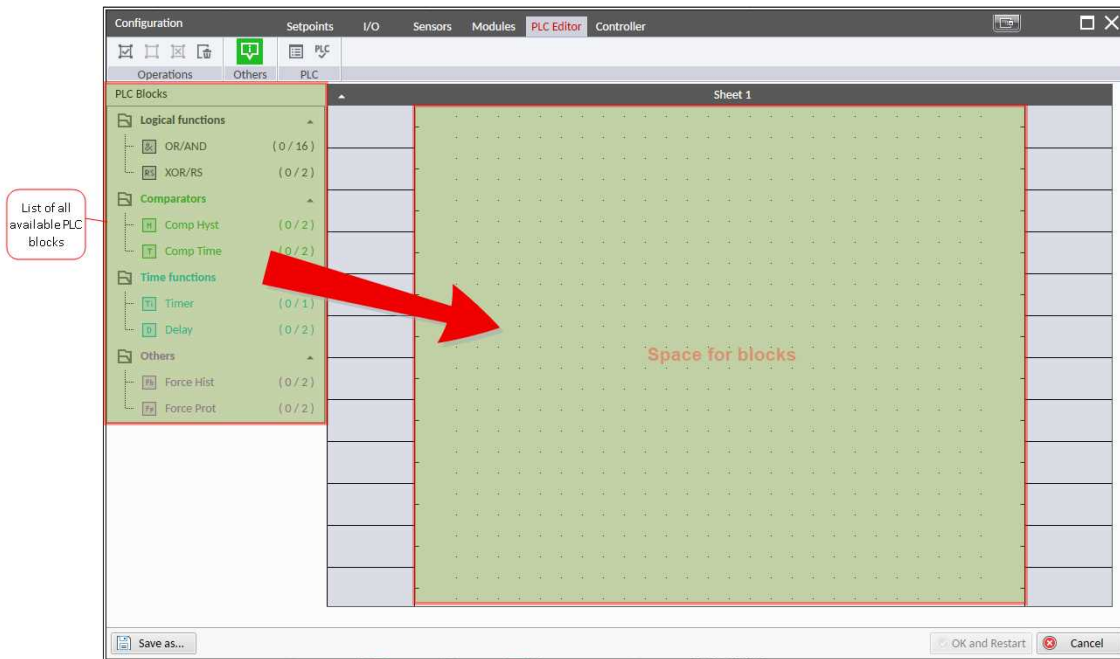


Image 5.52 Adding PLC blocks

**Note:** To delete PLC block just click on it and press delete button. Also delete selection function can be used.

**Note:** To see context help for selected PLC block just press F1 button.

## Define inputs and outputs

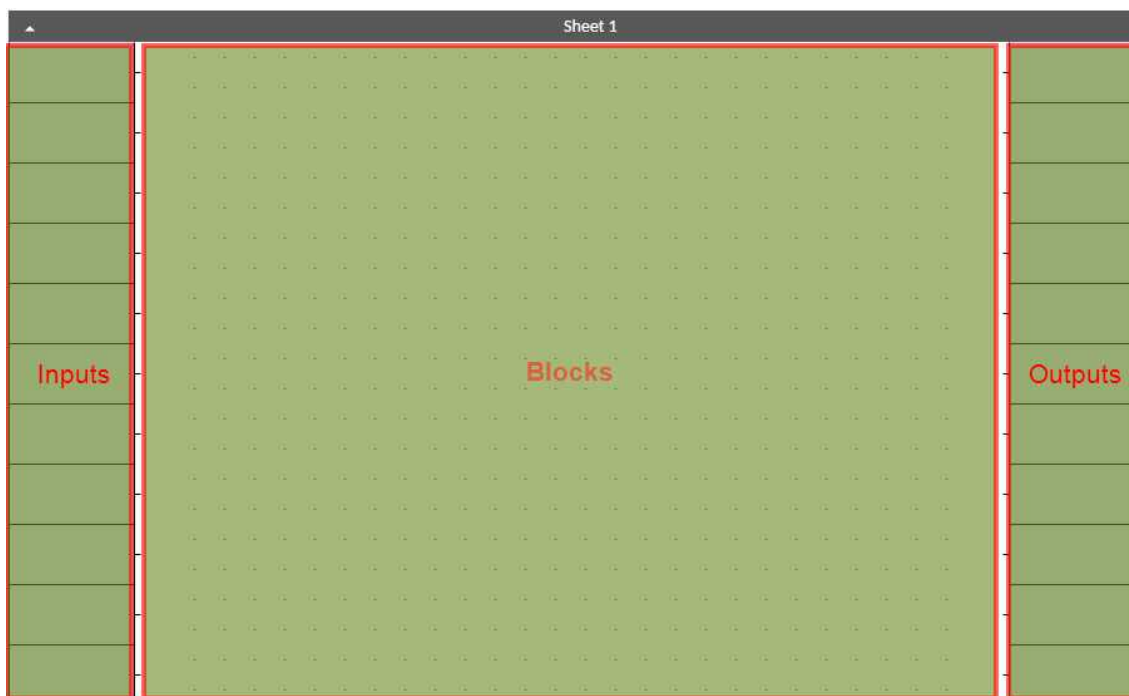


Image 5.53 Blank sheet of PLC editor

## Inputs

Sheet inputs are located at the left side of a sheet. Follow the procedure below to add or edit an input.

- ▶ Double-click on a free input position or existing input to add new input or edit the existing one.
- ▶ Select the source for the input.
  - If you create a binary input, you can select a source from following categories:
    - Bin. Values - this category contains all binary values available in the controller as binary inputs, logical binary outputs etc.
    - PLC Outputs - this category contains all PLC blocks binary outputs available in the controller.
  - If you create an analog input, you can select a source from following categories:
    - Ana. Values - this category contains all analog values available in the controller as analog inputs, electrical values, values from ECU etc.
    - All Setpoints - this category contains all setpoints of the controller except the dedicated PLC setpoints. Names, resolutions and dimensions of these setpoints can not be modified.
    - PLC Setpoints - this category contains a group of setpoints which are dedicated for using in the PLC program. PLC setpoints can be renamed, their dimension, resolution and limits can be modified according to need of PLC blocks where they are used.

|                      |                      |                                |                                |                                |                                      |
|----------------------|----------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------------|
| PLC Setpoint name:   | Dimension:           | Resolution:                    | Low limit:                     | High limit:                    |                                      |
| <input type="text"/> | <input type="text"/> | <input type="text" value="1"/> | <input type="text" value="0"/> | <input type="text" value="0"/> | <input type="button" value="Apply"/> |



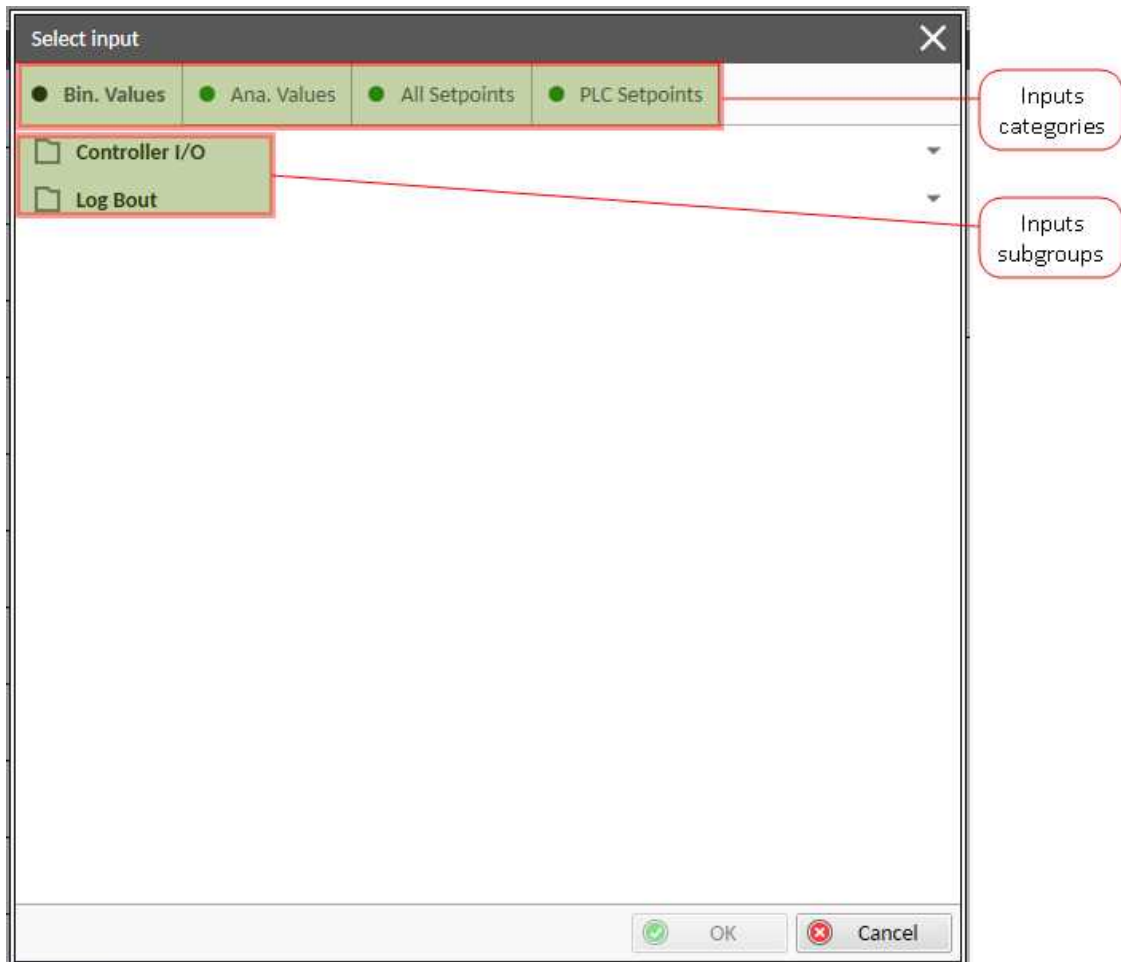


Image 5.54 PLC inputs

## Outputs

Sheet outputs are located at the right side of a sheet. Follow the procedure below to add or edit an input.

- ▶ Doubleclick on a free output position to add new sheet output.
- ▶ Doubleclick on an already created output to configure the output onto a controller output terminal or a logical binary input (first of all some PLC block output has to be connected to this output to enable configuration of output).

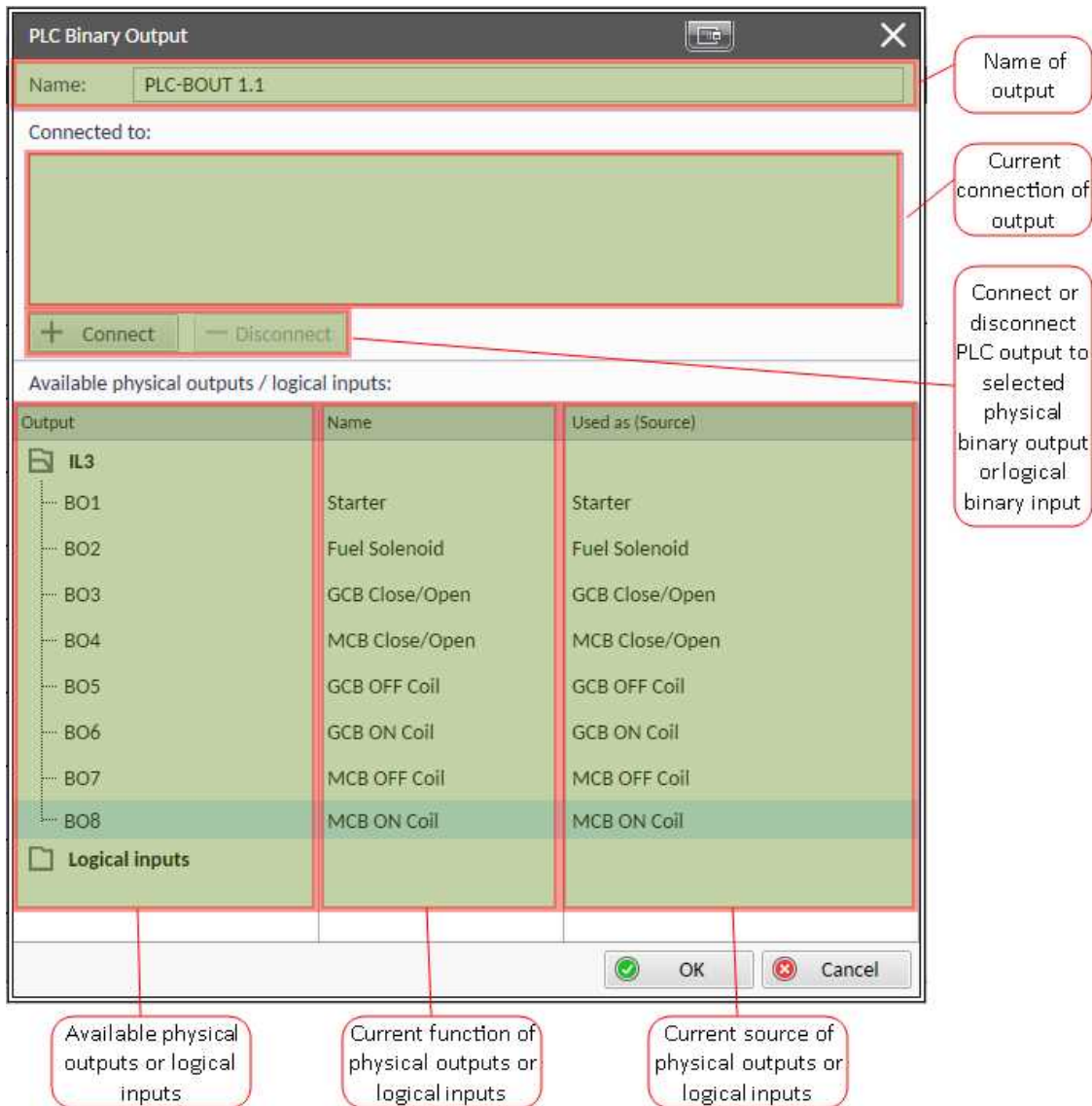


Image 5.55 PLC outputs

**IMPORTANT:** It is necessary to click on **Connect** button after selecting the output. Otherwise PLC output is not connected to output.

## Creating wires

Wires can be create between PLC inputs and PLC blocks and between PLC blocks and PLC outputs.

**IMPORTANT:** Keep the order of starting and finishing connection points. Wires between inputs and blocks have to start from inputs. Wires between blocks and outputs have to start from blocks.

Follow the procedure below to create wire.

- ▶ Locate the mouse pointer over the starting point of the wire. If the area under the mouse pointer is a connection point, the pointer will change the color (fill of pointer will be white).
- ▶ Press and hold the left mouse button and drag the wire to the destination of required connection point. If you point over a valid connection point, the connection point will be marked with a red circle.
- ▶ Release the left mouse button to create a wire between the two points. The wire is routed automatically.

**Note:** It is possible to make connection only between the outputs and inputs with the same type of value (binary or analog). Binary values are marker by black pointer, analog values are marked with green pointer.

**Note:** To delete wire just click on it and press delete button. Also delete selection function can by used.

## PLC logic execution rules

The PLC program is executed every 100 ms. The blocks are executed in order according to block numbers (item numbers), which are indicated in each block. The block numbers are assigned automatically according to position on sheet.

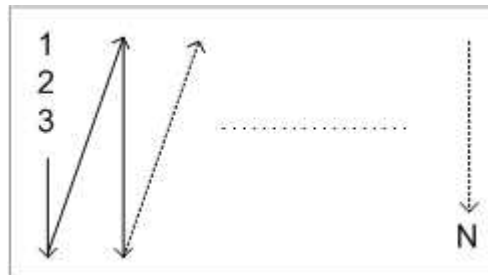
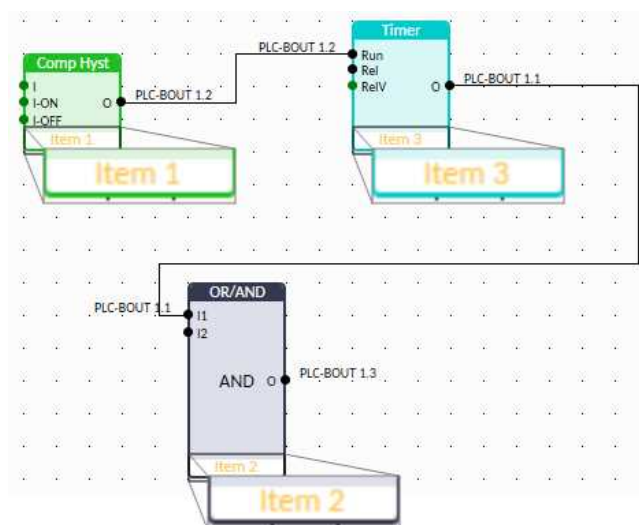
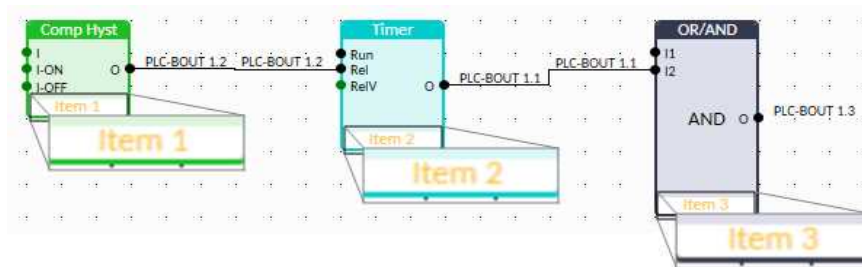


Image 5.56 PLC execution logic

**IMPORTANT:** Please always check that the blocks are ordered correctly, especially if you use direct feedbacks from outputs to inputs within one sheet. Wrong order may lead to incorrect results!!!



## Other functions

### Consistency check

Use this function to check if all inputs and outputs of PLC block are connected.

### Delete whole content of sheet

Use this function to delete the whole content of sheet (including blocks, wires, inputs, outputs, etc...).

### Hints

Use this function to enable or disable quick hints for blocks (controller help is not affected by this function).

### PLC monitor

PLC monitor is a powerful tool for monitoring your PLC. Just click on PLC monitor button on main IntelliConfig page to see you PLC. Active inputs and outputs have blue color. Also wires with active signals have blue color.

**IMPORTANT: It is not possible to edit PLC in PLC monitor tool.**

## 5.3.28 Aftertreatment Support

Aftertreatment support generally provides monitoring and control of aftertreatment system installed on generators engines. The requirements are defined as:

- ▶ Providing Aftertreatment status information by:
  - displaying universal lamps (icons)
  - displaying corresponding analog and binary values
- ▶ Control of Aftertreatment regeneration function by
  - transmitting commands to the ECU module

### Providing Aftertreatment status information

#### Aftertreatment screen

This screen is available when ECU module which supports Aftertreatment is configured. Aftertreatment screen is automatically brought to the front once any of selected lamps gets active or when increases reported severity. Deactivating of the lamp will not trigger automatic changeover to the Aftertreatment screen. The screen is then shown until operator switch it to another one. Alarmlist screen has lower priority, so even new alarm appears, Aftertreatment screen is still displayed. To avoid displaying blank screen, inactive lamps are represented by "greyed-out" icons. For no active lamp the screen shows all greyed-out icons. Please see examples below:

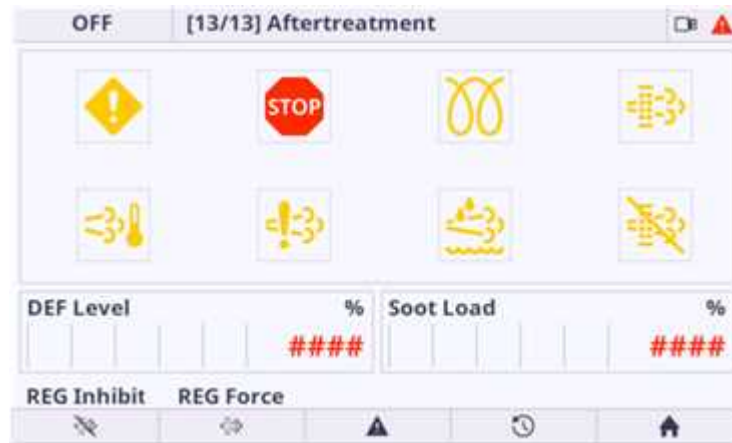


Image 5.57 Example of active Aftertreatment screen



Image 5.58 Example of inactive Aftertreatment screen

### Universal lamps (icons)

Universal lamp icons are shown on the Aftertreatment screen. Based on specific value read in specific frame with specific SPN is every lamp icon can be either:

- ▶ shown
- ▶ hidden
- ▶ blinking slow (1 Hz)
- ▶ blinking fast (2 Hz)

**Note:** Lamp icon blinking is defined as displaying active lamp icon and inverse colored active lamp icon in required frequency.

| Lamp name                            | Active icon | Inactive icon | Notes  |
|--------------------------------------|-------------|---------------|--|
| Yellow warning lamp                  |             |               | <b>Note:</b> This value can light or blink on both frequencies.  |
| Red stop lamp                        |             |               | <b>Note:</b> This value can light or blink on both frequencies.  |
| Engine wait to start                 |             |               |  |
| ATT filter lamp                      |             |               | <b>Note:</b> Indicates the Aftertreatment filter needs to be regenerated. This lamp also activates alarm <b>ATT Filter Lamp (page 811)</b> . |
| High exhaust system temperature lamp |             |               | <b>Note:</b> Indicates High exhaust system temperature. This lamp also activates alarm <b>ATT HEST Lamp (page 812)</b> .                     |
| SCR error lamp                       |             |               | <b>Note:</b> Indicates SCR system problems. This lamp also activates alarm <b>ATT SCR Error Lamp (page 812)</b> .                            |
| DEF low level lamp                   |             |               | <b>Note:</b> Indicates DEF fluid low level. This lamp also activates alarm <b>ATT DEF Level Lamp (page 812)</b> .                            |
| Regeneration inhibit lamp            |             |               | <b>Note:</b> Indicates Aftertreatment regeneration is inhibited. This lamp also activates alarm <b>ATT Inhibited Lamp (page 812)</b> .       |

## Analog values

Supported analog values:

- ▶ DPF Ash Load (page 559)
- ▶ DPF Soot Load (page 559)
- ▶ DEF Level (page 559)

## Control of Aftertreatment regeneration function

User can force or inhibit regeneration process by activating appropriate binary inputs of the controller. Please see the list of binary inputs below:

- ▶ REGENERATION FORCE (PAGE 674)
- ▶ REGENERATION INHIB (PAGE 674)

### 5.3.29 Geo-fencing

Geo-fencing function is kind of protection that evaluates whether the actual GPS location is within predefined area and based on the evaluation takes an action (sends sms, stops engine, make history record etc.). Function is enabled by setpoint **Geo-Fencing** (page 448) or by logical binary input **GEO-FENCING ENABLED** (PAGE 669).

Using IntelliConfig, it is possible to set two concentric geo-circles within which the unit is allowed to be located. Each geo-circle is defined as circular geographic area with centre (common for both geo-circles) named Home Position adjusted via setpoints **Home Latitude** (page 446) and **Home Longitude** (page 446) and radius named Fence Radius adjusted via setpoints **Fence Radius 1** (page 447) and **Fence Radius 2** (page 447).

Protections can be different for both circles. Protection are adjusted via setpoints **Fence 1 Protection** (page 449) and **Fence 2 Protection** (page 450).

It is also possible to see the current position of the controller in WebSupervisor map view.

### 5.3.30 Mains decoupling protections

#### Vector shift

The vector shift function is the fast protection for mains decoupling. It monitors the Load angle of the generator and if it gets changed dramatically, the protection is issued. The Vector shift is evaluated from the Mains Voltage Measurement (Phase 1).

Protection is enabled via setpoint **Vector Shift Protection** (page 326). Limit of protection is adjusted via setpoint **Vector Shift Limit** (page 326). When protection is activated, the breaker is opened. Which breaker is opened is adjusted via setpoint **Vector Shift CB Selector** (page 328). Maximal value of vector shift is represented by value **Max Vector ShiftMaxVectorS** (page 575).

**Note:** *VectorShift protection gets active (is unblocked) right 500 ms after the condition for activation of protection gets fulfilled = when Controller goes to parallel to mains operation (When Vector Shift Protection = PARALLEL ONLY) or when MCB gets closed (when Vector shift protection = ENABLED).*

The settings can lead to these situations:

| MCB status | GCB status | Vector Shift CB Selector | Vector Shift Protection            | Action   |
|------------|------------|--------------------------|------------------------------------|--|
| 1          | 1          | MCB or GCB               | Parallel or Enabled (No influence) | Opens MCB or GCB based on setpoint Vector Shift CB Selector. |
| 0          | 1          | No influence             | No influence                       | No action (GCB stays always closed)                          |
| 1          | 0          | No influence             | Parallel                           | No action MCB stays closed                                   |
| 1          | 0          | GCB                      | Enabled                            | No action MCB stays closed                                   |
| 1          | 0          | MCB                      | Enabled                            | MCB opens  |

If a vector shift is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is then closed again (synchronized) after **Mains Return Delay (page 319)** as the mains is evaluated as healthy.

If a vector shift is detected and consequently the GCB is opened, however mains voltage and frequency remain in limits, the GCB is then closed again (synchronized) immediately (no delay).

## ROCOF

The Rate of Change of Frequency function is the fast protection for mains decoupling. It monitors the change of frequency and if it gets changed dramatically, the protection is issued.

Protection is enabled via setpoint **ROCOF Protection (page 327)**. Limit of protection is adjusted via setpoints **ROCOF  $df/dt$  (page 328)** and **ROCOF Windows Length (page 327)**. When protection is activated, the breaker is opened. Which breaker is opened is adjusted via setpoint **Vector Shift CB Selector (page 328)**.

### 5.3.31 Droop

**IMPORTANT: Droop is relevant only for MINT application.**

The DROOP is primarily intended for Multiple parallel operation in Island to ensure the load sharing and VAR sharing when intercontroller communication fails. The Active and Reactive power is not regulated based on data communicated between the units (isochronous regulation) but the speed request and voltage request is calculated from actual voltage and actual frequency of the system (the measured Voltage and frequency of whole system is always equal). Actually the speed request is correlative to active power and the voltage request is correlative to reactive power. The correlation is the decreasing function and it creates the negative feedback of regulation.

Function is activated via setpoint **Load/Var Sharing Regulation Type (page 361)**. There are two droop modes - emergency droop and droop.



## Frequency droop

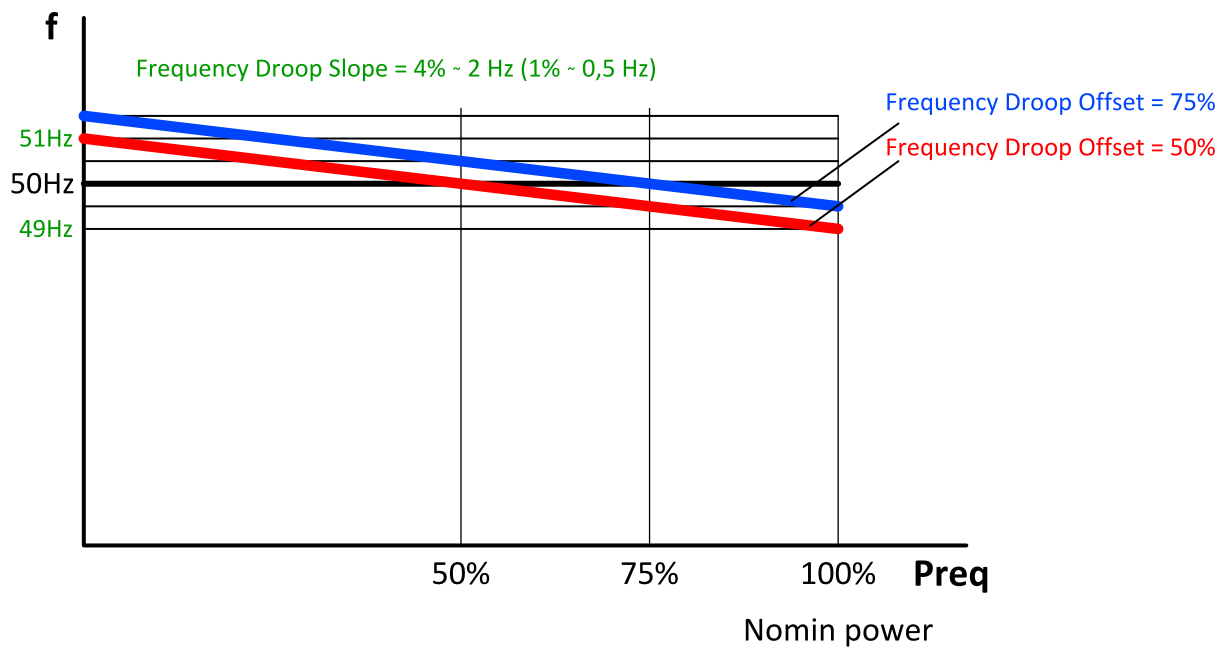


Image 5.59 Frequency droop

Equation:

Required frequency = Nominal frequency - [(Nominal frequency \* Frequency Droop Slope (page 362) / 100) \* (Active power / Nominal power - Frequency Droop Offset (page 363) / 100)].

## Voltage droop

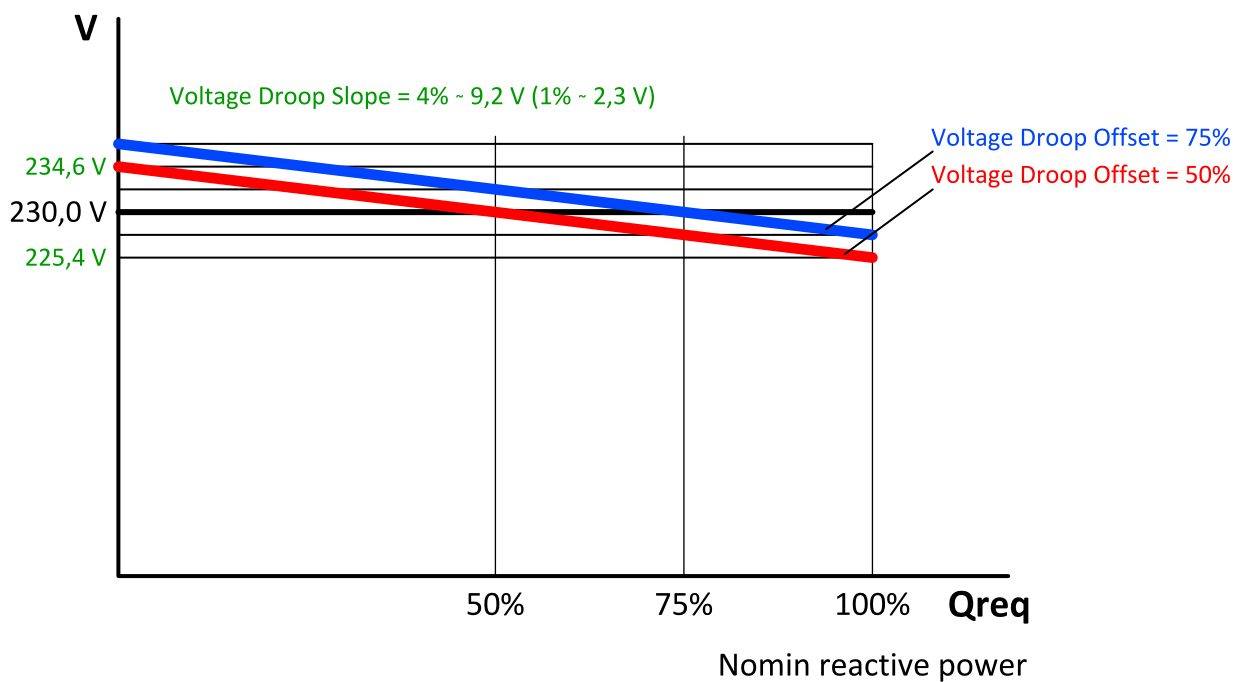


Image 5.60 Voltage droop

Equation

Required voltage = Nominal voltage - [(Nominal voltage \* **Voltage Droop Slope (page 363)** / 100) \* (Reactive power / Nominal reactive power - **Voltage Droop Offset (page 364)** / 100) ]

**Note:** Nominal reactive power is not setpoint, but is calculated from Nominal power for PF = 0,8

## Principle of droop operation

### Connecting of the gen-set operating in droop to the common bus bar

- ▶ Start command is received - start button in MAN mode or **LBI REMOTE START/STOP (PAGE 677)** in AUTO mode gets active
  - The gen-set operating in droop is not calculated in the load reserve.
  - **LBI REMOTE START/STOP (PAGE 677)** is not influenced by power management and gen-set starts if it gets active.
- ▶ Gen-set is starting - voltage and speed regulation are set to **Voltage Regulator Bias (page 354)** and **Speed Governor Bias (page 346)** (droop regulation is not active when GCB is opened).
- ▶ Connecting to bus
  - Dead bus - controller is prohibited to close it's GCB because of safety reasons (controller does not know about other controllers). Only controller with setpoint **Dead Bus GCB Close Master (page 362)** = ENABLED is allowed to close it's GCB to the dead bus. Otherwise it must be done manually in MAN mode.
  - Energized bus - controller starts synchronization (standard isochronous regulation).
  - GCB closes when synchronized - Now the droop regulation gets active

### Disconnecting of loaded gen-set from common bus bar in droop

- ▶ Gen-set is operating in droop and is loaded. Stop command is received - stop button in MAN mode or **LBI REMOTE START/STOP (PAGE 677)** in AUTO mode gets inactive.
- ▶ Controller starts soft unload of loaded gen-set
  - Soft unload can be disabled via **LBI DROOP UNLOAD DISL (PAGE 664)** in case when there is the last gen-set on the common bus bar and it is not possible to unload it. Then the GCB is opened immediately.
- ▶ GCB opens when the active power drops under **Unload MGCB Open LevelGenerator Unload GCB Open Level (page 352)**, latest when timer **Load Ramp (page 353)** elapses.

### Transition from droop to isochronous regulations

- ▶ The speed request during the transition from droop (or emergency droop) to isochronous regulation is changed smoothly (not in step). It prevents the system against overshoot of the frequency.
- ▶ Frequency is changed by 2 Hz per **Load Ramp (page 353)**.

### Forcing of the regulation to droop

- ▶ Droop regulation can be forced by **LBI FORCE DROOP OPER (PAGE 665)**.

## Principle of emergency droop

When **Load/Var Sharing Regulation Type (page 361)** = Emrg Droop, Isochronous regulation is used until the conditions for activation of emergency droop are fulfilled. After activation, emergency droop regulation is used until the conditions for deactivation are fulfilled.

### Conditions for activation

- ▶ The number of controllers detected by the controller on can is lower than the number in the setpoint **#Number Of Controller On CAN** (page 364).
- ▶ **#Emergency Droop On Delay** (page 365) has count down.

### Conditions for deactivation

- ▶ The number of controllers detected by the controller on can is equal or higher than the number in the setpoint **#Number Of Controller On CAN** (page 364).
- ▶ **#Emergency Droop Off Delay** (page 365) has count down.

## 5.3.32 Alternate configuration

In controller are 3 sets of configuration.

| Configuration set 1                    | Configuration set 2                    | Configuration set 3                    |
|--|--|--|
| Nominal Power 1 (page 455)             | Nominal Power 2 (page 459)             | Nominal Power 3 (page 463)             |
| Nominal Power Split Phase 1 (page 455) | Nominal Power Split Phase 2 (page 459) | Nominal Power Split Phase 3 (page 463) |
| Nominal RPM 1 (page 456)               | Nominal RPM 2 (page 460)               | Nominal RPM 3 (page 464)               |
| Nominal Frequency 1 (page 456)         | Nominal Frequency 2 (page 460)         | Nominal Frequency 3 (page 464)         |
| Nominal Voltage Ph-N 1 (page 457)      | Nominal Voltage Ph-N 2 (page 461)      | Nominal Voltage Ph-N 3 (page 465)      |
| Nominal Voltage Ph-Ph 1 (page 457)     | Nominal Voltage Ph-Ph 2 (page 461)     | Nominal Voltage Ph-Ph 3 (page 465)     |
| Nominal Current 1 (page 456)           | Nominal Current 2 (page 460)           | Nominal Current 3 (page 464)           |
| Connection Type 1 (page 453)           | Connection type 2 (page 457)           | Connection type 3 (page 461)           |

Configuration sets can be changed via logical binary input **ALTERNATE CONFIG 2** (PAGE 615) and logical binary input **ALTERNATE CONFIG 3** (PAGE 615).

**IMPORTANT: Gen-set can not switch to the alternative setpoints when is running.**

### 5.3.33 USB host

USB host is a function for programming of controller from USB Flash Drive. Following functions are supported:

- ▶ Firmware upload
- ▶ Configuration upload
- ▶ Firmware and configuration upload
- ▶ Configuration download

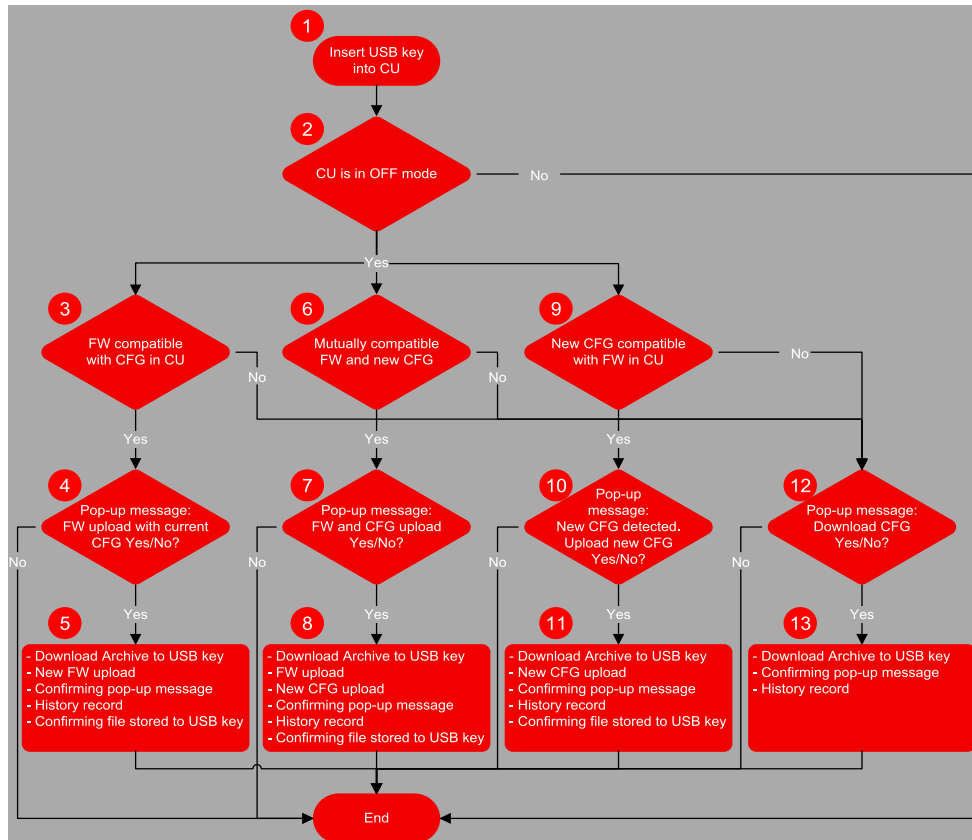


Image 5.61 USB host flowchart

Terminology:

- ▶ The Archive = the native file of IntelliConfig, including the complete Configuration + History + Statistic + Values (in the time of download) + Alarm list.
- ▶ Configuration = the part of Archive, in the terms of Configuration + Setpoints + PLC + IO definitions + Languages.
- ▶ New configuration = the configuration created in IntelliConfig for the purpose of uploading it into the controller using the USB memory stick. The new configuration is recognized due to it's name. The name has to contain the specific string ="InteliGen500-Genset name-M.N.P.B.aig3".
- ▶ Compatible firmware = the firmware version compatible with the configuration in the controller. The name of file including the firmware is "InteliGen500-M.N.P.B.bin".

Abbreviations:

- ▶ CU - control unit
- ▶ FW - firmware
- ▶ CFG - configuration

## Firmware upload

- ▶ Point 1 - controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.
- ▶ Point 2 - controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- ▶ Point 3 - Conditions for firmware upload with current configuration
  - The new firmware compatible with the version of the configuration in the controller has been detected (and there is no new configuration file).
  - Detection is based on name of firmware - required name: "InteliGen500-M.N.P.B.bin"
  - There can be stored more firmwares on the USB Flash Drive. Controller automatically select the compatible firmware with highest version.
- ▶ Point 4 - Pop-up message
  - Confirmation of firmware upload with current configuration
- ▶ Point 5 - Firmware upload
  - Current archive is download to USB Flash Drive (Name = SN\_YMMDDHHMM).
  - New firmware is uploaded into the controller without the change of the configuration
  - History record "USB Flash Drive FW upgrade" is made
  - Confirming file (.txt) on USB Flash Drive is made (Name = SN\_YMMDDHHMM)
    - Content: Serial number, Year/Date/Time, Upgrade to the FW "Name of the new FW" successful.
  - Confirmation pop-up message: "FW upgrade success"

## Configuration upload

- ▶ Point 1 - controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.
- ▶ Point 2 - controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- ▶ Point 9 - conditions for new configuration upload
  - The new configuration compatible with the version of the firmware in the controller has been detected (and there is no new firmware file).
  - Detection is based on name of configuration - required name: "InteliGen500-Genset name-M.N.P.B.aig3"
  - There can be only one configuration file
- ▶ Point 10 - Pop-up message
  - Confirmation of configuration upload with current firmware
- ▶ Point 11 - Configuration upload
  - Current archive is download to USB key (Name = SN\_YMMDDHHMM).
  - New configuration is uploaded into the controller without the change of the firmware

- History record "USB key CFG upload" is made
- Confirming file (.txt) on USB key is made (Name = SN\_YYMMDDHHMM)
  - Content: Serial number, Year/Date/Time, Upgrade to the FW "Name of the new CFG" successful.
- Confirmation pop-up message: "CFG upgrade success"

## Firmware and configuration upload

- ▶ Point 1 - controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.
- ▶ Point 2 - controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- ▶ Point 6 - conditions for new firmware and configuration upload
  - The new configuration has been detected. Also there is firmware file compatible with detected new configuration
  - Detection is based on name of configuration - required name: "InteliGen500-Genset name-M.N.P.B.aig3" and on name of firmware - required name: "InteliGen500-M.N.P.B.bin"
  - There can be only one configuration file
  - There can be stored more firmwares on the USB key. Controller automatically select the compatible firmware with highest version.
- ▶ Point 7 - Pop-up message
  - Confirmation of configuration and firmware upload
- ▶ Point 8 - Configuration and firmware upload
  - Current archive is download to USB key (Name = SN\_YYMMDDHHMM).
  - New firmware is uploaded into the controller
  - New configuration is uploaded into the controller
  - History record "USB key FW and CFG upload" is made
  - Confirming file (.txt) on USB key is made (Name = SN\_YYMMDDHHMM)
    - Content: Serial number, Year/Date/Time, Upgrade to the FW "Name of the new FW" successful, Upgrade to the FW "Name of the new CFG" successful.
  - Confirmation pop-up message: "FW and CFG upgrade success"

## Configuration download

- ▶ Point 1 - controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.
- ▶ Point 2 - controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- ▶ Points 3, 6, 9 - conditions for configuration download
  - There is no firmware or configuration with required name

- ▶ Point 12 - Pop-up message
  - Confirmation of configuration download
- ▶ Point 11 - Configuration download
  - Current archive is download to USB key (Name = SN\_YYMMDDHHMM).
  - History record "USB key Archive download" is made
  - Confirmation pop-up message: "Archive download successful"

### 5.3.34 E-Stop

Binary outputs for the control of some essential functions are internally wired as "safe", it means, that their deactivation is directly bind with the dedicated Input E-STOP (not evaluated as the LBI in the controller). This BO are fully configurable and are used e.g. for the Starter and Fuel control.

- ▶ The emergency stop circuit must be secured.
- ▶ No accidental activation on the PCB, circuit must disable the operation of the emergency stop.
- ▶ The power supply of the associated binary outputs (BIN1 and BIN2) is supplied by the E-STOP input, not by the + battery voltage.

**Note:** There is no difference in the way of configuration of all binary outputs. Binary outputs BO1 (Starter), BO2 (Fuel Solenoid) are intended for these functions (not dedicated).

There is a measuring of E-STOP input voltage analogically and setting the binary value (representing emergency stop input level) based on comparison of the measured voltage to two analog levels, which are derived from the controller supply voltage (battery voltage) perceptually.

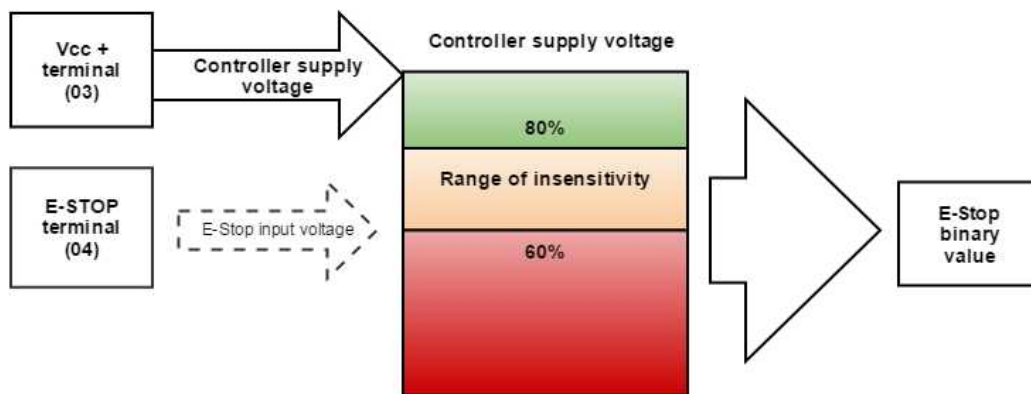


Image 5.62 SW principle of E-STOP

- ▶ If the input voltage of E-stop is higher than high comparison level (for ex. higher than 80% of the supply voltage), then E-stop is not activated.
- ▶ If the input voltage of E-stop is lower than low comparison level (for ex. lower than 60% of the supply voltage), then E-stop is activated.

If the input voltage of E-stop is located somewhere between low and high comparison levels (for ex. between 60 and 80 % of the supply voltage), then E-stop binary value will stay on its previous state (means E-stop binary value will not change).

### Visualization on CU screen

- ▶ 1 - E-STOP has voltage - state is OK
- ▶ 0 - E-STOP has no voltage - protection is active

More information about connection see **E-Stop on page 40**.

## 5.3.35 ECU Frequency selection

Setpoint *ECU Freq Select* is no longer in use. However **ECU Frequency Select (page 562)** value was kept and the value can be calculated from **Nominal Frequency (page 247)** setpoint. Sequence for frequency change is executed automatically (engine must be in still condition and ECU is powered on – ECU Power Relay is not configured) in following 9 steps:

1. Starting of the engine is blocked (state: Not Ready)
2. Wait 100 ms
3. *ECU Stop Pulse* is set for 1000 ms (standard Stop Pulse duration)
4. Wait 3000 ms
5. Frequency selection is changed to a new value
6. Wait 2000 ms
7. *ECU Stop Pulse* is set for 1000 ms (standard Stop Pulse duration)
8. Wait 2000 ms
9. Come back from start blocking state

This sequence does not control LBO **ECU POWER RELAY (PAGE 712)** anyhow.

**Note:** If LBO **ECU POWER RELAY (PAGE 712)** is used, this change can be made only in prestart phase. So prestart has to be set up for enough long time.

## 5.3.36 Mains import measurement

This functionality is applicable on SPTM application. This function is for gen-sets which are not equipped by the mains import measurement. Then the soft transfer of the load in the direction Mains to Generator (**Transfer Mains To Gen Bus (page 351)**) can't be driven by the mains import measurement (mains unload level - **Mains Unload MCB Open Window (page 353)**), but the load transfer duration must be defined by some certain time interval (**Close Transfer Max Duration (page 350)**).

**Note:** For situations when mains current is not measured by Mains CT (Mains Import Measurement = None or Analog Input), PF is limited to Base Power Factor value even though PF Control PTM = PF Imp/Exp.

## 5.3.37 Load shedding

The Load shedding is controlled disconnection of less important load groups (circuits) when the object consumption is too high. There are two functions of the load shedding:

- ▶ To avoid loss of power at the fundamental loads in island mode, when the object consumption is getting near to the maximum power of the gen-sets.

All Load shedding outputs are activated (closed) to trip the unessential load when gen-set goes to island:

- ▶ When GCB is closed after mains fail and gen-set starts in AUT mode.
- ▶ When MCB opens from parallel to mains operation in AUT mode.
- ▶ Before MCB is opened in MAN mode by button.



## How the Load shedding controls the Load shedding outputs

The load shedding function is active in all controller modes except OFF.

Load shedding has three steps and each step is linked with its own binary output, **LOAD SHEDDING STAGE 1** (PAGE 725), **LOAD SHEDDING STAGE 2** (PAGE 725) and **LOAD SHEDDING STAGE 3** (PAGE 725)

The Load shedding outputs can be activated one by one in the direction 1, 2, 3. The condition for activation are defined by setpoints **Load Shedding Level** (page 330) and **Load Shedding Delay** (page 330).

The Load shedding outputs are deactivated one by one according to the conditions given by the setpoints **Load Reconnection Level** (page 330), **Load Reconnection Delay** (page 331), **Auto Load Reconnection** (page 331).

For manual reconnection of the load is desired the **Auto Load Reconnection** (page 331) setpoint needs to be disabled and the **MANUAL LOAD RECONNECTION** (PAGE 671) digital input needs to be configured.

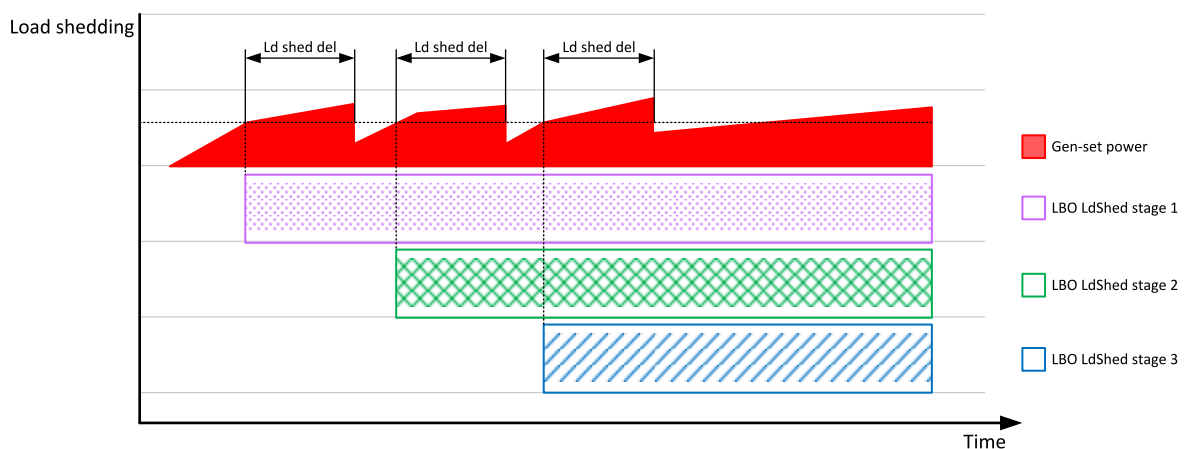


Image 5.63 Load shedding

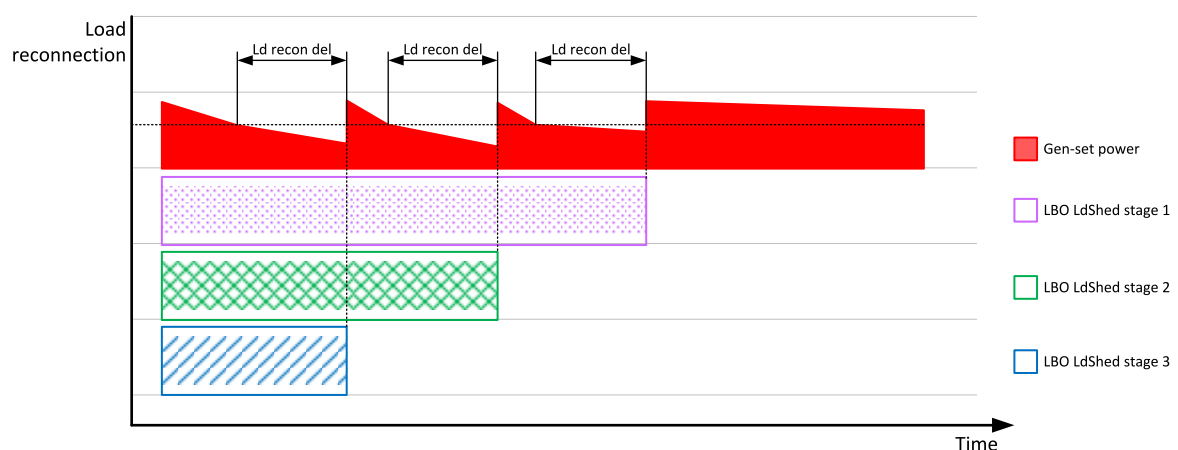


Image 5.64 Load reconnection

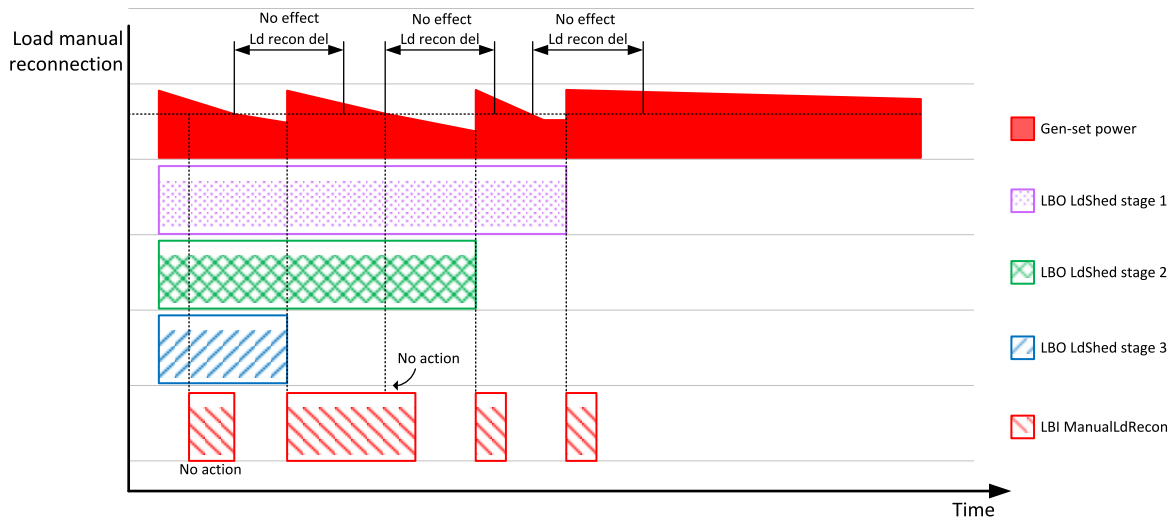


Image 5.65 Load manual reconnection

### 5.3.38 Peak shaving

Peak shaving is applicable on SPtM application only. The function compares the mains import with some certain limit and start the Gen-set when the load excised this limit to decrease the mains import for some certain time.

The Peak shaving function is active only in AUT mode in Parallel to Mains operation. Peak shaving is based on active power only. If load consumption increases over **Peak Shaving Start Level (page 240)** and for period longer than **Peak Shaving Start/Stop Delay (page 241)** the Gen-set is started. If load consumption decreases below **Peak Shaving Stop Level (page 240)** and period longer than **Peak Shaving Start/Stop Delay (page 241)** the Gen-set is stopped. The activation of the function is indicated by LBO:PEAK SHAVING ACTIVE (PAGE 731).

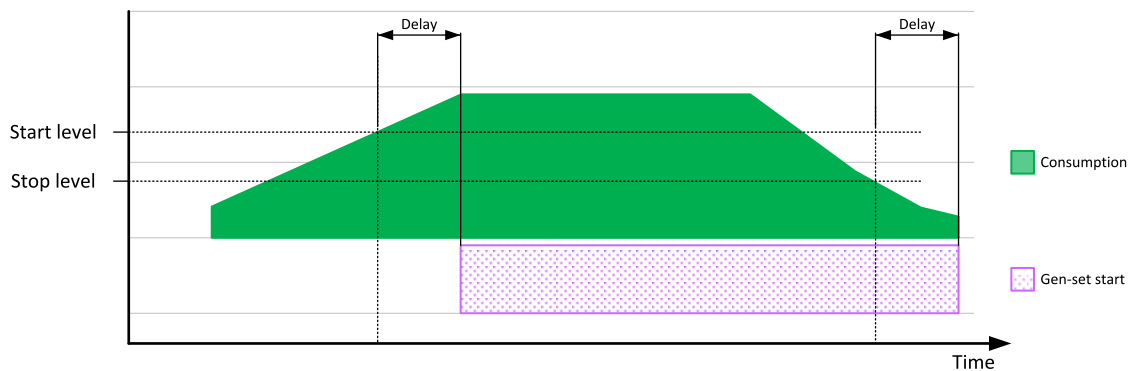


Image 5.66 Peak shaving

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# 6 Graphical User Interface

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## 6.1 Graphical User Interface

### 6.1.1 GUI overview

#### Front panel

Front panel of the unit uses hardware buttons for configuring, moving, scrolling, commands and other functions.



Image 6.1 : Front panel overview

#### Navigation buttons

Arrow buttons on the front panel are mainly used for navigation inside the entire graphical user interface. In addition the arrows left and right are used for changing the controller mode if the actual position is any metering screen.

### Arrow left and right



Image 6.2 : Arrow left and right

The buttons are used for :

- ▶ Changing the controller mode (only on metering screens)
- ▶ Movement between history columns
- ▶ Movement in the dialogs

### Arrow up and down



Image 6.3 : Arrow up and down

The buttons are used for :

- ▶ Cyclical movement between the metering Screens
- ▶ Movement in the dialogs
- ▶ Changing the value in the dialogs
- ▶ Movement in menus
- ▶ Listing on pages

### Enter



Image 6.4 : Enter button

The button is used for :

- ▶ Confirming the values
- ▶ Confirming the selections
- ▶ Confirming the listing options

### Menu



Image 6.5 : Menu button

The button is used for :

- ▶ Escape function
- ▶ Step back function
- ▶ Cyclical change of the page (from any metering screen)

## Function buttons

Function buttons are dedicated for the performing of the concrete function. By pressing the button the controller action or controller command is performed (see below).



Image 6.6 : Function buttons (Start, Stop, Alarm/Horn reset, Horn reset)

- ▶ **Start** : starting of the Gen-set
- ▶ **Stop** : stoping of the Gen-set
- ▶ **Alarm/Horn reset** : resets the horn and confirms all the alarms in the alarmlist
- ▶ **Horn reset** : resets only the horn

## User buttons



Image 6.7 : User button

User button is dedicated for predefined user function.

- ▶ Performing the controller command
- ▶ Jump to the specific page or metering screen
- ▶ special function on the pages

## Special and button combination

In this manual the shortcut is a term for the combination of the buttons or long press of the button.



Image 6.8 : Shortcut (jump to the administration)

- ▶ **Enter + Menu** : performs the jump to the administration. Enter button has to be pressed first.
- ▶ **Long press** of the arrow up or down button
  - in the menus : performs the cyclical listing
  - in the dialog : velocity of the changing value is increased based on special algorithm

## Status LED

There is one multicolor (RGB) LED on the front panel of the unit. The specified color and flashing function describes the actual state of the unit.



Image 6.9 : Status LED

- ▶ LED intensity is directly connected with the actual setting of the backlight intensity in Administration menu "Settings" accessible by shortcut Enter + Menu
  - the intensity respects the value of the Manual or External brightness control
- ▶ The flashing of the status LED and indicative Alarm icon in the top statusbar have the same period
- ▶ Meaning of the status LED colors is described below

### Color and flashing function meaning :

- ▶ Red is flashing
  - Active unconfirmed level2 (shutdown) alarm
  - Inactive unconfirmed level2 (shutdown) alarm
  - Lost of internal communication line
  - Controller unit in init state
- ▶ Red lights
  - Active confirmed level2 (shutdown) alarm
  - Integrated color display unit in init state
  - Integrated color display unit booting procedure
- ▶ Cyan lights
  - temperature inside the housing exceeded the 85°C (185°F)
- ▶ Yellow lights
  - Active unconfirmed level1 (warning) alarm
  - Inactive unconfirmed level1 (warning) alarm
  - Active confirmed level1 (warning) alarm
  - Active unconfirmed fail sensor alarm
  - Inactive unconfirmed fail sensor alarm
  - Active confirmed fail sensor alarm
- ▶ Green lights
  - unit is running correctly without any errors or alarms

### Color state priority :

1. Red is flashing
2. Red lights
3. Cyan lights

4. Yellow lights
5. Green lights

## Pages

There are several screens called pages in the graphical user interface (GUI), which are accessible by pressing the Menu button or concrete user button in the bottom status bar. Each page has a different function and different structure. Pages are described in special chapters in this manual.

The actual GUI consists of 6 different pages :

- ▶ Metering screen
- ▶ Alarmlist
- ▶ Setpoints
- ▶ History
- ▶ Trends
- ▶ Administration
  - Page administration is accessible only by pressing the combination of the Enter and Menu buttons from the only Metering screen.

## Screens

Each type of controller has special set of screens stored in the controller configuration. The description of the each metering screens is by default predefined by ComAp. Scrolling between the screens is performed using the arrow up and down buttons.

## Special screens

There are 2 special screens stored in the unit :

- ▶ Init screen
  - displayed during the booting procedure and in Administration menu
  - dedicated for specific user logo (by default predefined by ComAp)
- ▶ Service screen
  - displayed in Administration menu
  - dedicated for useful technical information (by default predefined by ComAp)

**Note:** More information about Init and Service screen modification is described in concrete chapter of this manual.

## Dialogs

Values and parameters and other can be set in the controller via dialogs. There are several dialogs in the GUI. Dialogs for numbers, texts and lists.

### Dialog Value

The dialog value is dedicated for number setting. When the dialog is active the buttons arrow up and down are used for number selection. Enter button confirms the option. Menu button cancels the dialog without saving.

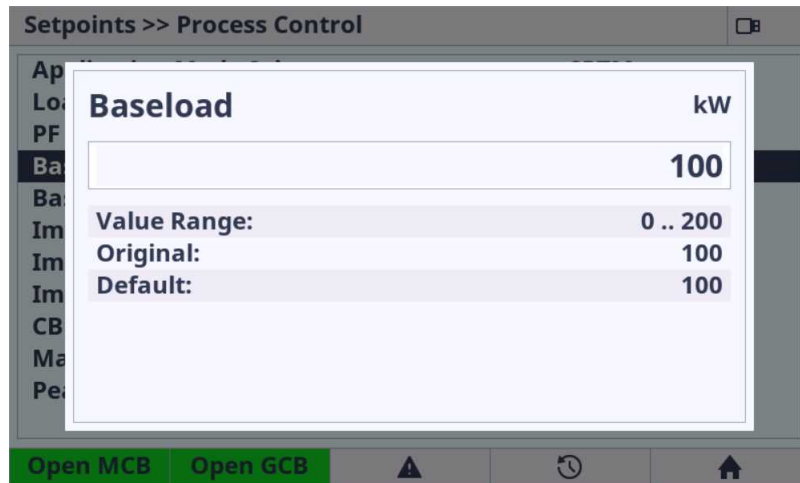


Image 6.10 : Dialog Value overview

### Dialog Value Extended

The dialog value extended is dedicated for number setting with combination with one or more string value. When the dialog is active the buttons arrow up and down are used for number/item selection. Enter button confirms the option. Menu button cancels the dialog without saving.



Image 6.11 : Dialog Value Extended overview

### Dialog String List

The dialog string list is dedicated for list item selection. When the dialog is active the buttons arrow up and down are used for item selection. Enter button confirms the option. Menu button cancels the dialog without saving.



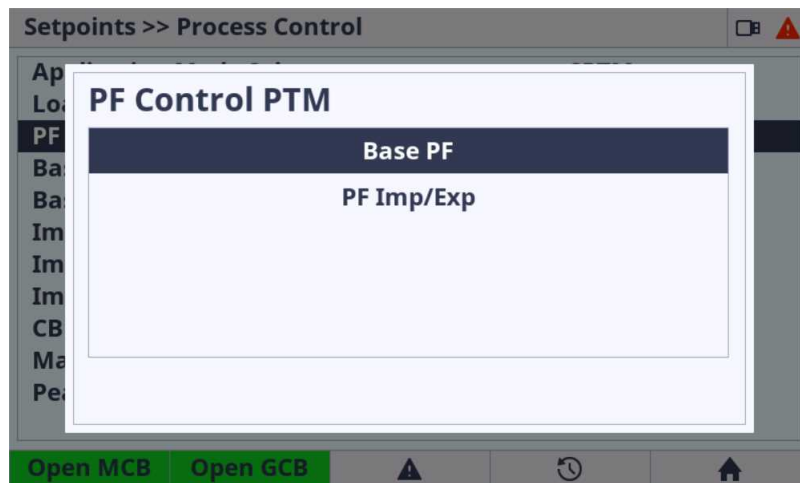


Image 6.12 : Dialog String List overview

### Dialog Text

The dialog text is dedicated for text inserting or modification. When the dialog is active the buttons arrow up and down are used for letter selection. Arrows left and right are used for moving between the letters in the text. Letter DEL deletes actual selected letter (using move to left or right). Insert letter inserts the letter to the actual position (using move to left or right) Enter button confirms the text modification. Menu button cancels the dialog without saving.

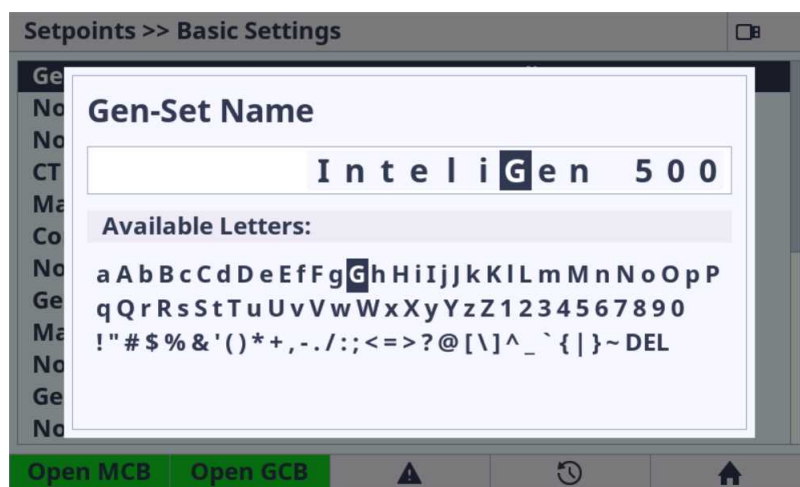


Image 6.13 : Dialog Text overview

**Note:** Enter button is used for dialog confirmation and saving the entire text to the configuration and because of this the DEL and INS letter is inserted using the left or right arrow button.

### Dialog IP address

The dialog IP address is dedicated for IP address insertion. When the dialog is active the buttons arrow up and down are used for number selection. Arrows left and right are used for moving between the IP cells. Enter button confirms the option. Menu button cancels the dialog without saving.

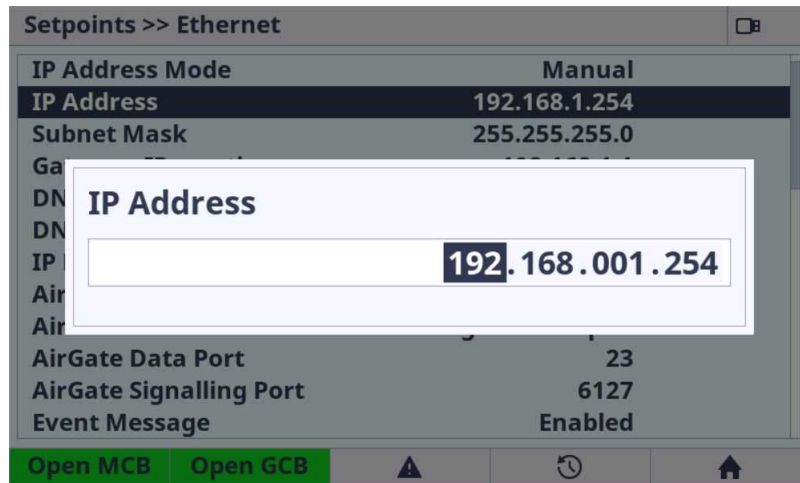


Image 6.14 : Dialog IP address overview

### Dialog Message

The dialog message has informal character about the result of any action. Enter or Menu button cancels the dialog without saving. There is no need to confirm the selection.

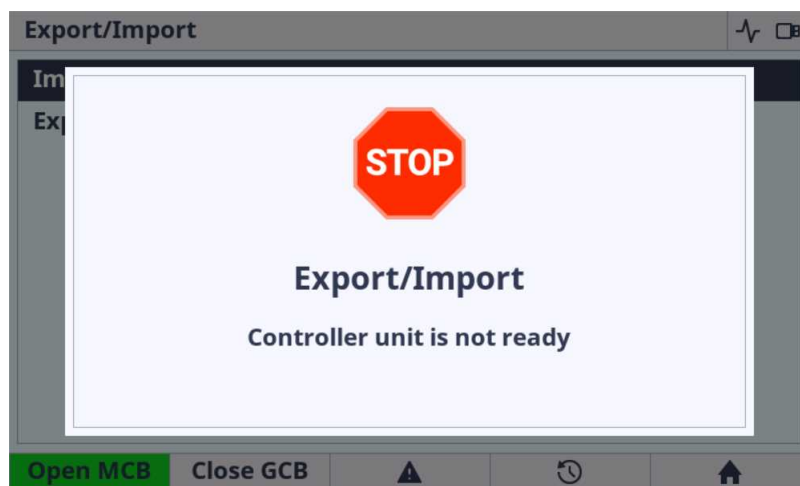


Image 6.15 : Dialog Message overview

### Dialog Progress

The dialog progress has informal character about the result of any action. The progress bar and percents are also displayed during the action performing. Enter or Menu button cancels the dialog without saving. There is no need to confirm the selection.



Image 6.16 : Dialog Progress overview

### Dialog Date

The dialog date is dedicated for date setting. When the dialog is active the buttons arrow up and down are used for number selection. Arrows left and right are used for moving between the date cells. Enter button confirms the option. Menu button cancels the dialog without saving.



Image 6.17 : Dialog Date overview

### Dialog Time

The dialog time is dedicated for date setting. When the dialog is active the buttons arrow up and down are used for number selection. Arrows left and right are used for moving between the time cells. Enter button confirms the option. Menu button cancels the dialog without saving. Menu button cancels the dialog without saving.



Image 6.18 : Dialog Time overview

### Dialog Password

The dialog password is dedicated for password insertion. When the dialog is active the buttons arrow up and down are used for number selection. Enter button confirms the option. Menu button cancels the dialog without saving.

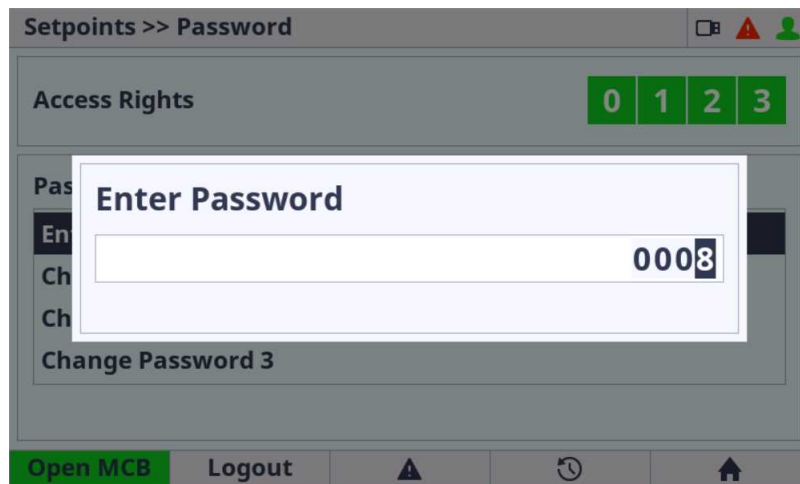


Image 6.19 : Dialog Password overview

### Dialog Password Change

The dialog password change is dedicated for password change. When the dialog is active the buttons arrow up and down are used for number selection. Enter button confirms the first option and the same password must be inserted again. Enter button after insertion the second cell performs the password change (in case the password are same). Menu button cancels the dialog without saving.



Image 6.20 : Dialog Password Change overview

**Note:** The user must be logged in with respective rights to be able to change password for respective rights.

### Dialog Timer

The dialog timer is dedicated for timer setting. When the dialog is active the buttons arrow left and right are used for the line option selection. Enter button confirms the actual option in the line and the next option can be performed. Enter button on the last line confirms all the option in dialog and save the timer settings to the controller. Menu button cancels the dialog without saving.

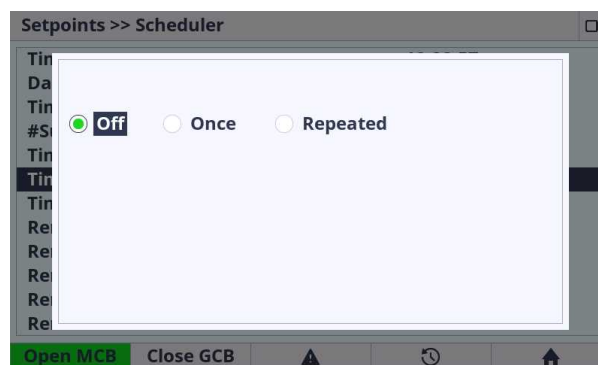


Image 6.21 : Dialog Timer (Off) overview

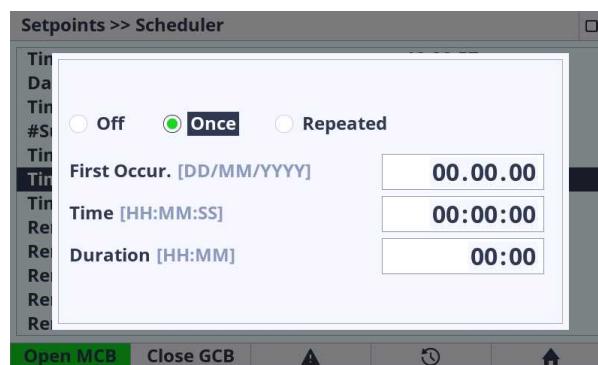


Image 6.22 : Dialog Timer (Once) overview

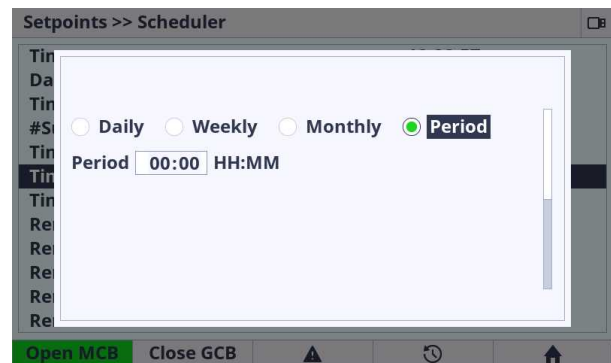
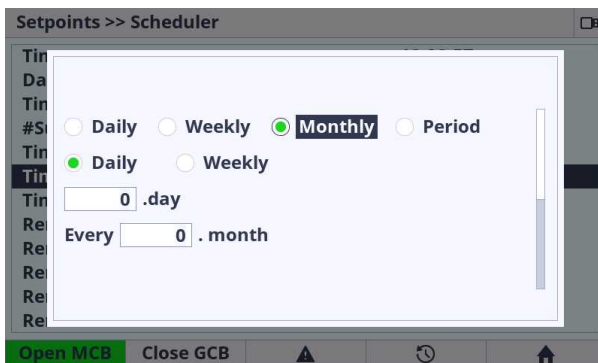
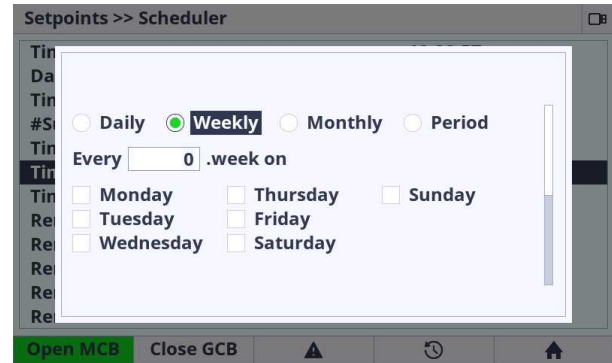
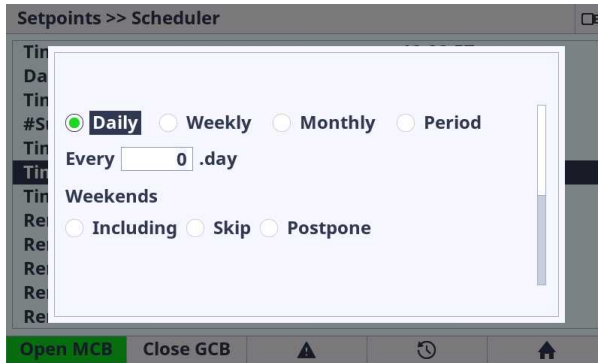
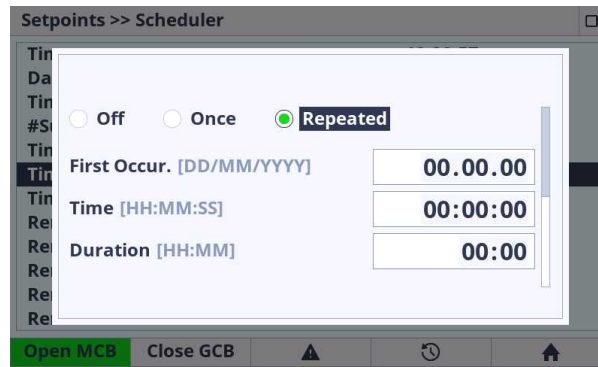


Image 6.23 : Dialog Timer (Repeated) overview

## Status bars

### Bottom status bar

The bottom status bar is used for the user button functions. There are several status bars in the GUI. Bottom status bar consists of 5 areas (user buttons) dedicated for emitting the command to the controller unit (e.g. GCB open, GCB close, etc.), jump to the specified page (e.g. alarmlist, history) or special functions on some pages.

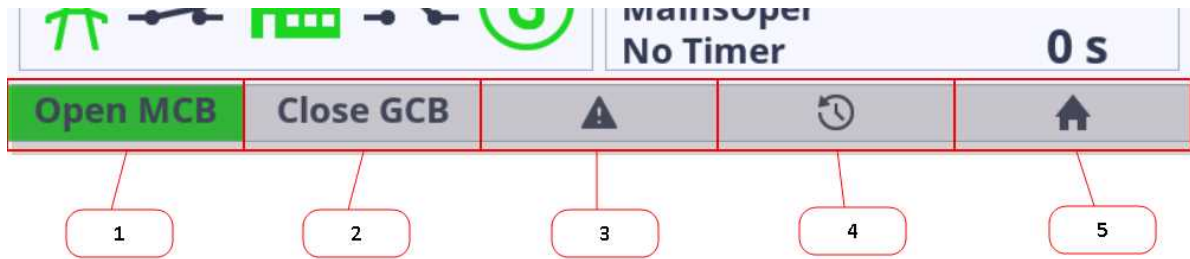


Image 6.24 : Example (bottom status bar on Home metering screen)

1. **User button 1** - emitting the command to the controller or link to page in GUI or special function
2. **User button 2** - emitting the command to the controller or link to page in GUI or special function
3. **User button 3** - emitting the command to the controller or link to page in GUI or special function
4. **User button 4** - emitting the command to the controller or link to page in GUI or special function
5. **User button 5** - emitting the command to the controller or link to page in GUI or special function

**Note:** The button press is visually indicated by black frame around the button area. The indication does not mean that requested command is performed, it is only press indication.

**Note:** Concrete status bar views for concrete page are described in specific chapters in this manual.

## Top status bar

The top status bar can NOT be adjusted. Information in the top status bar is fixed and controlled by ComAp.



Image 6.25 Top Status Bar description



Image 6.26 : Top Status Bar - Mode selector dialog

1. **Mode selector** - Mode selector is dedicated for the controller mode selection. Using arrow left and right the controller mode is changed (only on the metering screens). The choice must be always confirmed by enter button. There is 5s timer for the automatic mode selector dialog cancellation. The mode selector dialog can be also canceled by menu button.
2. **Page title** - Each page and each metering screen has its own title. The first number in square brackets describes the actual metering screen position. The second number describes the total available number of metering screens.
3. **Trending** - The icon is active when the trending is running. Icon is inactive when the trending is stopped.
4. **USB Stick** - The icon is active if the USB stick is plugged in the display unit. Icon is inactive if there is no USB stick plugged in.
5. **Access Lock** - Access lock icon is active if the display is locked for security reasons. Icon is inactive if the controller unit is not locked.
6. **PC connection** - PC connection icon is active if the unit established connection to the PC using the USB cable. Icon is inactive if there is not established connection to the PC.
7. **Alarm indication** - The alarm icon is flashing red if there is at least one unconfirmed alarm (shutdown or warning) in the alarmlist. The icon lights red if there is at least one confirmed active alarm and no unconfirmed alarm in the alarmlist. The icon is inactive if the alarmlist is empty.
8. **User** - The user icon lights green if the user is logged in to the controller. The icon is inactive if the user is logged out.

## 6.1.2 Metering screens

Metering screens are dedicated for important controller values and setpoints.

### InteliGen 500 controller screens

InteliGen 500 metering screens are predefined by Comap and covers all the application types.

- ▶ the movement between the metering screens is done using the arrow up and down buttons in the front panel
- ▶ the entire screens and instruments on the screens are dynamically displayed or hidden based on the following state of the controller unit :

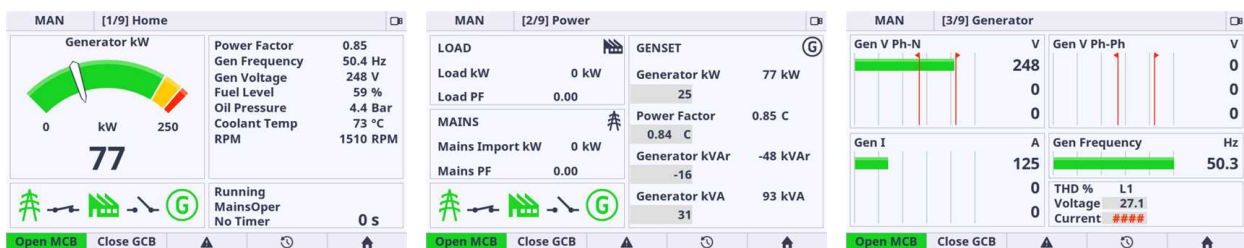


- Application type
- Wiring controller settings
- Connected PlugIn modules
- Configured CAN modules
- Aftertreatment ECU list settings

▶ The following structure is predefined in the IntelliGen 500 controller archive by default :

1. Home
2. Power
3. Generator
4. Mains
5. Bus
6. Synchro
7. Power Management
8. Analog inputs
9. Binary Inputs | Outputs
10. Statistics
11. Ethernet
12. Aftertreatment
13. CM-4G-GPS
14. CM-GPRS
15. EM-BIO8-EFCP-A
16. EM-BIO8-EFCP-B
17. CAN modules
18. ECU modules
19. Virtual modules

**Note:** Some of the screens are added automatically If external modules, ECU modules and others are added using IntelliConfig software. The screens are automatically removed if the respective module is removed from the configuration.



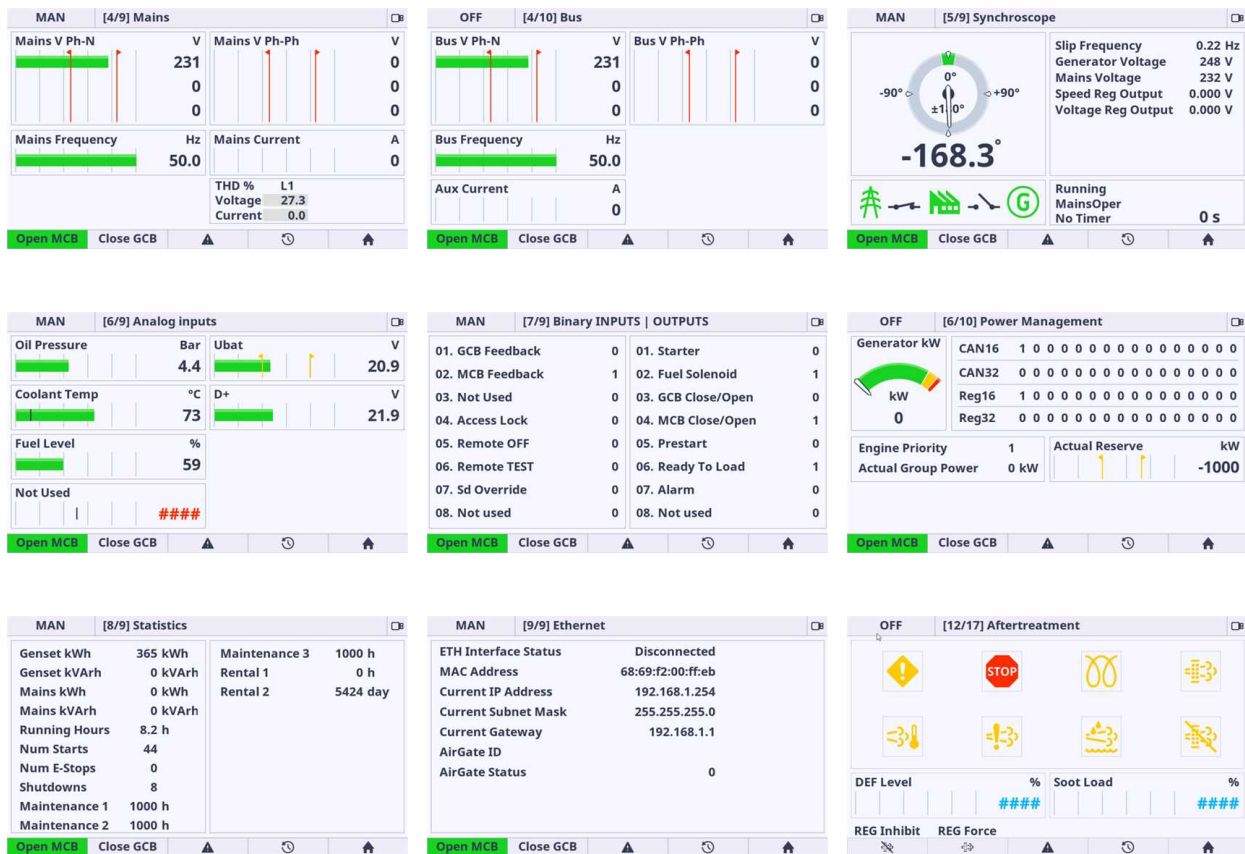


Image 6.27 : IntelliGen 500 metering screens overview

### 6.1.3 Alarmlist

The alarmlist page is intended for displaying the controller alarms. If any of the following type of the controller alarm occurs The alarmlist page is displayed and also the alarm button in the Top status bar starts flashing RED, even if it is not the shutdown alarm. The Automatic jump to the Alarmlist page is performed only in case the actual GUI position is the Home metering screen. The alarm icon in the top status bar is informative icon where the display unit informs the user that there is any alarm stored in the controller unit. Pressing the User button 3 opens the alarmlist page. The alarmlist page is displayed until the alarmlist contains at least one unconfirmed alarm.

There are 4 different types of controller alarms :

- ▶ **Warning (often also known as 1st level alarm)** - represented by the YELLOW colour. These types of alarms inform the user that something is wrong and need to be checked and confirmed.
- ▶ **Shutdown (often also known as 2nd level alarm)** - represented by the RED colour. These types of alarms protects the GenSet or Engine during the wrong state.
- ▶ **ECU alarm** - represented by the BLUE colour. This type of alarm comes from the connected external ECU units.
- ▶ **Sensor fail alarm** - represented by the WHITE colour. A special kind of alarm that appears if any connected sensor emits the wrong state.

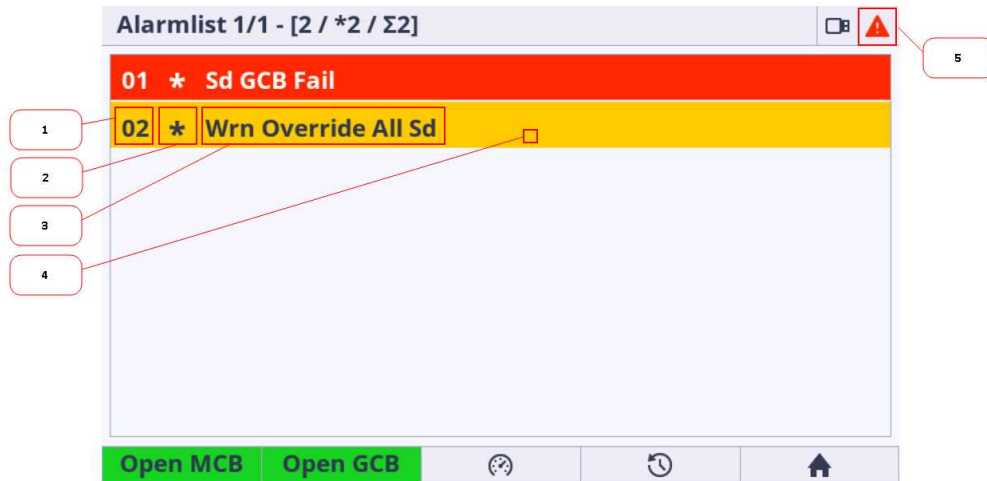


Image 6.28 : Alarmlist Page

1. **Alarm item number** - displays the number of the concrete alarm.
2. **Alarm item star** - describes if the alarm is CONFIRMED or NOT CONFIRMED. The confirmation action is performed by the Alarm reset button in the front panel
  - a. Star is displayed - alarm is NOT CONFIRMED
  - b. Star is not displayed - alarm is CONFIRMED (using alarm reset button)
3. **Alarm description** - The short description of the alarm
4. **Alarm coloring** - There are specified the color and asterix combination
  - ▶ level 1 (warning) alarm
    - Active/unconfirmed : \* / yellow background / dark text (asterix active)
    - Active/confirmed : yellow background / dark text (asterix inactive)
    - Inactive/unconfirmed : \* / dark background / yellow text / asterix active
  - ▶ level 2 (shutdown) alarm
    - Active/unconfirmed : \* / red background / white text (asterix active)
    - Active/confirmed : red background / white text (asterix inactive)
    - Inactive/unconfirmed : \* / dark background / red text (asterix active)
  - ▶ sensor fail alarm
    - Active/unconfirmed : \* / white background / dark text (asterix active)
    - Active/confirmed : white background / dark text (asterix inactive)
    - Inactive/unconfirmed : \* / dark background / white text (asterix active)
  - ▶ ECU alarm
    - Active/unconfirmed : \* / blue background / white text (asterix active)
    - Active/confirmed : blue background / white text (asterix inactive)
    - Inactive/unconfirmed : \* / dark background / blue text (asterix active)
5. **Topstatus bar Alarmlist icon** - The alarm icon is flashing red if there is at least one unconfirmed alarm (shutdown or warning) in the alarmlist. The icon lights red if there is at least one confirmed active alarm and no unconfirmed alarm in the alarmlist. The icon is inactive if the alarmlist is empty. This is information that something is wrong and need to be checked and resolved.

**Note:** The Alarmlist displays maximum 8 alarm items at the same time. If there is more than 8 alarms in the alarmlist it is possible to list in the page to another alarm items by arrow up and down buttons.

**Note:** The alarmlist page is automatically displayed and backlight is turned on if the new alarm appears (only in case the actual GUI position is the Home metering screen).

**IMPORTANT:** IntelliGen 500 controller displays maximum 16 alarms.

**IMPORTANT:** Alarm reset button confirms all the unconfirmed alarms stored in controller.

**IMPORTANT:** If the actual GUI position is Alarmlist page and there is at least one unconfirmed alarm in the Alarmlist the jump to the home metering screen and backlight timeout are ignored.

## 6.1.4 Setpoints

The setpoint page is intended for setting the controller values. Each type of controller has specific setpoints to be set. The setpoints also depend on the type of application like SPtM and MINT. Availability of the setpoint item also depends on configuration level settings in Administration page. Setpoint is set in 2 steps.

- ▶ 1st step - Setpoint group is selected using buttons arrow up and down and confirmed using enter button

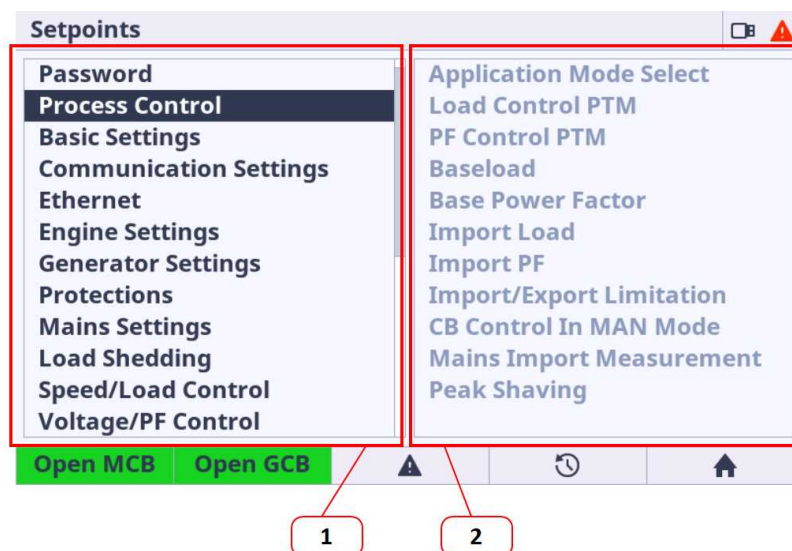
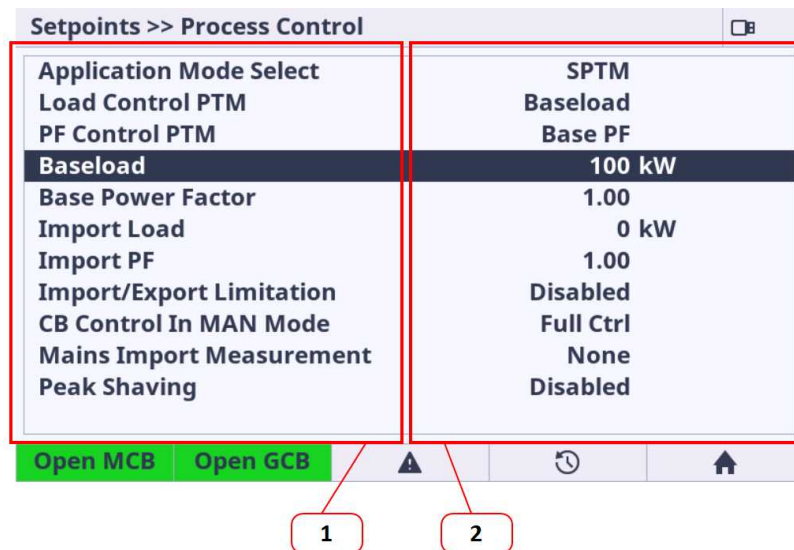



Image 6.29 : Setpoints Page overview

1. **Setpoints group** - the column setpoint group displays the available groups based on the controller, application type and configuration level settings. Respective setpoint group is selected using enter button.
2. **Available setpoints in actually selected group** - each setpoint group contains specific setpoints. The informative column Setpoint name displays the available set of setpoints to be set in each Setpoint group. This column is only informative and can NOT be set using the arrow left and right. The setpoint setting is done using the 2nd step - see below.
  - ▶ 2nd step - Setpoint item is selected using the buttons arrow up and down and the dialog for value setting is called using the enter button. The dialogs are described in the chapter Dialogs.



| Setpoint Name            | Value         |
|--------------------------|---------------|
| Application Mode Select  | SPTM          |
| Load Control PTM         | Baseload      |
| PF Control PTM           | Base PF       |
| <b>Baseload</b>          | <b>100 kW</b> |
| Base Power Factor        | 1.00          |
| Import Load              | 0 kW          |
| Import PF                | 1.00          |
| Import/Export Limitation | Disabled      |
| CB Control In MAN Mode   | Full Ctrl     |
| Mains Import Measurement | None          |
| Peak Shaving             | Disabled      |

Open MCB Open GCB 

1 2

Image 6.30 : Group Setpoints Page

1. **Setpoint name** - Setpoint is set using the enter button. Specific dialog is displayed and the value can be set. There are several types of dialogs (text, numeric, stringlist) and the type of called dialog depends on the setpoint type. The dialogs are described in the chapter Dialogs.
2. **Actual value** - Informative actual value for specific setpoint is displayed. Value range, original value and default value for the selected setpoint are displayed inside the dialog.

## Password screen

The group Password is not setpoint group. This Password item is manually placed to the first group position on the program code level just for this controller unit.



Image 6.31 : Main Setpoints Page

1. **Password item** - the item dedicated for the password settings, login and logout.

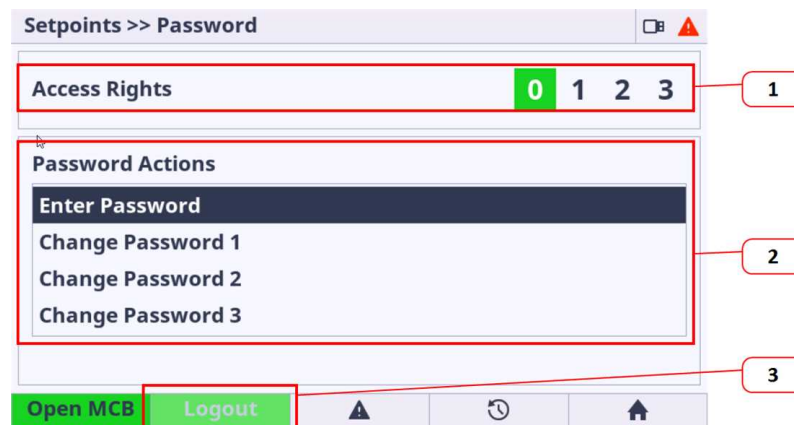


Image 6.32 : Setpoints Password Page

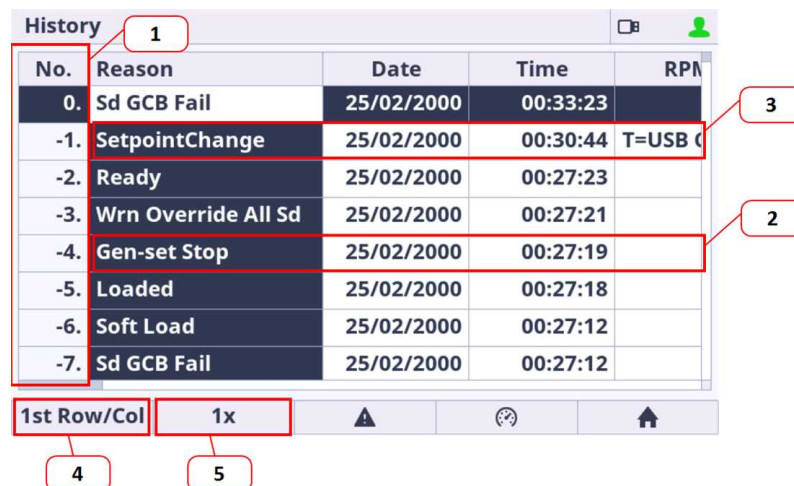
1. **Logged Access Level Info** - the information about actually logged in access rights.
  - a. 0 - user has access rights 0, which means logged-out
  - b. 0,1 - user has access rights 0 + 1 access rights
  - c. 0,1,2 - user has access rights 0 + 1 + 2 access rights
  - d. 0,1,2,3 - user has access rights 0 + 1 + 2 + 3, which means administrator rights
2. **Password Actions** - the list of available password actions.
  - a. Enter Password - calls the dialog for password insert
  - b. Change Password - calls the dialog for password change of respective access rights
3. **Logout Button** - is active in case of any user is logged in. The button is inactive if any user is logged out - this is indicated by green light of 0 access level.

## 6.1.5 History

The history page displays the records of the important moments in the controller history.

There are 2 types of history records :

- ▶ **Event records** - are also known as standard history records. This type of record appears in case the controller event has been made. The time stamp history also belongs in the event history. The time record is stored for a specified period of time.
- ▶ **System records** - are also known as text history record. These type of records are generated during the user login/off, controller programming or other system actions.



| No. | Reason              | Date       | Time     | RPM     |
|-----|---------------------|------------|----------|---------|
| 0.  | Sd GCB Fail         | 25/02/2000 | 00:33:23 |         |
| -1. | SetpointChange      | 25/02/2000 | 00:30:44 | T=USB C |
| -2. | Ready               | 25/02/2000 | 00:27:23 |         |
| -3. | Wrn Override All Sd | 25/02/2000 | 00:27:21 |         |
| -4. | Gen-set Stop        | 25/02/2000 | 00:27:19 |         |
| -5. | Loaded              | 25/02/2000 | 00:27:18 |         |
| -6. | Soft Load           | 25/02/2000 | 00:27:12 |         |
| -7. | Sd GCB Fail         | 25/02/2000 | 00:27:12 |         |

1st Row/Col    1x

Image 6.33 : History page overview

1. **Fixed column** - has a different shade of colour. Fixed column is always merged and anchored on the left side of the history page.
2. **Event history record** - this type of record appears in case the controller event has been made. The time stamp history also belongs in the event history. The time record is stored for a specified period of time. Pressing the enter button the dialog with detailed information for selected record is displayed.
3. **System history record** - this type of record appears in case the controller system action has been made. The time stamp history also belongs in the event history. The time record is stored for a specified period of time. Pressing the enter button the dialog with detailed information for selected record is displayed.
4. **Jump to first row and column** - the jump to the first row and first column is performed if the button is pressed.
5. **Listing mode** - by pressing this button the listing mode is changed. There are available 3 modes : listing by 1 item, listing by 1 page, listing by 10 page. The mode is useful if the history is full of records. Listing mode is also automatically changed if the listing buttons arrow up and down are pressed for longer time. Original mode is set when the listing buttons are released.

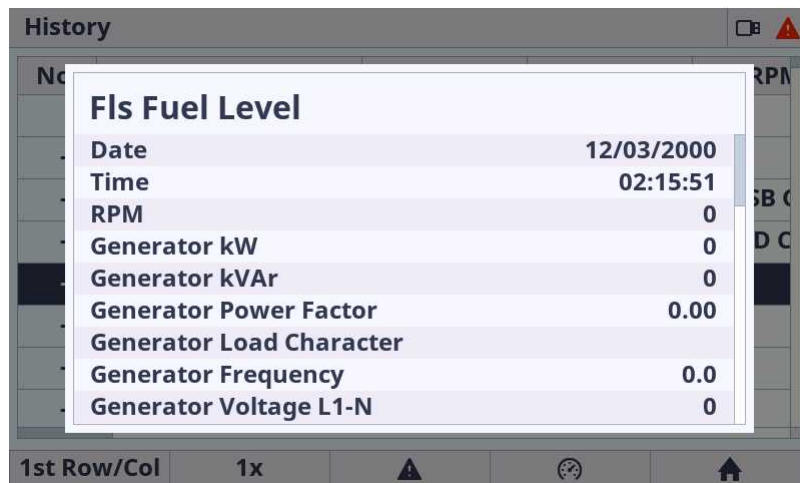


Image 6.34 : History page - Item detail dialog

**Note:** Pressing the enter button on the actually selected row the dialog with detailed information for selected record is displayed.

**IMPORTANT:** Each controller unit supports the specific number of history records. E.g. controller IntelliGen 500 supports 500 history records. Default configuration consists of 33 columns. Maximal column amount is approximately 100 columns based on the type of the observed value.

## 6.1.6 Administration

🔍 back to Graphical User Interface

### Init screen

The init screen is the special screen (bitmap) defined and stored in the controller. The init screen is displayed during the booting procedure. The init screen is also accessible from administration as a first list item. The purpose of the init screen is to allow the user to create and show his own initial logo screen during the booting procedure. The init screen logo can be uploaded using the IntelliConfig. By default the init screen is predefined by ComAp.



Image 6.35 : Init screen overview



## Controller Info

Controller info page is dedicated for important information about the entire unit. These information is useful mainly for issue troubleshooting .

Controller info page is divided into 3 main blocks of information :

- ▶ Integrated Color Display unit
- ▶ Controller unit
- ▶ Configuration

| ControllerInfo         |                        |
|------------------------|------------------------|
| Name                   | Value                  |
| ICD HW version         | 1.0.0.900              |
| ICD SW version         | 1.0.0.900              |
| ICD bootloader version | 0.0.0.0                |
| ID String              | InteliGen-500-1.0.0.20 |
| Software version       | 1.0.0.20               |
| Serial number          | FF110339               |
| Controller type (HW)   | 21                     |
| Application type (HW)  | 2                      |

Open MCB   Close GCB   ⚠   ⌛   🏠

Image 6.36 : Administration Page - Controller Info

**Note:** Similar values with similar structure can be displayed using InteliConfig PC tool.

## Modules Info

Modules info page is dedicated for important information about the connected modules information. The page Modules Info displays the information from the following type of connected modules :

- ▶ Plug-In modules
- ▶ CAN peripheral extension modules



Image 6.37 : Administration Page - Modules Info

**Note:** The availability of the connected module depends on the type of controller unit.

## Settings

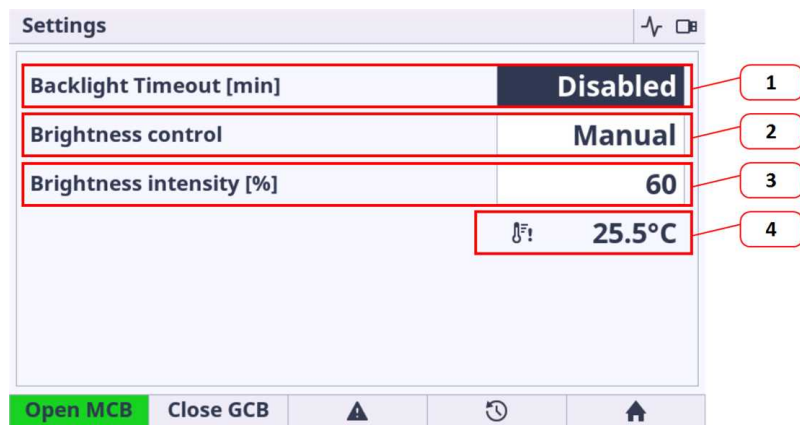


Image 6.38 : Administration Page - Settings

1. **Backlight Time** - if the cell area is pressed the dialog for time settings is displayed. The user is able to set the period from 1 up to 241 minutes. There is also the option to set NO Timeout which means the display unit is backlighted forever.
2. **Brightness Control** :
  - a. Manual (by default) - the value of the backlight is set manually using the value dialog (point 3)
  - b. External - the value of the backlight is given by the Analog Input settings in IntelliConfig and connected value of resistor, voltage or current (based on the type of the selected sensor).

3. **Brightness intensity** - the value is selected using the value dialog. Note the value is applied immediately during the change of the value.
4. **Internal Temperature information**- gives the actual inside temperature of the unit. There is implemented automatic mechanism for lowering the backlight intensity based the internal derating backlight curve. If the inside temperature exceeds 35 °C the area behind the temperature lights yellow. The yellow color indicates that the display backlight curve is applied and automatically starts derate the backlight intensity. The backlight intensity returns to normal when the temperature is decreased bellow 35 °C. This feature saves the lifetime of the internal components.

**IMPORTANT:** It is strongly recommended to use backlight on the standard level max. 60%. Maximal backlight intensity level of 100% is suitable only for application with higher amount of the ambient light. Be aware that higher intensity level means higher surface front glass temperature and lower lifetime.

**IMPORTANT:** It is strongly recommended to use Backlight Time (timer) set on the reasonable amount of time (approximately 30 minutes) during the normal running genset or engine phase. It is because of saving lifetime of the display unit. The display unit is still running if the backlight is off. For switching on the LCD backlight the simple pressing any button is necessary.

## Languages

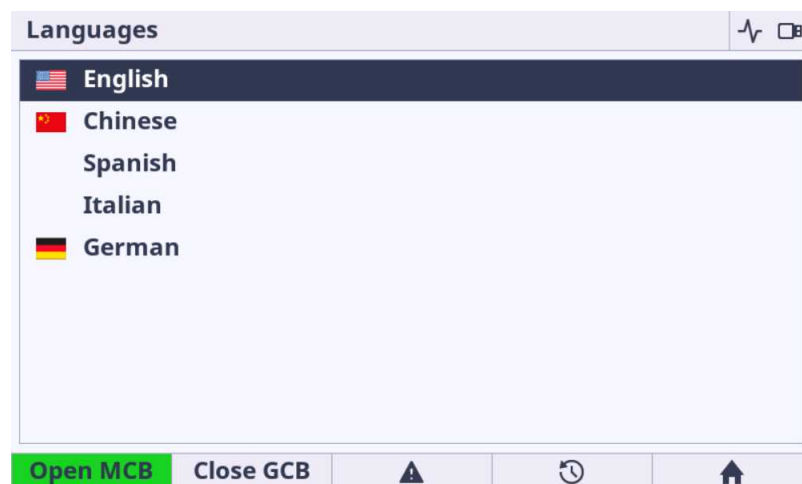


Image 6.39 : Administration Page - Languages

- ▶ **Language settings** - the list of languages stored in the controller configuration is displayed in the list of possible languages.
- ▶ The integrated color display unit can display the following languages
  - English
  - Chinese
- ▶ The integrated color display unit can **partially** display the following languages
  - Bulgarian, Taiwan, Czech, German, Greek, Spanish, Finnish, French, Hungarian, Icelandic, Italian, Japanese, Korean, Dutch - Netherlands, Norwegian, Polish, Roman, Russian, Croatian, Slovak, Swedish, Turkish, Ukrainian, Slovenian, Estonian, Latvian, Lithunian, Vietnamese, Italian, Portuguese, Bosnian

**IMPORTANT:** Even the language is configured in IntelliConfig the specific language is unavailable if the language is available in configuration (but empty) or the language is not supported by integrated color display unit.

**Note:** The flag is not displayed if the language is supported but the flag icon does not exist in the integrated color display unit.

## Configuration level

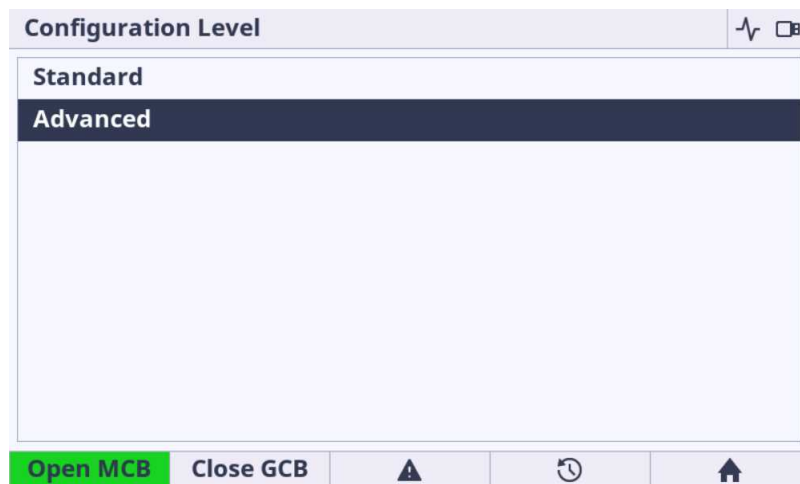


Image 6.40 : Administration Page - Configuration Level

- ▶ **Standard** - Limited amount of settings are available for configuration. The description which settings are available in chapters concerning to controller functions.
- ▶ **Advanced** - Set by factory default. All the settings are available for configuration. Be aware that only experienced users should perform the settings of extended functions.

**Note:** By default the Advanced settings is selected which means all the setpoints are available by default. To restrict the availability the Standard setting must be performed. The advanced and standard category are set in IntelliConfig PC application.

## Export / Import

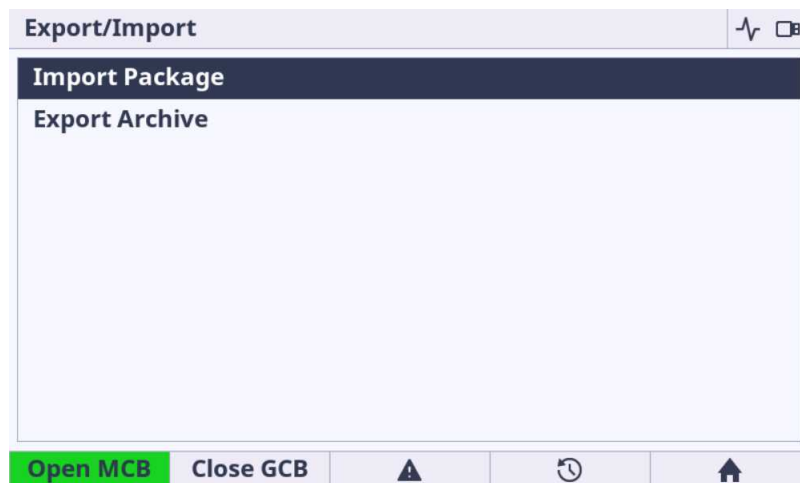
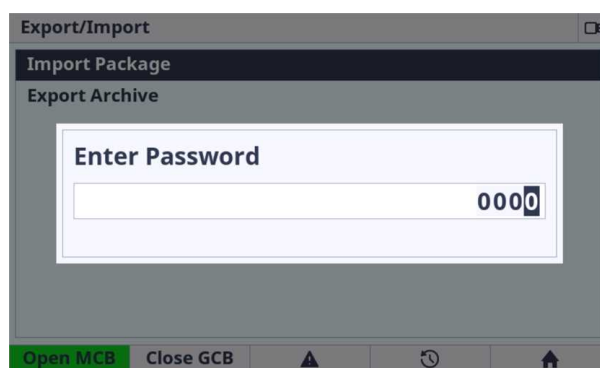


Image 6.41 : Administration Page - Export & Import

- ▶ **Import Package** - is dedicated for integrated color display unit firmware updated, controller firmware update, controller archive update. Extension modules firmware update is not supported.
  - If the USB stick is not connected the import function is not available and visually indicated as a greyed text.
  - File packages used for firmware import can be prepared only in InteliConfig PC application **only**.
  - The files (\*.pcg3) prepared in InteliConfig (for import) must be stored in the root of USB stick folder - the only root folder is supported for import.
  - Import function is always protected by Administrator (level 3 access rights) password. Until the correct password is not inserted the import function is unavailable. Be aware that there is implemented algorithm to have password protected against the brute force attempts.



- The message dialog (Controller unit is not ready) is displayed if the controller is not in state ready for programming (e.g. genset running)
- ▶ **Export Archive** - is dedicated for the entire archive export.
  - If the USB stick is not connected the export function is not available and visually indicated as a greyed text.
  - The archive files (\*.aig3) is exported to the fixed directory in the USB stick (root:/IG500/Archive. The directory structure is automatically created if does not exist.

- Export function is not protected by password.
- The message dialog (Controller unit is not ready) is displayed if the controller is not in state ready for archive export (e.g. genset running)
- Waiting dialog is displayed during the export process.
- The message dialog is displayed after archive process.
  - Archive Export Successful if successfully exported.
  - Archive Export Failed if any error occurs during the export process.
- Integrated color display unit is restarted after export process.

**Note:** Once the USB stick is inserted to the display unit the directory and its subdirectories are created automatically if does not exist.

**IMPORTANT:** Requested files to be imported must be saved in the root directory on a USB Stick.

## Imported File selection

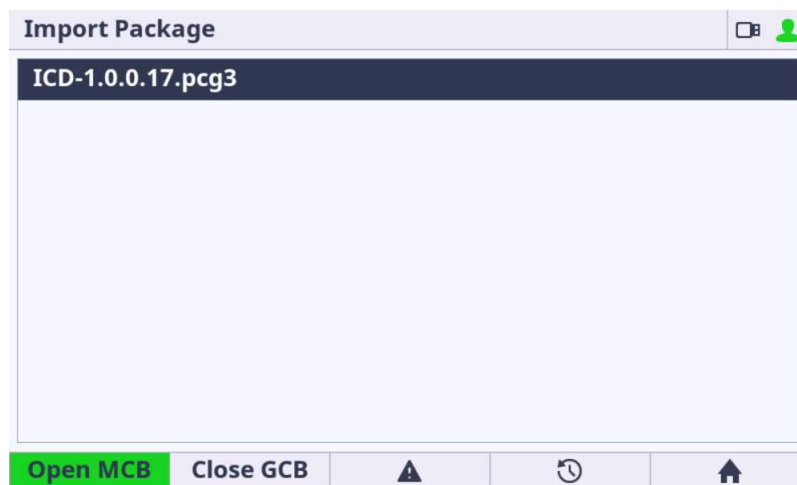


Image 6.42 : Administration Page - Export & Import - File selection

- ▶ **File selection** - is available if the conditions above (in section Import Package) is fulfilled
  - Only files with pcg3 extension is displayed.
  - Maximum 100 files (\*.pcg3) in root is displayed.
  - The message dialog (Package Incompatible) is displayed if the incompatible pcg3 file is used
  - The message dialog (Invalid File) is displayed if the pcg3 file is invalid or corrupted

## Import process

| Import Package     |           |          |  |  |
|--------------------|-----------|----------|--|--|
| Name               | Actual    | Package  |  |  |
| HMI Logo           | N/A       | N/A      |  |  |
| HMI Fonts          | 1.0.0.0   | 1.0.0.0  |  |  |
| HMI Images         | 1.0.0.5   | 1.0.0.5  |  |  |
| HMI Firmware       | 1.0.0.900 | 1.0.0.17 |  |  |
| HMI Service screen | N/A       | N/A      |  |  |
|                    |           |          |  |  |
|                    |           |          |  |  |
|                    |           |          |  |  |
|                    |           |          |  |  |
|                    |           |          |  |  |

Image 6.43 : Administration Page - Export & Import - Import process

- ▶ **Import process** - is available if the correct and compatible file is selected conditions above (in section Import Package) is fulfilled
  - The import process is not allowed if at least one file in the package is not compatible with each other - the Import button is not displayed.
  - When the Import process is started it is not possible to interrupt it.
  - Bar Message is displayed
    - Package Import Successful (green colored) - if success
    - Package Import Failed (red colored) - if any error during the process
  - the user is informed about the actual item progress
    - - the file has been imported correctly
    - - the file import is under progress
    - - the file is incompatible
  - The device is rebooted after import process.

**IMPORTANT:** Integrated color display unit firmware is updated in two steps. Firstly the firmware is uploaded to the internal memory (indicated by icon ). The second step is the firmware update from internal memory. The firmware is updated immediately after reboot using bootloader (Indicated by progress bars and messages in limited GUI). After all the unit is automatically started with new firmware.

**IMPORTANT:** Only in some special cases the import process using USB stick must be performed twice. This situation is always described in New Feature List with more detailed information.

**IMPORTANT:** Only FAT16 and FAT32 file system on USB stick are supported.

**Note:** If the USB stick is plugged in the Import/Export page is automatically displayed.

**Note:** If the import process fails try the import process again.

**Note:** If the import process fails try to create new package file using IntelliConfig.

## Service screen

The service screen is the special screen (bitmap) defined and stored in the controller. The service screen is also accessible from administration as a last list item. The purpose of the service screen is to allow the site administrator to put into the display (resp. controller) important data for technical support. The status screen can be uploaded using the IntelliConfig. By default the service screen is predefined by ComAp.

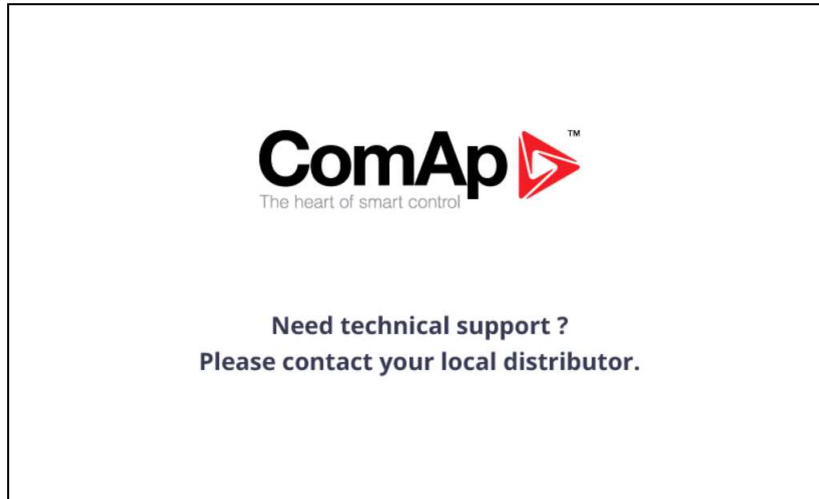


Image 6.44 : Service screen overview



## 6.1.7 Trends

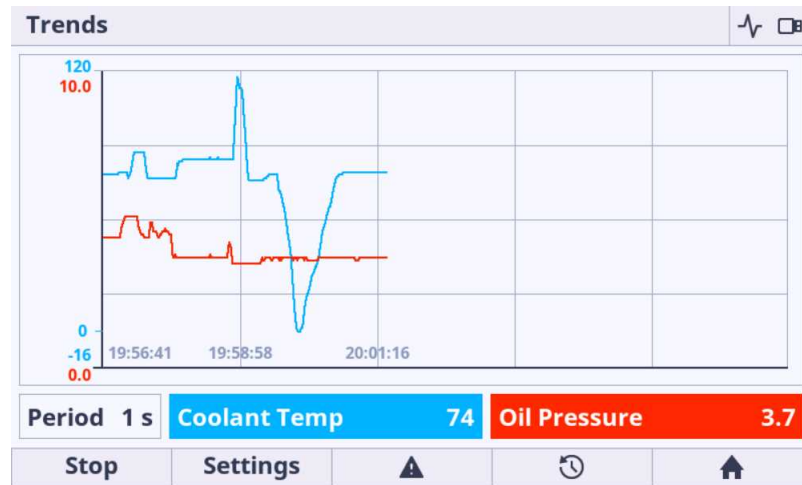


Image 6.45 : Trends page overview

The Trends page is divided on to 3 main blocks :

- ▶ **Main Trends Window** is intended to display all trends. The view and chart movement is fully automatic.
- ▶ **Channel panel** displays the actual values and sample period.
- ▶ **Function buttons** is intended for start, stop and settings of the trends.

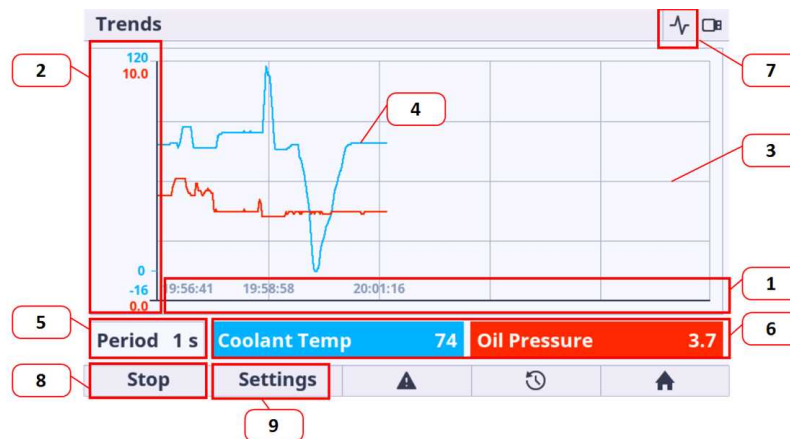


Image 6.46 : Trends page description

1. **X axis** -X axis displays the time stamps. The view of X axis is fully automatic.
2. **Y axis** - If the default range is not suitable for the displaying of the value it can be adjusted in settings option. See below for more information.
3. **Grid** - the grid is displayed behind the trends charts. The grid is fully automatic.
4. **Trend line** - each channel have different colour for better value identification. The color of the trend line match to the Value color in channel panel.
5. **Actual period** - Actual period settings. The period can be adjusted in settings option.
6. **Actual channel value panels** - display the values of the newest (actual) sample.

7. **Trend Icon** (Top Status bar) -if the trends are running the informative icon is shown in the top status bar
8. **Start / Stop button** - the button is dedicated for manual start and stop of the trends. It is possible to setup the automatic start of trending based on the trigger. There are 2 triggers : Return to Home metering screen and the specified bit of the available binary value.
9. **Channel settings button** - There are some settings available for the trends. See more information bellow.

## Trends settings

Trends settings page is dedicated for the available trends settings. The navigation in trends settings page is done by buttons arrow up, arrow down, arrow left, arrow right, enter, user button 1 and 2.

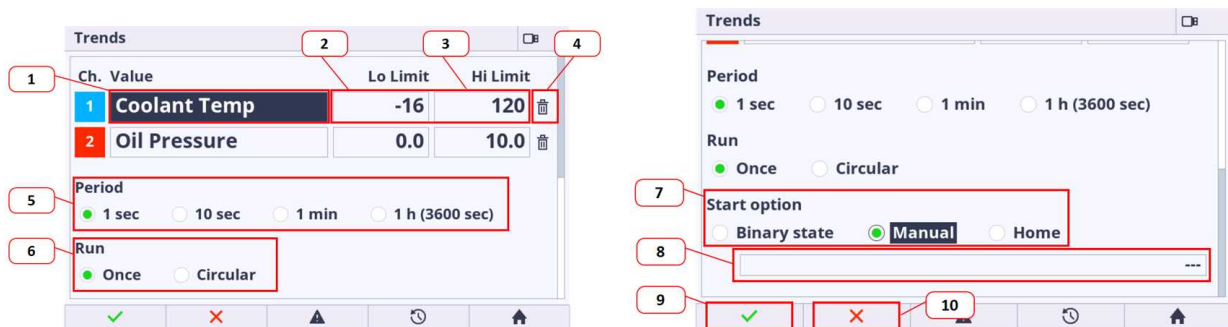


Image 6.47 : Trends page settings overview

1. **Channel value** - the channel value menu appears if the enter button is pressed just on the position. Inside the channel value menu the requested channel value can be selected. The value availability depends on the type of configuration stored in the controller.
2. **Low limit value** - the low limit value is intended for changing the low border of the value range. For the best view of the displayed trends it is highly recommended to set this limit to the minimum expected value with some reserve.
3. **High limit value** - the high limit value is intended for changing the low border of the value range. For the best view of the displayed trends it is highly recommended to set this limit to the maximum expected value with some reserve.
4. **Quick channel removal** - pressing the enter button on the trash bin icon the actual channel is not configured.
5. **Period** - section is dedicated for setting of the sample time period.
6. **Run** - the section is intended for the selection of the run mode
  - a. once - trending only until the trend chart window is full
  - b. circular - cyclic mode (trending is repeated continuously) - be aware the samples are stored only in internal temporary memory, the trend chart starts moving when the trend chart window is full, the oldest samples are trashed out
7. **Start option** - The start of trends are triggered by the start option. There are 3 start options.
  - a. Binary state - the trigger is the bit of the selected binary value. Manual start and stop is still active.
  - b. Manual (by default) - the trigger is the start button called by user.
  - c. Home - the trigger is the return to the Home metering screen from any GUI position. Manual start and stop is still active.
8. **Bit of binary value selection** - If the start option is set to Binary state then the field for the bit of the concrete binary value is activated.
9. **Acknowledgment button** - Pressing the user button 1 (Confirm) the settings are saved.
10. **Cancel button** - Pressing the user button 2 (Cancel) the settings are canceled and the main trends page is displayed without any change of the trends configuration.

**Note:** To get the best view of the displayed trends it is recommended to manually set the typical value range for each channel.

**IMPORTANT:** If the trending is started and the changes have been made in the settings the trending is restarted based on the new settings.

**IMPORTANT:** Be aware the samples are stored only in internal temporary memory. Trend chart starts moving when the trend chart window is full, the oldest samples are trashed out.

**IMPORTANT:** There is no option to store the trends to the external memories like USB stick, etc.

## 6.2 Quick help

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### 6.2.1 Logging in/off to the Controller

The user is able to log in/off to/from the controller via the menu Passwords in Setpoint page.

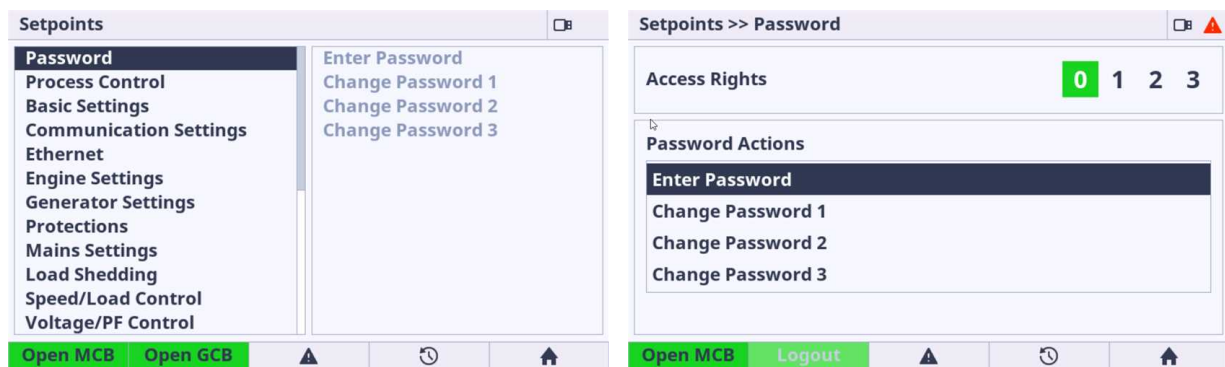


Image 6.48 : Password menu

1. Current Access Rights are shown on the top of the page.
2. Press the button on item Enter Password, the Password dialog will appear.
3. Insert the correct password. If the password is not correct, the user is informed about it. Be aware there is a brute force algorithm protection implemented.
4. The icon (user) in the top status bar turns green when the user is logged in.

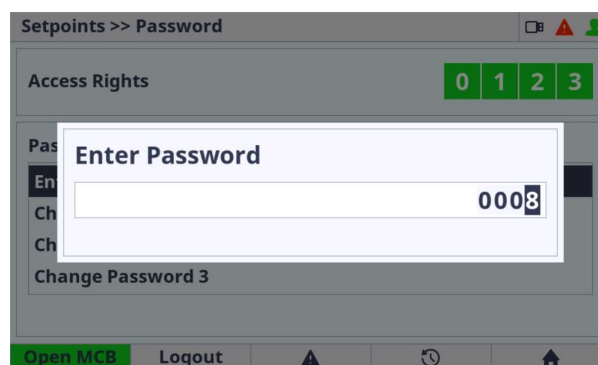


Image 6.49 : Password dialog

**Note:** Each Access Rights password can be changed by inserting old password and new password.

**IMPORTANT:** If the setpoint is protected by password the password dialog appears when the attempt to password change is performed.

**IMPORTANT:** Be aware there is a brute force algorithm protection implemented. If the brute force protection is active then the user is informed by Invalid Password message even the password is inserted correctly.

## 6.2.2 Important values

The important controllers values and system buttons are displayed by default and accessible from the Home, Power and Synchro metering screens. The breaker status, controller status and system timer are also displayed on the Home metering screen.



Image 6.50 : Important values

## 6.2.3 Gen-set mode change

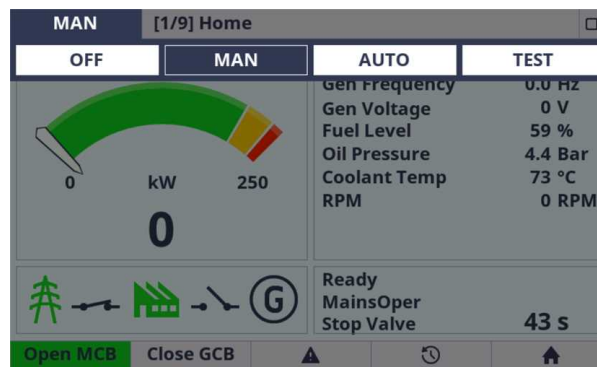


Image 6.51 : Genset mode change

1. Press the button arrow left or right in any metering screen
2. Change the controller mode using button arrow left or right and confirm the selection using enter button.
3. If all the controller conditions are fulfilled the GenSet mode is changed.

**IMPORTANT:** If the controller mode setpoint is protected by password the password dialog appears when the attempt to confirm the selection is performed.

## 6.2.4 Password change

The password change can be performed using the Password menu in Setpoint page.

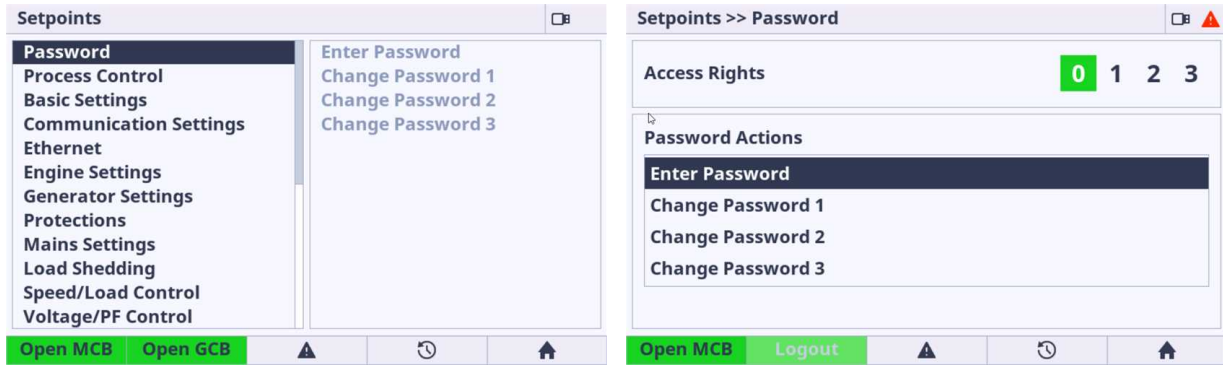


Image 6.52 : Password menu

1. Choose the item for which access right you want to change password.
2. Using password change dialog enter correct old and new requested password and confirm the choice.
3. The password for respective Access Rights level is changed.

## 6.2.5 Display brightness settings

The display brightness setting is adjustable using the Administration Menu - IntelliVision Settings.

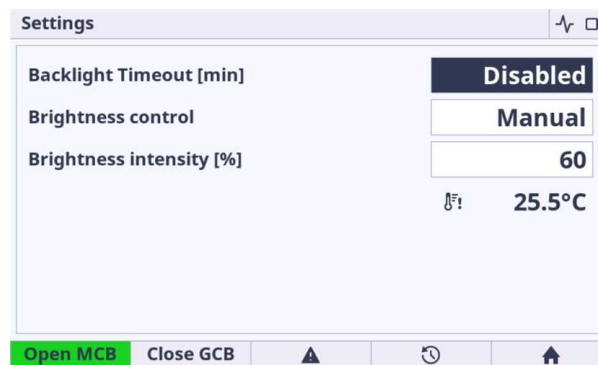


Image 6.53 : Display brightness settings

**Backlight Timeout** - can be set at a range of 1 to 254 minutes or Disabled. Disabled means the backlight never shuts down.

### Brightness control

1. If the manual mode is chosen the user is responsible for his own backlight intensity.
2. If the External mode is chosen the display unit expects the external resistor (potentiometer) on its Analog input. The type of sensor can be set in IntelliConfig

**Brightness intensity** - The backlight intensity can be adjusted using the value dialog from 1 up to 100%. It is not possible to set 0 to avoid total shutdown of backlight intensity.

**IMPORTANT:** It is strongly recommended to use maximum backlight if it is really needed. The temperature of the LCD grows linearly with the set of LCD backlight intensity. The product lifetime is temperature dependant. In general it means higher temperature lower lifetime.

**IMPORTANT:** It is strongly recommended to set the Backlight Timeout to reasonable time (e.g 5 minutes). If the backlight is off then any button press switch on the backlight again.

## 6.2.6 State messages

| State message                      | Description  |
|------------------------------------|--|
| Running                            | Indication of correctly running controller.  |
| Initialize control unit            | Controller unit initialization is under progress. The message is displayed during the booting procedure. |
| Control unit is programmed         | The controller upgrade process is under progress.  |
| Configuration Reading              | Controller configuration reading is in progress. Text disappears when controller is detected.            |
| Detecting main CU failed           | Internal communication error.  |
| Unsupported configuration format   | Configuration version is not supported   |
| Unsupported screen format          | Screens template has unsupported screen format. Screens template is missing in configuration.            |
| Control unit firmware is corrupted | Controller unit is not in valid state.   |
| Wrong configuration content        | Content of the configuration in controller unit does not match to configuration.                         |

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## 6.3 Custom configuration

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### 6.3.1 Init or Service screen logo customization

There is a possibility to change the init or service screen logo.

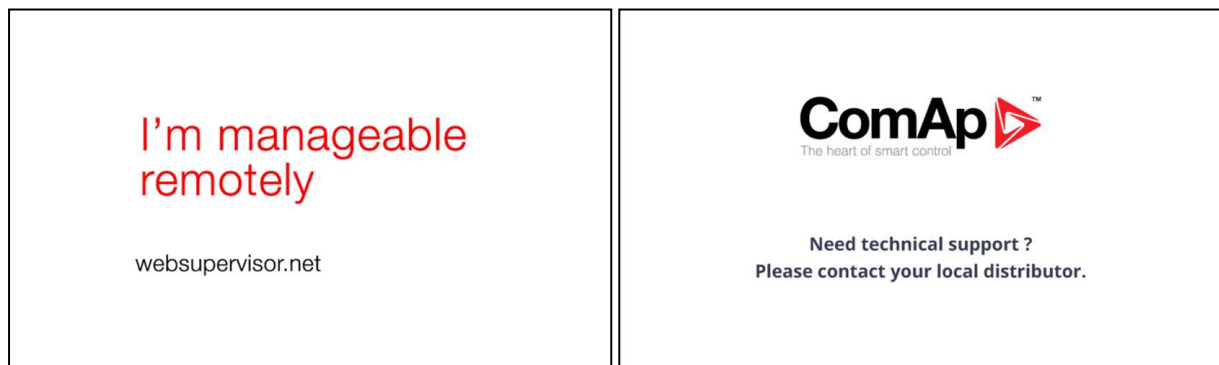
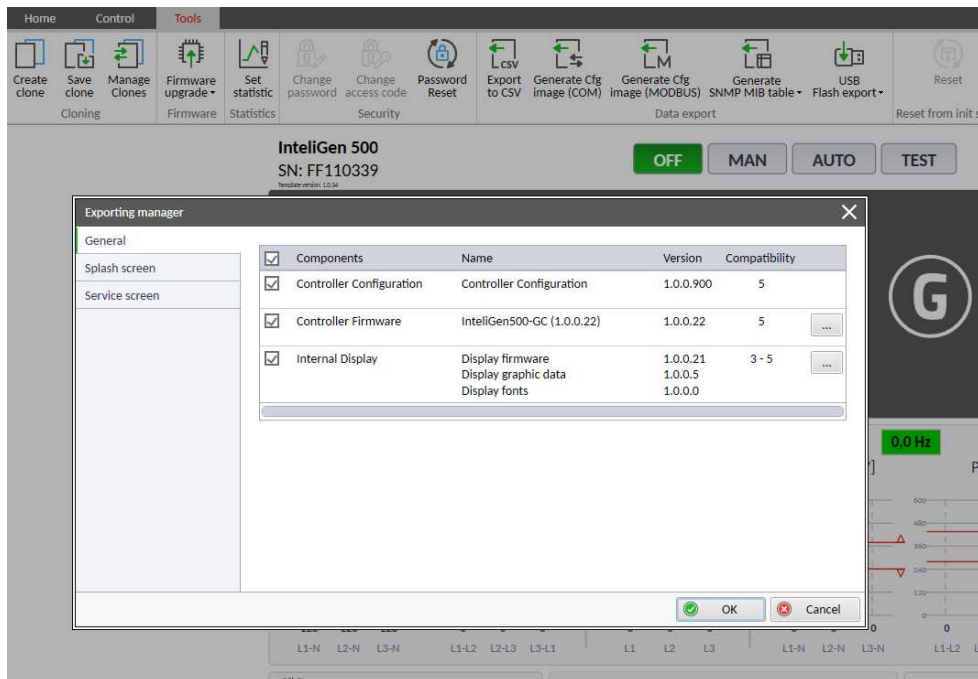


Image 6.54 : Default init and service screen logos

1. Make your own starting logo.
2. The image resolution is 800 x 480 pixels. Target image format is \*.png, \*.jpg or \*.bmp.
3. Open IntelliConfig PC application and connect to the controller where you want to change the logo (init, service or both at the same time).

4. Click to the tab Tools - USB Flash Export - Exporting Manager



5. Prepare the package with the requested logos (Init, Service, or both). It is possible to prepare the package only with the logos.
6. Confirm your choice and save the package file in the root directory of your USB stick.
7. Insert the USB stick into the controller unit.
8. Administration - Import/Export screen is automatically displayed when the USB stick is inserted. Or if the USB stick is already inserted use Enter + Menu button combination from metering screen, select the Import/Export item.
9. Select Import package. Insert the administrator (Access Rights level 3) password if not logged in.
10. Press user button 1 (Import)
11. The new logo(s) is(are) being imported to the Controller unit.
12. The device is rebooted and new logos imported.
13. Remove the USB Stick.



# 7 Communication

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## 7.1 PC

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 7.1.2 Remote communication ..... 197

### 7.1.1 Direct communication

A RS232, USB, RS485 or ethernet interface can be used for direct cable connection to a PC.

#### Connection via RS232

A plug-in communication module CM-RS232-485 is necessary for communication via RS232 connection. The module is plugged into the slot located on the rear side of the controller. To find more information about installation of the modules **see Plug-in module installation on page 50**.

RS232 interface uses **COM1 Mode (page 466)** port of the controller. Use a cross-wired serial communication cable with DB9 female connectors and signals Rx, Tx, GND.

**Note:** Also USB-RS232 convertor can be used.

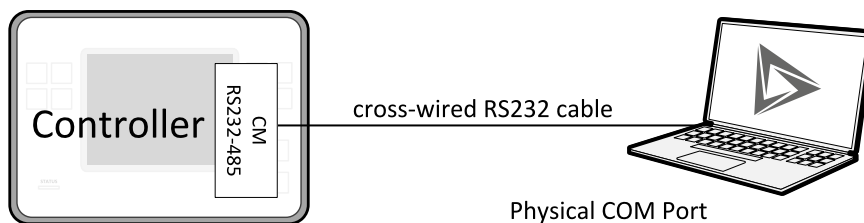


Image 7.1 Cross-wired RS232 cable is used

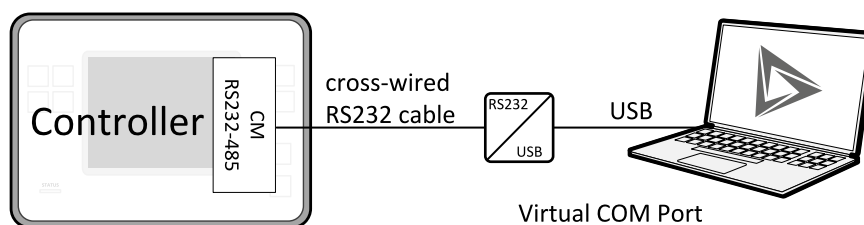


Image 7.2 Cross-wired RS232 cable and USB is used

## Connection via RS485

Plug-in module CM-RS232-485 or on board RS485 connector can be used for communication via RS485 connection.

A plug-in communication module CM-RS232-485 is necessary for communication via RS485 connection.

The module is plugged into the slot located on the rear side of the controller. To find more information about installation of the modules see **Plug-in module installation on page 50**.

RS485 interface uses **COM2 Mode (page 467)** port of the controller.

**Note:** Also USB-RS485 convertor can be used.

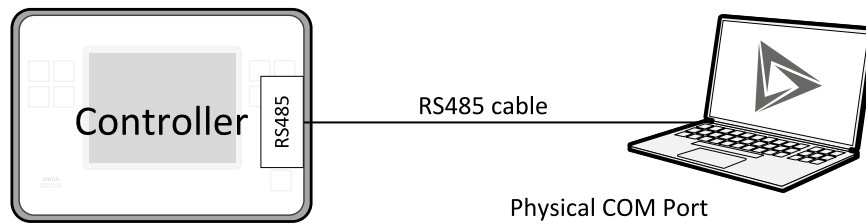


Image 7.3 Built-in RS485 is used

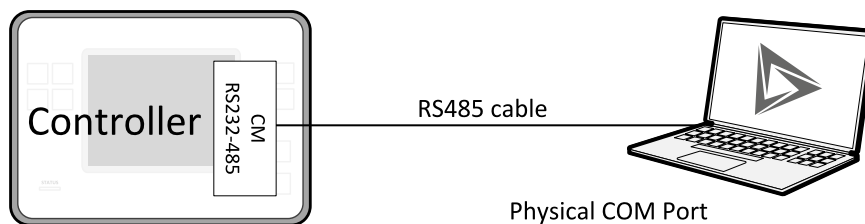


Image 7.4 Plug-in module CM RS232-485 is used

## Connection via Ethernet

This connection type is used for communication with the controller from IntelliConfig or any other PC tool. Eight remote clients can be connected at the same time (six direct IP clients and two AirGate clients).

To connect your PC tool to the controller use the INTERNET connection type and just put the Ethernet IP address into the gen-set address box in the PC tool.

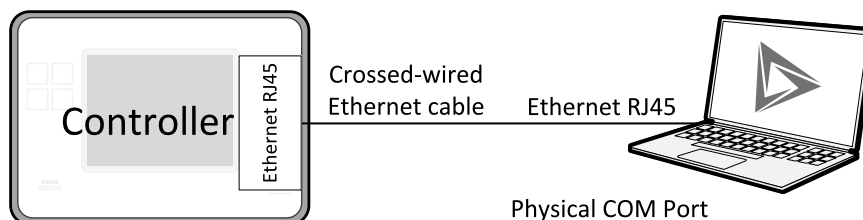


Image 7.5 Ethernet cable is used

## Connection via USB

USB interface uses HID profile.

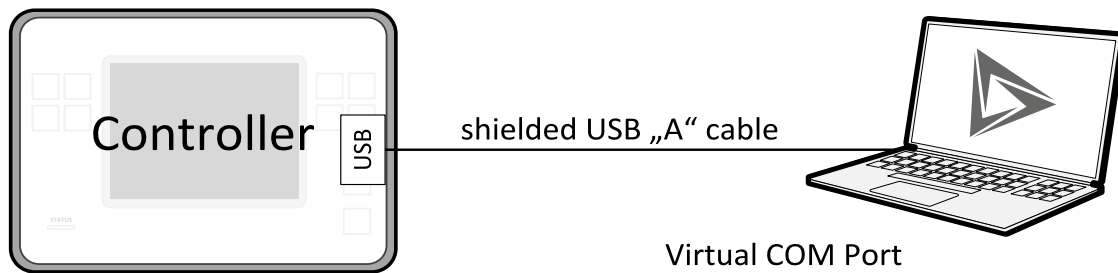


Image 7.6 Shielded USB type A cable is used

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## 7.1.2 Remote communication

A PC can be connected to the controller also remotely via CM-4G-GPSCM-GPRS or the built-in ethernet interface.

**IMPORTANT:** Factory default password and access code are "0". It is necessary to change them to avoid **Default Credentials (page 795)** or **Default Credentials (page 820)** alarm.

### Ethernet LAN connection

Direct IP LAN connection is intended to be used if the Ethernet module is reachable from the client computer by specifying the IP address at which the module can be contacted.

- ▶ If direct IP connection is to be used within a local network the Ethernet must have static IP address in the respective local network.

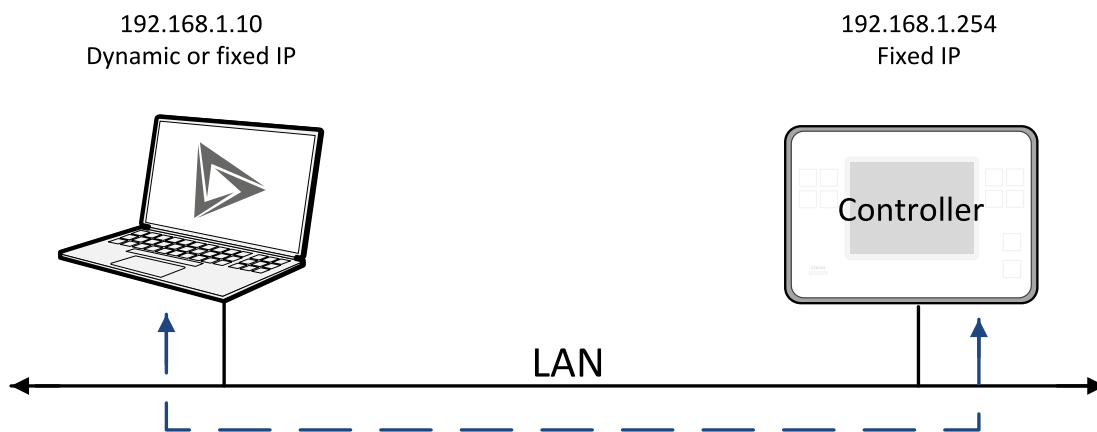


Image 7.7 Ethernet LAN connection

### Setting-up static IP address

There are two basic ways to get the static IP address.

First way is to switch the Ethernet to manual IP address mode. Adjust the setpoint **IP Address Mode (page 255)** to FIXED. In that case all setpoints of IP settings (**IP Address (page 256)**, **Subnet Mask (page 256)**, **Gateway IP (page 257)**, **DNS IP Address 1 (page 258)** and **DNS IP Address 2 (page 258)**) have to be adjusted manually. If this method is used several basic rules should be kept to avoid conflicts with the remaining network infrastructure:

- ▶ The static IP used in the controller must be selected in accordance with the local network in which Ethernet is connected.
- ▶ The static IP used in the controller must be excluded from the pool of addresses which is assigned by DHCP server, which is in charge of the respective local network.
- ▶ The local infrastructure must generally allow using devices with manually assigned IP addresses.
- ▶ There must not be any other device using the same static IP address. This can be tested from a computer connected to the same network using "ping <required\_ip\_address>" command issued from the command line. The IP address is not occupied if there is not any response to the ping command.

**Note:** The list above contains only basic rules. Other specific restrictions/rules may take place depending on the local network security policy, technology used, topology etc.

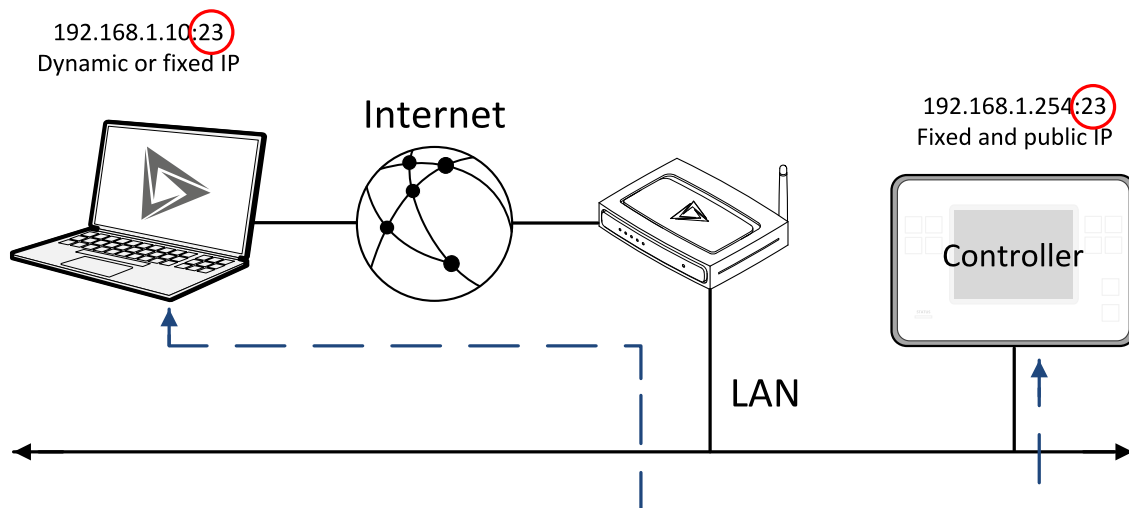
Next way is to switch the Ethernet to automatic IP address mode. Adjust the setpoint **IP Address Mode** (page 255) to AUTOMATIC. In that case all IP settings are assigned by DHCP server. Then configure the DHCP server to assign always the same IP address (i.e. static IP address) to the particular Ethernet according to it's MAC address.

## Internet connection

### Public static IP

If public static IP connection is to be used from the Internet, the IP address, which is entered into the client computer, must be static and public in scope of the Internet.

- ▶ If Ethernet is connected to Internet via a local ethernet network then in most cases port forwarding must be created from the public IP address of the network gateway to the local IP address of Ethernet at the port specified for ComAp protocol. Different port numbers can be used to create multiple port forwarding rules in the same local network.



### AirGate

This connection type is intended for remote connection from IntelliConfig, or any other ComAp PC tool over the Internet in situations, where obtaining fixed public IP address is not possible. Two remote clients can be connected at the same time.

This connection type is active if AirGate connection is enabled. Setpoint **AirGate Address** (page 260) must contain AirGate server address. It can be entered in text form as well as numeric form. There is a public AirGate server available at address "airgate.comap.cz".

Once the controller is attached to the Internet and the AirGate server address is properly adjusted then the controller registers automatically to the server and an identification string AirGate ID is given to a controller, which is visible at the controller screen.

To connect your PC tool to the controller use the AirGate connection, put the the same AirGate address as in the controller into the AIRGATE ADDRESS field and use the AirGate ID displayed on the controller.

## SMS

### Event SMS

The IntelliGen 500 controller equipped with the CM-GPRS or CM-4G-GPS communication module is able to send Event SMS according to the setting of setpoint:

- ▶ **Event Message** (page 485)

**Note:** Firstly setpoint **Telephone Number 1** (page 486) has to be adjusted.

The following events can be received by mobile phone:

- ▶ Engine Start/Stop
  - Manual Start/Stop
  - Remote Start/Stop
- ▶ Load on Gen-set

Message structure:

- ▶ Genset Name (hh:mm:ss dd.mm.yyyy)
- ▶ hh:mm:ss Load on Genset

### Alarm SMS

The IntelliGen 500 controller equipped with the CM-GPRS or CM-4G-GPS communication module is able to send Alarm SMS according to the setting of setpoints:

- ▶ **Wrn Message** (page 485)
- ▶ **BOC Message** (page 485)
- ▶ **Sd Messages** (page 486)

**Note:** Firstly setpoint **Telephone Number 1** (page 486) has to be adjusted.

Message structure:

- ▶ Gen-set Name
- ▶ AL=(Alarm 1, Alarm 2, Alarm x)

**Note:** Asterisk means that alarm is unconfirmed and exclamation mark means that alarm is active.

## SMS commands

To control the gen-set equipped with IntelliGen 500 controller and CM-GPRS or CM-4G-GPS communication module (or modem) via SMS requests, send an SMS in the structure of:

# xxxx, yyyy, zzzz, etc.

SMS send to the telephone number of the SIM card in your CM-GPRS module (or modem). Where the “#” mark means the controller access code, “xxxx” means the Command 1, “yyyy” is Command 2, “zzzz” is Command 3, etc.

**Note:** Access code is set up via IntelliConfig.

**IMPORTANT:** If wrong controller access code is set, then only help command is working.

|             |  |
|-------------|--|
| start       | Start the engine in MAN mode.                          |
| stop        | Stop the engine in MAN mode.                           |
| fault reset | Acknowledging alarms and deactivating the horn output. |
| gcb close   | Closing GCB in MAN and TEST mode.                      |
| gcb open    | Opening GCB in MAN and TEST mode.                      |
| off         | Switching to OFF mode.                                 |
| man         | Switching to MAN mode.                                 |
| auto        | Switching to AUTO mode.                                |
| status      | Get status information from controller unit.           |
| help        | Get a list of available SMS requests.                  |

**Note:** Between commands are internal delays adjusted due to system requirements.

**Example:** When the controller, in AUTO mode, with a controller name of “IntelliGen 500-Test”, with the CM-GPRS module and access code “0” receives the SMS:

0 man, start, gcb close, gcb open, stop, auto

Controller mode will be changed to MANUAL mode. The engine will be started and GCB will close. Then GCB will open, the engine will stop and it will go into AUTO mode again.

The controller will send back the SMS (controller will respond to SMS after every command has been finished, not sooner.):

#IntelliGen 500-Test: <OK>,<OK>,<OK>, <OK>,<OK>, <OK>

The value <OK> or <ERROR> means if the command has been performed successfully or not.

## Emails

### Event Email

The IntelliGen 500 controller equipped with the Ethernet communication module is able to send Event Email according to the setting of setpoint:

► **Event Message (page 485)**

**Note:** Firstly setpoints *Email Address 1 (page 481)* and *SMTP Sender Address (page 266)* (for Ethernet) have to be adjusted.

**Note:** *#Summer Time Mode (page 426)* and *Time Zone (page 484)* have to be adjusted for correct time in emails.

Message structure:

Controller

---

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

---

Alarm 1

Alarm 2

Alarm 3

Events

---

hh:mm:ss Event 1

hh:mm:ss Event 2

hh:mm:ss Event 3

## Alarm Email

The IntelliGen 500 controller equipped with the Ethernet communication module is able to send Alarm Emails according to the setting of setpoints:

- ▶ **Wrn Message (page 485)**
- ▶ **BOC Message (page 485)**
- ▶ **Sd Messages (page 486)**

**Note:** Firstly setpoints *Email Address 1 (page 481)* and *SMTP Sender Address (page 266)* (for Ethernet) have to be adjusted.

**Note:** *#Summer Time Mode (page 426)* and *Time Zone (page 484)* have to be adjusted for correct time in emails.

Message structure:

Controller

---

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

---

Alarm 1

Alarm 2

Alarm 3

History events

---

0 dd/mm/yyyy hh:mm:ss.0 Event 1

-1 dd/mm/yyyy hh:mm:ss.0 Event 2

-2 dd/mm/yyyy hh:mm:ss.0 Event 3

**Note:** Asterisk means that alarm is unconfirmed and exclamation mark means that alarm is active.

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## 7.2 Connection to 3rd party systems

|                                    |     |
|------------------------------------|-----|
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| 7.2.2 MODBUS-RTU, MODBUS/TCP ..... | 204 |

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### 7.2.1 SNMP

SNMP is an UDP-based client-server protocol used for providing data and events into a supervisory system (building management system). The controller plays the role of a „SNMP Agent“ while the supervisory system plays the role of a „SNMP Manager“.

- ▶ Ethernet module is required for SNMP function
- ▶ Supported versions - SNMP v1 and SNMP v2c

The SNMP Agent function is to be enabled by the setpoint **SNMP Agent** (page 267) in the Ethernet setpoint group. The setpoints **SNMP RD Community String** (page 267) and **SNMP WR Community String** (page 267) in the same group can be used to customize the „community strings“ for the read and write operations



which have function like „passwords“. All requests sent from the SNMP Manager have to contain community string which match with the community string adjusted in the controller otherwise the controller refuses the operation.

## MIB table

The „MIB table“ (Management Information Base) is a table which gives to the Manager description of all objects provided by the Agent.

- ▶ The MIB table is specific for each controller type and configuration
- ▶ The MIB table is to be exported from the controller configuration using IntelliConfig
- ▶ Controllers with identical firmware and configuration share also identical MIB table, however if the configuration and/or firmware is not identical the MIB table is different and must be exported separately for each controller.

The root node of the MIB table of IntelliGen controller is enterprises.comapProjekt.il, which is 1.3.6.1.4.1.28634.14. Under this node there are following sub-nodes :

- ▶ Notifications group (SMI v2 only) contains definitions of all notification-type objects that the Agent may send to the Manager.
- ▶ GroupRdFix contains read-only objects that exist in all controller regardless of the firmware version/type and configuration.
- ▶ GroupRdCfg contains read-only objects that depend on the firmware version/type and configuration.
- ▶ GroupWrFix contains read-write objects that exist in all controller regardless of the firmware version/type and configuration.
- ▶ GroupWrCfg contains read-write objects that depend on the firmware version/type and configuration.
- ▶ GroupW contains write-only objects.
- ▶ NotificationData group contains objects that are accessible only as bindings of the notification messages.

## SMI version

In IntelliConfig the MIB table may be exported in two different formats – SMI v1 and SMI v2. The format which shall be used for export depends on the SNMP Manager and SMI version that it does support.

Typically, SMI v1 is used for SNMP v1 and vice versa, but it is not a rule and SMI v2 may be also used for SNMP v1.

## SNMP reserved objects

| Name             | OID              | Access     | Data type | Meaning  |
|------------------|------------------|------------|-----------|--|
| pfActionArgument | groupWrFix.24550 | read,write | Gauge32   | Writing: command argument<br>Reading: command return value |
| pfActionCommand  | groupW.24551     | write      | Integer32 | Command code 1)  |
| pfPassword       | groupW.24524     | write      | Integer32 | Password   |

1) For list of commands, arguments and description of the procedure of invoking commands see the description of the MODBUS protocol.

## SNMP notifications

Except the request-response communication model, in which the communication is controlled by the Manager, there are also messages that the Agent sends without any requests. These messages are called „Notifications“ and inform the Manager about significant events occurred in the Agent.

The controller can send notifications to two different SNMP Managers (two different IP addresses). The addresses are to be adjusted in the Ethernet setpoint group by the setpoints **SNMP Traps IP Address 1 (page 268)** and **SNMP Traps IP Address 2 (page 268)**. If the Manager address is not adjusted the particular notification channel is off. The controller will send the notifications in format adjusted by the setpoint **SNMP Trap Format (page 268)**.

- ▶ Each notification (kind of event) is identified by an unique identifier (Trap ID in SNMPv1 or Notification OID in SNMPv2). This unique identifier gives the specific meaning to the notification message, e.g. Protection 1. level - Fuel Level - alarm activated.
- ▶ All possible notifications and their identifiers are listed in the MIB table.
- ▶ The notification message also contains controller name, serial number and textual description of the event.

## Operational events

This events are used for SNMP traps. See the list below:

- ▶ Start commands of gen-set
  - Start button
  - Remote start
- ▶ Stop commands of gen-set
  - Stop button
  - Remote stop
- ▶ Breaker record
  - Load on gen-set

## 7.2.2 MODBUS-RTU, MODBUS/TCP

MODBUS protocol is used for integration of the controller into a building management system or for remote monitoring via 3rd party monitoring tools.

- ▶ MODBUS-RTU can be used with serial interfaces (via on board RS485 connector or via CM-RS232-485 communication module). The MODBUS-RTU server must be activated by switching the setpoint **RS485 Mode (page 253)** or **COM2 Mode (page 467)** to the Modbus position. The serial speed for MODBUS-RTU communication is to be adjusted by the setpoint **RS485 MODBUS Speed (page 254)** or **COM2 MODBUS Communication Speed (page 468)**.
- ▶ MODBUS/TCP can be used with the built-in ethernet interface. Up to 3 clients can be connected simultaneously. The MODBUS/TCP server must be activated by the setpoint **MODBUS Server (page 269)**.

MODBUS, MODBUS/TCP protocol can be used simultaneously with direct Ethernet connection and the SNMP agent.

**IMPORTANT: Do not write setpoint repeatedly(e.g. power control form a PLC repeated writing of baseload setpoint via Modbus). The setpoints are stored in EEPROM memory. which can be overwritten up to 10<sup>5</sup> times without risk of damage or data loss, but may become damaged, when the allowed number of writing cycles is exceeded!**

## Address space

The object address space is separated into several areas as described in the table below. The actual mapping of specific controller data objects to specific MODBUS addresses, which depends on configuration, can be exported into a text file from the appropriate controller archive using IntelliConfig. There are several special registers with fixed meaning (reserved registers) which are listed in a separate table in this chapter.

| MODBUS address | Meaning            | Access  | MODICON object type                  | MODBUS function               |
|----------------|--------------------|---|--------------------------------------|-------------------------------|
| 0000 .. 0999   | Binary objects     | Read only                                     | Discrete Inputs                      | Read: 01, 02                  |
| 1000 .. 2999   | Values             | Read only                                     | Input Registers                      | Read: 03, 04                  |
| 3000 .. 3999   | Setpoints          | Read/Write                                    | Holding Registers                    | Read: 03, 04<br>Write: 06, 16 |
| 4200 .. 7167   | Reserved registers | Read/Write, depends on each specific register | Input Registers<br>Holding Registers | Read: 03, 04<br>Write: 06, 16 |

## Configurable part of the map

The contents of the configurable part of the map is specified in the configuration table. It can be changed by the customer as well as exported in a human-readable format using the configuration tool.

### Discrete inputs

The discrete inputs are read-only objects located in the address range 0-999. The source ComAp objects for discrete inputs can be:

- ▶ Single bit of any value of any binary type.
- ▶ Protection (e.g. 2nd-level protection of the state "xyz"). The input is high if the protection is active regardless of if it is configured or not.

### Input registers

The input registers are read-only numeric values located in the address range 1000-2999. The source ComAp objects can be:

- ▶ Any controller value of any data type. The mapping of the particular data type into registers is described in **Mapping data types to registers (page 206)**.

### Holding registers

The holding registers are read-write numeric values located in the address range 3000-3999. The source ComAp objects can be:

- ▶ Any controller setpoint of a primitive data type. The mapping of the particular data type into registers is described in **Mapping data types to registers (page 206)**.

## Default contents of the configurable part

The default map of MODBUS objects contain following items. This map expects the PC tool does have the function allowing the user to modify the map.

| Object type       | Starting object address | Controller object   |
|-------------------|-------------------------|---|
| Discrete inputs   | 0000                    | Physical binary inputs CU + configured* modules<br>Logical binary outputs<br>Protections on binary inputs CU + configured* modules<br>Protections on analog inputs CU + configured* modules<br>All Built-in fixed protections |
| Input registers   | 1000                    | All configured* visible values  |
| Holding registers | 3000                    | None  |

\*Present in the default configuration.

**IMPORTANT: The default map of a particular firmware branch and application must not change when a new version of the firmware is created. If new objects are added they must be added to free positions so, that the previous content is not affected.**

**IMPORTANT: The default map of a particular firmware branch must not contain different values in different applications at the same MODBUS address. It means if a ComAp object does not make sense in some application type the respective MODBUS address must be left unassigned.**

## Mapping data types to registers

As there are multiple data types in the controller but only one data type in MODBUS (the register, which is 2 byte long), a mapping table is necessary to compose and decompose the MODBUS messages correctly.

| Data type  | Meaning                 | Number of registers | Data mapping   |
|------------|-------------------------|---------------------|--|
| Integer8   | 1-byte signed integer   | 1                   | MSB = sign extension<br>LSB = value  |
| Unsigned8  | 1-byte unsigned integer | 1                   | MSB = 0<br>LSB = value   |
| Integer16  | 2-byte signed integer   | 1                   | MSB = value, MSB<br>LSB = value, LSB   |
| Unsigned16 | 2-byte unsigned integer | 1                   | MSB = value, MSB<br>LSB = value, LSB   |
| Integer32  | 4-byte signed integer   | 2                   | MSB1 = value, byte 3 (MSB)<br>LSB1 = value, byte 2<br>MSB2 = value, byte 1<br>LSB2 = value, byte 0 (LSB) |
| Unsigned32 | 4-byte unsigned integer | 2                   | MSB1 = value, byte 3 (MSB)<br>LSB1 = value, byte 2<br>MSB2 = value, byte 1<br>LSB2 = value, byte 0 (LSB) |
| Binary8    | 8-bit binary value      | 1                   | MSB = 0<br>LSB = value, bits 0-7   |

| Data type | Meaning  | Number of registers | Data mapping   |
|-----------|--|---------------------|--|
| Binary16  | 16-bit binary value                                | 1                   | MSB = value, bits 8-15<br>LSB = value, bits 0-7  |
| Binary32  | 32-bit binary value                                | 2                   | MSB1 = value, bits 24-31<br>LSB1 = value, bits 16-23<br>MSB2 = value, bits 8-15<br>LSB2 = value, bits 0-7  |
| Char      | 1-byte ASCII character                             | 1                   | MSB = 0<br>LSB = ASCII value of the character  |
| StrList   | Index into a list of strings                       | 1                   | MSB = 0<br>LSB = index into the list   |
| ShortStr  | Zero-terminated string of max 15 ASCII characters. | 8                   | MSB1 = ASCII value of the 1. character<br>LSB1 = ASCII value of the 2. character<br>MSB2 = ASCII value of the 3. character<br>LSB2 = ASCII value of the 4. character<br>...  |
| LongStr   | Zero-terminated string of max 31 ASCII characters. | 16                  | MSB1 = ASCII value of the 1. character<br>LSB1 = ASCII value of the 2. character<br>MSB2 = ASCII value of the 3. character<br>LSB2 = ASCII value of the 4. character<br>...  |
| Date      | Date (dd-mm-yy)                                    | 2                   | MSB1 = BCD (dd)<br>LSB1 = BCD (mm)<br>MSB2 = BCD (yy)<br>LSB2 = 0  |
| Time      | Time (hh-mm-ss)                                    | 2                   | MSB1 = BCD (hh)<br>LSB1 = BCD (mm)<br>MSB2 = BCD (ss)<br>LSB2 = 0  |
| Alarm     | An item of the Alarmlist                           | 27                  | MSB1 = reserved for future use<br>LSB1 = reserved for future use<br>MSB2 = Alarm level *)<br>LSB2 = Alarm status **)<br>MSB3 = alarm string ***)<br>LSB3 = alarm string<br>MSB4 = alarm string<br>LSB5 = alarm string<br>... |

\*) 1 .. level 1 (yellow), 2 .. level 2 (red), 3 .. sensor fail

\*\*\*) Bit0 – alarm is active, Bit1 – alarm is confirmed

\*\*\*) String encoding is UTF-8

## Error codes (exception codes)

Exception code is returned by the controller (server) if the query sent from the client could not be completed successfully.

The controller responds with the error codes in as follows:

- ▶ 01 – illegal function is returned if an incompatible type of operation is applied for a specific object, e.g. if function 03 is applied to a binary object.
- ▶ 02 – illegal address is returned if the client tries to perform an operation with a object address that is not related to any existing object or that is located inside an object which is composed by multiple addresses (registers).
- ▶ 04 – device error is returned in all other erroneous situations. More detailed specification of the problem can be consequently obtained by reading the registers 4205 – 4206.

## Reserved registers

There are several registers with specific meaning. These registers are available in all controllers regardless of the configuration.

| Register addresses | Number of registers | Access     | Data type  | Meaning  |
|--------------------|---------------------|------------|------------|--|
| 4200 - 4201        | 2                   | read/write | Time       | RTC Time in BCD code   |
| 4202 - 4203        | 2                   | read/write | Date       | RTC Date in BCD code   |
| 4204               | 1                   | read/write | Unsigned8  | Index of the language that is used for text data provided by MODBUS (e.g. alarmlist messages).                                       |
| 4205 - 4206        | 2                   | read       | Unsigned32 | Last application error. To be read after the device returns the exception code 04. It contains specific information about the error. |
| 4207 - 4208        | 2                   | read/write | Unsigned32 | Writing: command argument<br>Reading: command return value   |
| 4209               | 1                   | write      | Unsigned16 | Command code   |
| 4010               | 1                   | -          | -          | Not implemented  |
| 4211               | 1                   | write      | Unsigned16 | Password   |
| 4212 - 4213        | 2                   | read       | Unsigned32 | Communication status   |
| 4214               | 1                   | read       | Unsigned8  | Number of items in the Alarmlist   |
| 4215 - 4241        | 27                  | read       | Alarm      | 1. record in alarm list  |
| 4242 - 4268        | 27                  | read       | Alarm      | 2. record in alarm list  |
| 4269 - 4295        | 27                  | read       | Alarm      | 3. record in alarm list  |
| 4296 - 4322        | 27                  | read       | Alarm      | 4. record in alarm list  |
| 4323 - 4349        | 27                  | read       | Alarm      | 5. record in alarm list  |

| Register addresses | Number of registers | Access | Data type | Meaning                  |
|--------------------|---------------------|--------|-----------|--------------------------|
| 4350 - 4376        | 27                  | read   | Alarm     | 6. record in alarm list  |
| 4377 - 4403        | 27                  | read   | Alarm     | 7. record in alarm list  |
| 4404 - 4430        | 27                  | read   | Alarm     | 8. record in alarm list  |
| 4431 - 4457        | 27                  | read   | Alarm     | 9. record in alarm list  |
| 4458 - 4484        | 27                  | read   | Alarm     | 10. record in alarm list |
| 4485 - 4511        | 27                  | read   | Alarm     | 11. record in alarm list |
| 4512 - 4538        | 27                  | read   | Alarm     | 12. record in alarm list |
| 4539 - 4565        | 27                  | read   | Alarm     | 13. record in alarm list |
| 4566 - 4592        | 27                  | read   | Alarm     | 14. record in alarm list |
| 4593 - 4619        | 27                  | read   | Alarm     | 15. record in alarm list |
| 4620 - 4646        | 27                  | read   | Alarm     | 16. record in alarm list |

## List of commands and arguments

"Commands" are used to invoke a specific action in the controller via the communication channel. The list of available actions is in the table below. The general procedure of writing a command via MODBUS is as follows:

- (Optional) Write required level of password into the register 44212 (register address 4211). Use function 6. If the password is required or not depends on configuration of access rules. It can be adjusted/modified by IntelliConfig.
- Write the command argument into the registers 44208-44209 (register addresses 4207-4208). Use function 16.
- Write the command code into the register 44210 (register address 4209). Use function 6.
- (Optional) Read the command return value from the registers 44208-44209 (register addresses 4207-4208). Use function 3.
- If the command was executed the return value is as listed in the table. If the command was accepted but there was an error during execution the return value indicates the reason:
  - 0x00000001 – invalid argument
  - 0x00000002 – command refused (e.g. controller not in MAN, breaker can not be closed in the specific situation etc.)

| Action          | Command code | Argument   | Return value |
|-----------------|--------------|------------|--------------|
| Engine start *) | 0x01         | 0x01FE0000 | 0x000001FF   |
| Engine stop *)  | 0x01         | 0x02FD0000 | 0x000002FE   |
| Fault reset *)  | 0x01         | 0x08F70000 | 0x000008F8   |
| Horn reset *)   | 0x01         | 0x04FB0000 | 0x000004FC   |
| GCB toggle *)   | 0x02         | 0x11EE0000 | 0x000011EF   |
| GCB on          | 0x02         | 0x11EF0000 | 0x000011F0   |
| GCB off         | 0x02         | 0x11F00000 | 0x000011F1   |
| MCB toggle *)   | 0x02         | 0x12ED0000 | 0x000012EE   |
| MCB on          | 0x02         | 0x12EE0000 | 0x000012EF   |
| MCB off         | 0x02         | 0x12EF0000 | 0x000012F0   |

\*) This action is an equivalent of pressing the front panel button

## MODBUS examples

### Modbus RTU examples

- ▶ Reading of Battery voltage
  - Export table of values from IntelliConfig

| Table: Values                    |          |                       |           |         |     |          |     |     |                |
|----------------------------------|----------|-----------------------|-----------|---------|-----|----------|-----|-----|----------------|
| Allowed MODBUS functions: 03, 04 |          |                       |           |         |     |          |     |     |                |
| Register(s)                      | Com.Obj. | Name                  | Dimension | Type    | Len | Dec      | Min | Max | Group          |
| <b>01053</b>                     | 8213     | <b>BatteryVoltage</b> | <b>V</b>  | Integer | 2   | <b>1</b> | 0   | 400 | Controller I/O |

| Request: (Numbers in Hex) |                 |  |    |                     |    |    |     |  |  |
|---------------------------|-----------------|--|----|---------------------|----|----|-----|--|--|
| 01                        | 03              | 04   | 1D | 00                  | 01 | 15 | 3C  |  |  |
| Controller address        | Modbus function | Register address<br>041D <sub>hex</sub> = <b>1053</b> <sub>dec</sub> |    | Number of registers |    |    | CRC |  |  |

| Response: (Numbers in Hex) |                 |  |   |    |    |     |  |  |  |
|----------------------------|-----------------|--|---|----|----|-----|--|--|--|
| 01                         | 03              | 02   | 00  | F0 | B8 | 00  |  |  |  |
| Controller address         | Modbus function | Length of data<br>02 <sub>hex</sub> = 2 bytes read | Data<br>00F0 <sub>hex</sub> = <b>240</b> <sub>dec</sub> |    |    | CRC |  |  |  |

We read value 240 from register 01053. From table of modbus registers we get dimension of read value and "Dec". Dec=1 means shift one decimal place to the right. So battery voltage is **24.0 V**.



- ▶ Reading Nominal power
  - Export table of values from IntelliConfig

| Table: Values                    |          |                      |           |         |     |          |     |       |           |
|----------------------------------|----------|----------------------|-----------|---------|-----|----------|-----|-------|-----------|
| Allowed MODBUS functions: 03, 04 |          |                      |           |         |     |          |     |       |           |
| Register(s)                      | Com.Obj. | Name                 | Dimension | Type    | Len | Dec      | Min | Max   | Group     |
| <b>01228</b>                     | 9018     | <b>Nominal Power</b> | <b>kW</b> | Integer | 2   | <b>0</b> | 0   | 32767 | Generator |

| Request: (Numbers in Hex) |                 |   |    |    |                     |    |    |     |  |
|---------------------------|-----------------|---|----|----|---------------------|----|----|-----|--|
| 01                        | 03              | 04  | CC | 00 | 01                  | 45 | 05 |     |  |
| Controller address        | Modbus function | Register address<br>04CC <sub>hex</sub> = 1228 <sub>dec</sub> |    |    | Number of registers |    |    | CRC |  |

| Response: (Numbers in Hex) |                 |  |    |    |  |    |  |     |  |
|----------------------------|-----------------|--|----|----|--|----|--|-----|--|
| 01                         | 03              | 02   | C8 | 00 | B9   | D2 |  |     |  |
| Controller address         | Modbus function | Length of data<br>02 <sub>hex</sub> = 2 bytes read |    |    | Data<br>00C8 <sub>hex</sub> = 200 <sub>dec</sub> |    |  | CRC |  |

Read nominal power is 200 kW.

- ▶ Reading all binary inputs as modbus register

| Table: Values                    |          |                      |           |          |     |          |     |     |                |
|----------------------------------|----------|----------------------|-----------|----------|-----|----------|-----|-----|----------------|
| Allowed MODBUS functions: 03, 04 |          |                      |           |          |     |          |     |     |                |
| Register(s)                      | Com.Obj. | Name                 | Dimension | Type     | Len | Dec      | Min | Max | Group          |
| <b>01068</b>                     | 8235     | <b>Binary Inputs</b> |           | Binary#2 | 2   | <b>0</b> | -   | -   | Controller I/O |

| Request: (Numbers in Hex) |                 |   |    |    |                     |    |    |     |  |
|---------------------------|-----------------|---|----|----|---------------------|----|----|-----|--|
| 01                        | 03              | 04  | 2C | 00 | 01                  | 44 | F3 |     |  |
| Controller address        | Modbus function | Register address<br>042C <sub>hex</sub> = 1068 <sub>dec</sub> |    |    | Number of registers |    |    | CRC |  |

| Response: (Numbers in Hex) |                 |  |    |    |   |    |  |     |  |
|----------------------------|-----------------|--|----|----|---|----|--|-----|--|
| 01                         | 03              | 02   | 12 | 00 | 38  | 49 |  |     |  |
| Controller address         | Modbus function | Length of data<br>02 <sub>hex</sub> = 2 bytes read |    |    | Data<br>0012 <sub>hex</sub> = 00010010 <sub>bin</sub> |    |  | CRC |  |

Binary inputs is 00010010. It means Binary input 2 and binary input 5 are active.

**Note:** You can use modbus function 4 insted of 3, rest of data remain same (CRC differs).

► Reading binary inputs as coil status.

| Table: Binaries                          |                              |                  |                                |       |   |                |
|--|------------------------------|------------------|--------------------------------|-------|---|----------------|
| Allowed MODBUS functions: 01, 02         |                              |                  |                                |       |   |                |
| Addresses<br>Modbus Addr.<br>Prot. Addr. | Source<br>= Value<br>= State | C.O.#<br>State # | Name of Value<br>Name of State | Bit # | Bit Name<br>Activated by protection(s): | Group          |
| 00000                                    | Value                        | 8235             | Binary Inputs                  | 1     | GCB Feedback                            | Controller I/O |
| 00001                                    | Value                        | 8235             | Binary Inputs                  | 2     | MCB Feedback                            | Controller I/O |
| 00002                                    | Value                        | 8235             | Binary Inputs                  | 3     | Emergency Stop                          | Controller I/O |

We will read state of MCB Feedback binary input.

| Request: (Numbers in Hex) |                 |   |    |                     |    |     |    |
|---------------------------|-----------------|---|----|---------------------|----|-----|----|
| 01                        | 01              | 00  | 01 | 00                  | 01 | AC  | 0A |
| Controller address        | Modbus function | Register address<br>$0001_{hex} = 0001_{dec}$ |    | Number of registers |    | CRC |    |

| Response: (Numbers in Hex) |                 |  |    |                                    |    |
|----------------------------|-----------------|--|----|------------------------------------|----|
| 01                         | 01              | 01   | 01 | 90                                 | 48 |
| Controller address         | Modbus function | Length of data<br>$01_{hex} = 1 \text{ byte read}$ |    | Data<br>$01_{hex} = \text{active}$ |    |
|                            |                 |  |    | CRC                                |    |

The readed data is 01, it means this binary input is active.

**Note:** You can use modbus function 2 insted of 1, rest of data remains same (CRC differs).

► Starting the engine

Before starting engine you may need to write password. Depends on your settings in controller.

Table Reserved registers (page 208)

| Register addresses | Number of registers | Access     | Data type  | Meaning  |
|--------------------|---------------------|------------|------------|--|
| 4207 - 4208        | 2                   | read/write | Unsigned32 | Writing: command argument<br>Reading: command return value |
| 4209               | 1                   | write      | Unsigned16 | Command code   |

Table List of commands and arguments (page 209)

| Action       | Command code | Argument   | Return value |
|--------------|--------------|------------|--------------|
| Engine start | 0x01         | 0x01FE0000 | 0x000001FF   |
| Engine stop  | 0x01         | 0x02FD0000 | 0x000002FE   |

Request 1/2: (Numbers in Hex)

|                    |  |   |                     |    |                      |    |
|--------------------|--|---|---------------------|----|----------------------|----|
| 01                 | 10   | 10  | 6F                  | 00 | 03                   | 06 |
| Controller address | Modbus function<br>$10_{\text{hex}} = 16_{\text{dec}}$ | Register address<br>$106F_{\text{hex}} = 4207_{\text{dec}}$ | Number of registers |    | Data length in bytes |    |

Request 2/2: (Numbers in Hex)

|          |    |    |    |              |    |     |    |
|----------|----|----|----|--------------|----|-----|----|
| 01       | FE | 00 | 00 | 00           | 01 | 68  | 0B |
| Argument |    |    |    | Command code |    | CRC |    |

**Note:** Command and argument may be written as one "packet" (function 16) or you can split it and write argument (function 16) and after that write command code (function 6).

► Password

This password is the same as in IntelliConfig or directly in controller.

Table **Reserved registers (page 208)**

| Register addresses | Number of registers | Access | Data type  | Meaning  |
|--------------------|---------------------|--------|------------|----------|
| 4211               | 1                   | write  | Unsigned16 | Password |

**Note:** Default password is "0".

In this example the password is "1234".

| Request: (Numbers in Hex) |                 |   |    |   |    |     |    |
|---------------------------|-----------------|---|----|---|----|-----|----|
| 01                        | 06              | 10  | 73 | 04  | D2 | 7C  | D1 |
| Controller address        | Modbus function | Register address<br>1073 <sub>hex</sub> = 4211 <sub>dec</sub> |    | Password<br>04D2 <sub>hex</sub> = 1234 <sub>dec</sub> |    | CRC |    |

| Response for success: (Numbers in Hex) |                 |   |    |               |    |     |    |
|--|-----------------|---|----|---------------|----|-----|----|
| 01                                     | 06              | 10  | 73 | 00            | 00 | 7C  | D1 |
| Controller address                     | Modbus function | Register address<br>1073 <sub>hex</sub> = 4211 <sub>dec</sub> |    | Allways zero. |    | CRC |    |

| Response for bad password: (Numbers in Hex) |                                  |   |  |  |     |    |  |
|---|----------------------------------|---|--|--|-----|----|--|
| 01  | 86                               | 04  |  |  | 43  | A3 |  |
| Controller address                          | Modbus exception for function 6. | 04 – device error<br><b>see Error codes (exception codes) on page 208</b> |  |  | CRC |    |  |

► Nominal Power – writing

| Table: Setpoints                         |          |                      |           |          |     |          |     |      |                |
|--|----------|----------------------|-----------|----------|-----|----------|-----|------|----------------|
| Allowed MODBUS functions: 03, 04, 06, 16 |          |                      |           |          |     |          |     |      |                |
| Register(s)                              | Com.Obj. | Name                 | Dimension | Type     | Len | Dec      | Min | Max  | Group          |
| <b>03008</b>                             | 8276     | <b>Nominal Power</b> | <b>kW</b> | Unsigned | 2   | <b>0</b> | 1   | 5000 | Basic Settings |

| Request: (Numbers in Hex) |                 |   |    |  |    |     |    |  |  |
|---------------------------|-----------------|---|----|--|----|-----|----|--|--|
| 01                        | 06              | 0B  | C0 | 00   | 64 | 8A  | 39 |  |  |
| Controller address        | Modbus function | Register address<br>0BC0 <sub>hex</sub> = 3008 <sub>dec</sub> |    | Data<br>0064 <sub>hex</sub> = 100 <sub>dec</sub> |    | CRC |    |  |  |

| Response: (Numbers in Hex) |                 |   |    |              |    |     |    |  |  |
|----------------------------|-----------------|---|----|--------------|----|-----|----|--|--|
| 01                         | 06              | 0B  | C0 | 00           | 00 | 8B  | D2 |  |  |
| Controller address         | Modbus function | Register address<br>0BC0 <sub>hex</sub> = 3008 <sub>dec</sub> |    | Allways zero |    | CRC |    |  |  |

Written setpoint nominal power is 100 kW.

► CRC calculation

The check field allows the receiver to check the validity of the message. The check field value is the Cyclical Redundancy Check (CRC) based on the polynomial  $x^{16}+x^{15}+x^2+1$ . CRC is counted from all message bytes preceding the check field.

Online CRC calculator: <http://www.lammertbies.nl/comm/info/crc-calculation.html> Use CRC-16 (Modbus)

Write LSB first.

For writing nominal power 100 kW the CRC is calculated from this data: 01060BC00064<sub>hex</sub>

## Modbus TCP examples

### ▶ Reading of Battery voltage

- Export table of values from IntelliConfig

| Table: Values                    |          |                       |           |         |     |          |     |     |                |
|----------------------------------|----------|-----------------------|-----------|---------|-----|----------|-----|-----|----------------|
| Allowed MODBUS functions: 03, 04 |          |                       |           |         |     |          |     |     |                |
| Register(s)                      | Com.Obj. | Name                  | Dimension | Type    | Len | Dec      | Min | Max | Group          |
| <b>01053</b>                     | 8213     | <b>BatteryVoltage</b> | <b>V</b>  | Integer | 2   | <b>1</b> | 0   | 400 | Controller I/O |

| Request: (Numbers in Hex)          |                                 |                                |    |                    |                 |   |    |                     |    |    |    |
|------------------------------------|---------------------------------|--------------------------------|----|--------------------|-----------------|---|----|---------------------|----|----|----|
| 00                                 | 00                              | 00                             | 00 | 00                 | 06              | 01  | 03 | 04                  | 1D | 00 | 01 |
| transaction identifier (usually 0) | protocol identifier (usually 0) | Length of data bytes following |    | Controller address | Modbus function | Register address<br>041D <sub>hex</sub> = 1053 <sub>dec</sub> |    | Number of registers |    |    |    |

| Request: (Numbers in Hex)          |                                 |                                |    |                    |                 |   |    |                     |    |    |    |
|------------------------------------|---------------------------------|--------------------------------|----|--------------------|-----------------|---|----|---------------------|----|----|----|
| 00                                 | 00                              | 00                             | 00 | 00                 | 06              | 01  | 03 | 04                  | 1D | 00 | 01 |
| transaction identifier (usually 0) | protocol identifier (usually 0) | Length of data bytes following |    | Controller address | Modbus function | Register address<br>041D <sub>hex</sub> = 1053 <sub>dec</sub> |    | Number of registers |    |    |    |

| Response: (Numbers in Hex)         |                                 |                                |    |                    |                 |  |    |  |    |    |  |
|------------------------------------|---------------------------------|--------------------------------|----|--------------------|-----------------|--|----|--|----|----|--|
| 00                                 | 00                              | 00                             | 00 | 00                 | 05              | 01   | 03 | 02   | 00 | F0 |  |
| transaction identifier (usually 0) | protocol identifier (usually 0) | Length of data bytes following |    | Controller address | Modbus function | Length of data<br>02 <sub>hex</sub> = 2 bytes read |    | Data<br>00F0 <sub>hex</sub> = 240 <sub>dec</sub> |    |    |  |

We read value 240 from register 01053. From table of modbus registers we get dimension of read value and "Dec". Dec=1 means shift one decimal place to the right. So battery voltage is **24.0 V**.

🔍 [back to Connection to 3rd party systems](#)

# 8 Technical data

## Power supply

|                              |                  |
|------------------------------|------------------|
| Power supply range           | 8-36 V DC        |
| Power consumption            | 320 mA / 8 V DC  |
|                              | 210 mA / 12 V DC |
|                              | 120 mA / 24 V DC |
|                              | 90 mA / 36 V DC  |
| Power terminal fusing        | Max. 4 A         |
|                              | E-Stop max.1.2 A |
| E-Stop power terminal fusing | 1.2 A            |
| Max. Power Dissipation       | 9 W              |

## D+

|                         |                             |
|-------------------------|-----------------------------|
| Max. excitation current | 250 mA                      |
| Charging fail threshold | 80 % of U <sub>supply</sub> |

## Operating conditions

|   |                          |
|---|--------------------------|
| Operating temperature                   | -20 °C to +70 °C         |
| Storage temperature                     | -30 °C to +80 °C         |
| Protection degree (front panel)         | IP 65                    |
| Operating humidity                      | 95 % w/o condensation    |
| Vibration                               | 5-25 Hz, ± 1.6 mm        |
|   | 25-100 Hz, a = 4 g       |
| Shocks                                  | a = 500 m/s <sup>2</sup> |
| Surrounding air temperature rating 70°C |                          |
| Suitable for pollution degree 2         |                          |
| Heat radiation                          | 9 W                      |

## Voltage measurement

|                      |                                 |
|----------------------|---------------------------------|
| Measurement inputs   | 3ph-n Gen voltage , 3ph-n Mains |
| Measurement range    | 277 V ph-n                      |
| Max. allowed voltage | 350 V ph-n                      |
| Accuracy             | 1 %                             |
| Frequency range      | 40-70 Hz (accuracy 0.1 Hz)      |
| Input impedance      | 0.72 MΩ ph-ph , 0.36 MΩ ph-n    |

## Display

|            |                             |
|------------|-----------------------------|
| Type       | Build-in monochromatic 3.2" |
| Resolution | 800 × 480 px                |

## E-Stop

|  |  |
|--|--|
| Dedicated terminal for E-Stop input                    |  |
| Physically disconnects binary outputs 1 & 2 from power |  |

## Binary inputs

|                       |                        |
|-----------------------|------------------------|
| Number                | 8, non-isolated        |
| Close/Open indication | 0-2 V DC close contact |
|                       | 6-36 V DC open contact |

### Binary outputs

|                                   |   |
|-----------------------------------|---|
| Supplied by power terminal        | 6 low current output, non-isolated<br>BO 3-8 = 0.5 A<br>switching to positive supply terminal |
| Supplied by E-Stop power terminal | 2 high current output, non-isolated<br>BO 1, 2 = 4 A<br>switching to positive supply terminal |

### Analog inputs

|           |                       |   |
|-----------|-----------------------|---|
| Number    | 4, switchable (R/U/I) |   |
| Type      | Resistive             |   |
| Resistive | Range                 | 0-2 500 Ω<br>0-15 000 Ω with limited accuracy   |
|           | Sensor current        | 10mA @ 100 Ω  |
|           | Accuracy              | 0 – 250 Ω: 2% from measured value and +/- 5 Ω<br>250 – 15 000 Ω: 4% from measured value |
| Voltage   | Range                 | 0-10 V  |
|           | Max. voltage          | 12,5 V  |
|           | Input impedance       | 40 kΩ   |
|           | Accuracy              | 1% from measured value and +/- 0,1 V  |
| Current   | Range                 | 0-20 mA   |
|           | Max. current          | 25 mA   |
|           | Input impedance       | 150 Ω   |
|           | Accuracy              | 1% from measured value and +/- 0,2 mA   |

### Voltage regulator output

|            |               |
|------------|---------------|
| Protection | Isolated      |
| Type       | max ± 10 V DC |

### Speed governor output

|             |  |
|-------------|--|
| Output type | ±10 VDC or 5 V @ 500 Hz PWM selectable by jumper |
| Protection  | Non-isolated                                     |

### Magnetic pickup

|                                 |   |
|---------------------------------|---|
| Voltage input range             | 4 Vpk-pk to 50 Vpk-pk in range 4 Hz to 1 kHz<br>6 Vpk-pk to 50 Vpk-pk in range 1 kHz to 5 kHz<br>10 Vpk-pk to 50 Vpk-pk in range 4 Hz to 10 kHz |
| Frequency input range           | 4 Hz to 10 kHz  |
| Frequency measurement tolerance | 0.2 % from range 10 kHz   |

### Communications

|               |  |
|---------------|--|
| USB port      | Non-isolated                                     |
| CAN 1 + CAN 2 | 250 / 50 kbps, isolated, nominal impedance 120 Ω |

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# 9 Appendix

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## 9.1.1 Setpoints

### What setpoints are:

Setpoints are analog, binary or special data objects which are used for adjusting the controller to the specific environment. Setpoints are organized into groups according to their meaning. Setpoints can be adjusted from the controller front panel, PC, MODBUS, etc.

All setpoints can be protected by a password against unauthorized changes. Password protection can be assigned to the setpoints during the configuration procedure.

**IMPORTANT: Do not write setpoints repeatedly (e.g. power control from a PLC by repeated writing of baseload setpoint via Modbus). The setpoints are stored in EEPROM memory, which can be overwritten up to 10<sup>5</sup> times without risk of damage or data loss, but it may become damaged, when the allowed number of writing cycles is exceeded.**

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For full list of setpoints go to the chapter **List of setpoints (page 222)**.

## List of setpoints

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## Group: Process Control

### Subgroup: Application Selector

#### Application Mode Select

|  |   |                             |            |      |  |      |   |
|--|---|-----------------------------|------------|------|--|------|---|
| <b>Setpoint group</b>  | Process Control   | <b>Related FW</b>           | 1.0.0      |      |  |      |   |
| <b>Range [units]</b>   | SPtM / MINT [-]   |                             |            |      |  |      |   |
| <b>Default value</b>   | MINT  | <b>Alternative config</b>   | NO         |      |  |      |   |
| <b>Step</b>  | [-]   |                             |            |      |  |      |   |
| <b>Comm object</b>   | 12157   | <b>Related applications</b> | MINT, SPtM |      |  |      |   |
| <b>Config level</b>  | Advanced  |                             |            |      |  |      |   |
| <b>Setpoint visibility</b>   | Always  |                             |            |      |  |      |   |
| <b>Description</b>   |   |                             |            |      |  |      |   |
| <p>This setpoint defines the controller application.</p> <p>The change of this setpoint is accepted in OFF mode only = It is not possible to change the setpoint while the controller is not set to OFF mode.</p>  |   |                             |            |      |  |      |   |
| <table border="1"> <tr> <td>SPtM</td> <td>Single parallel to mains application. The controller controls two breakers – a mains breaker and a generator breaker. Feedback from both breakers is required.</td> </tr> <tr> <td>MINT</td> <td>Multiple island-parallel application without mains and multiple parallel application with mains. The controller controls one breaker only, the generator breaker. Feedback from the generator breaker is required. For parallel to mains operation also mains breaker feedback is required.</td> </tr> </table> |   |                             |            | SPtM | Single parallel to mains application. The controller controls two breakers – a mains breaker and a generator breaker. Feedback from both breakers is required. | MINT | Multiple island-parallel application without mains and multiple parallel application with mains. The controller controls one breaker only, the generator breaker. Feedback from the generator breaker is required. For parallel to mains operation also mains breaker feedback is required. |
| SPtM   | Single parallel to mains application. The controller controls two breakers – a mains breaker and a generator breaker. Feedback from both breakers is required.  |                             |            |      |  |      |   |
| MINT   | Multiple island-parallel application without mains and multiple parallel application with mains. The controller controls one breaker only, the generator breaker. Feedback from the generator breaker is required. For parallel to mains operation also mains breaker feedback is required. |                             |            |      |  |      |   |

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## Subgroup: Load Control

### Load Control PTM

|                            |                              |                             |            |
|----------------------------|------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Process Control              | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Baseload / Import/Export [-] |                             |            |
| <b>Default value</b>       | Baseload                     | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | [-]                          |                             |            |
| <b>Comm object</b>         | 8638                         | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                     |                             |            |
| <b>Setpoint visibility</b> | Always                       |                             |            |

#### Description

This setpoint adjust the type of load control.

|          |  |
|----------|--|
| Baseload | <p>Gen-set produces amount of the power given by setpoint <b>Baseload (page 233)</b>. The rest of power is supplied from the mains or exported to the mains (depends on proportions of load and <b>Baseload (page 233)</b> setpoint). Even in baseload control mode can be the Import/Export limited. This function can be activated by setpoint <b>Import/Export Limitation (page 235)</b> = Enabled. Then the request for the power of the genset operating in baseload can be limited to prevent the Import/Export go below the limit given by setpoint <b>Import Load (page 234)</b>.</p> <p><b>Example:</b> Baseload = 1000 kW, load = 700 kW, Import load = 100. Then the Baseload request will be limited to 600 kW to prevent the Import power go below 100 kW</p> <p><b>Example:</b> Baseload = 1000 kW, load = 700 kW, Import load = -100. Then the Baseload request will be limited to 800 kW to prevent the Import power go below -100 kW (actually it is limitation of the export).</p> <p>The load of the gen-set group is controlled to keep constant level of base load of the whole system. The level is adjusted by the setpoint <b>#System BaseLoad (page 235)</b>.</p> |
| Imp/Exp  | <p>Gen-set produces the certain amount of power to keep constant import/export from the mains regardless the demand of the load. The requested import/export is given by setpoint <b>Import Load (page 234)</b>. If the value of the setpoint is &gt;0 the power is imported from the mains, if setpoint value is &lt;0, then the power is exported to the mains.</p>  |

**Note:** In both modes, the lower level of the power is always limited by the setpoint **Minimal Power PTM (page 305)**. If the requested load (given by the active load control mode, e.g. Baseload, Import/Export) is below this limit the requested load is limited to the level adjusted by this setpoint.

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## PF Control PTM

|  |  |                             |       |         |  |            |  |
|--|--|-----------------------------|-------|---------|--|------------|--|
| <b>Setpoint group</b>  | Process Control  | <b>Related FW</b>           | 1.0.0 |         |  |            |  |
| <b>Range [units]</b>   | Base PF/ PF Import/Export [-]  |                             |       |         |  |            |  |
| <b>Default value</b>   | Base PF  | <b>Alternative config</b>   | NO    |         |  |            |  |
| <b>Step</b>  | [-]  |                             |       |         |  |            |  |
| <b>Comm object</b>   | 10120  | <b>Related applications</b> | SPtM  |         |  |            |  |
| <b>Config level</b>  | Standard   |                             |       |         |  |            |  |
| <b>Setpoint visibility</b>   | Always   |                             |       |         |  |            |  |
| <b>Description</b>   |  |                             |       |         |  |            |  |
| This setpoint adjust the type of power factor control.   |  |                             |       |         |  |            |  |
| <table border="1"> <tr> <td>Base PF</td> <td> <p>The power factor on the gen-set is kept on the level given by the setpoint <b>Base Power Factor (page 233)</b> regardless the load demand. The rest of demanded reactive power is supplied from the mains. Values &gt;1 means that capacitive reactive power is supposed to be imported from mains, values &lt;1 means that inductive reactive power is imported from the mains.</p> <p>Gen-sets are controlled to keep the constant level of the power factor. The level is adjusted by setpoint <b>#System Power Factor (page 236)</b>.</p> </td> </tr> <tr> <td>PF Imp/Exp</td> <td> <p>Gen-set produces the certain amount of reactive power to keep constant PF imported from the mains regardless the demand of the load. The requested power factor import is given by setpoint <b>Import PF (page 234)</b>. Values &gt;1 means that the gen-set is pushing the capacitive power to the system (system Gen-set - Load-Mains), values &lt;1 means that the gen-set is pushing the inductive power to the system.</p> </td> </tr> </table> |  |                             |       | Base PF | <p>The power factor on the gen-set is kept on the level given by the setpoint <b>Base Power Factor (page 233)</b> regardless the load demand. The rest of demanded reactive power is supplied from the mains. Values &gt;1 means that capacitive reactive power is supposed to be imported from mains, values &lt;1 means that inductive reactive power is imported from the mains.</p> <p>Gen-sets are controlled to keep the constant level of the power factor. The level is adjusted by setpoint <b>#System Power Factor (page 236)</b>.</p> | PF Imp/Exp | <p>Gen-set produces the certain amount of reactive power to keep constant PF imported from the mains regardless the demand of the load. The requested power factor import is given by setpoint <b>Import PF (page 234)</b>. Values &gt;1 means that the gen-set is pushing the capacitive power to the system (system Gen-set - Load-Mains), values &lt;1 means that the gen-set is pushing the inductive power to the system.</p> |
| Base PF  | <p>The power factor on the gen-set is kept on the level given by the setpoint <b>Base Power Factor (page 233)</b> regardless the load demand. The rest of demanded reactive power is supplied from the mains. Values &gt;1 means that capacitive reactive power is supposed to be imported from mains, values &lt;1 means that inductive reactive power is imported from the mains.</p> <p>Gen-sets are controlled to keep the constant level of the power factor. The level is adjusted by setpoint <b>#System Power Factor (page 236)</b>.</p> |                             |       |         |  |            |  |
| PF Imp/Exp   | <p>Gen-set produces the certain amount of reactive power to keep constant PF imported from the mains regardless the demand of the load. The requested power factor import is given by setpoint <b>Import PF (page 234)</b>. Values &gt;1 means that the gen-set is pushing the capacitive power to the system (system Gen-set - Load-Mains), values &lt;1 means that the gen-set is pushing the inductive power to the system.</p>   |                             |       |         |  |            |  |

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## #System Load Control PTM

|                            |                            |                             |       |
|----------------------------|----------------------------|-----------------------------|-------|
| <b>Setpoint group</b>      | Process Control            | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>       | Baseload / Loadsharing [-] |                             |       |
| <b>Default value</b>       | Baseload                   | <b>Alternative config</b>   | NO    |
| <b>Step</b>                | [-]                        |                             |       |
| <b>Comm object</b>         | 8774                       | <b>Related applications</b> | MINT  |
| <b>Config level</b>        | Standard                   |                             |       |
| <b>Setpoint visibility</b> | Always                     |                             |       |

### Description

Load control mode in parallel to mains operation of the whole group of gen-sets.

|             |   |
|-------------|---|
| Baseload    | The total power of the group is controlled to constant level given by the setpoint <b>#System BaseLoad (page 235)</b> . Each loaded gen-set takes equal part (relative to their nominal power) from this requested value. The load is regulated locally in each controller by Load control regulation loop, load-sharing is not active. The setpoint <b>#System BaseLoad (page 235)</b> is also used for determining which gen-sets have to run or not. |
| Loadsharing | Gen-sets load is controlled by MainsCompact controller to share the total load (given by the setpoint <b>#System BaseLoad (page 235)</b> ) with other loaded gen-sets in such a way, that all loaded gen-sets will be loaded at the same level (relative to gen-set nominal power). Load-sharing regulation loop is active.   |

**Note:** The Loadsharing mode shall be used in case a MainsCompact controller is present in the system. In systems without MainsCompact the setpoint must be in the Baseload position.

**Note:** The power factor (PF) is regulated to constant level given by the setpoint **#System PF Control PTM (page 233)** in parallel to mains operation and does not depend on active load control mode.

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## #System PF Control PTM

|  |   |                             |       |         |   |             |  |
|--|---|-----------------------------|-------|---------|---|-------------|--|
| <b>Setpoint group</b>  | Process Control   | <b>Related FW</b>           | 1.0.0 |         |   |             |  |
| <b>Range [units]</b>   | Base PF / Var Sharing [-]   |                             |       |         |   |             |  |
| <b>Default value</b>   | Base PF   | <b>Alternative config</b>   | NO    |         |   |             |  |
| <b>Step</b>  | [-]   |                             |       |         |   |             |  |
| <b>Comm object</b>   | 8779  | <b>Related applications</b> | MINT  |         |   |             |  |
| <b>Config level</b>  | Standard  |                             |       |         |   |             |  |
| <b>Setpoint visibility</b>   | Always  |                             |       |         |   |             |  |
| <b>Description</b>   |   |                             |       |         |   |             |  |
| Power factor control mode in parallel to mains operation of the whole group of gen-sets.   |   |                             |       |         |   |             |  |
| <table border="1"> <tr> <td>Base PF</td> <td>Gensets PF is controlled by their PF control loops to provide constant power factor adjusted by setpoint <b>#System Power Factor (page 236)</b>. IntelliMains doesn't play active role in PF control in parallel to mains operation.</td> </tr> <tr> <td>Var Sharing</td> <td>Gensets PF is controlled by IntelliMains through the VAr sharing line.</td> </tr> </table> |   |                             |       | Base PF | Gensets PF is controlled by their PF control loops to provide constant power factor adjusted by setpoint <b>#System Power Factor (page 236)</b> . IntelliMains doesn't play active role in PF control in parallel to mains operation. | Var Sharing | Gensets PF is controlled by IntelliMains through the VAr sharing line. |
| Base PF  | Gensets PF is controlled by their PF control loops to provide constant power factor adjusted by setpoint <b>#System Power Factor (page 236)</b> . IntelliMains doesn't play active role in PF control in parallel to mains operation. |                             |       |         |   |             |  |
| Var Sharing  | Gensets PF is controlled by IntelliMains through the VAr sharing line.  |                             |       |         |   |             |  |

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## Baseload

|   |   |                             |       |
|---|---|-----------------------------|-------|
| <b>Setpoint group</b>                                 | Process Control                           | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>                                  | 0 .. <b>Nominal Power (page 242)</b> [kW] |                             |       |
| <b>Default value</b>                                  | 100 kW                                    | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 kW                                      |                             |       |
| <b>Comm object</b>                                    | 8639                                      | <b>Related applications</b> | SPtM  |
| <b>Config level</b>                                   | Standard                                  |                             |       |
| <b>Setpoint visibility</b>                            | Always                                    |                             |       |
| <b>Description</b>                                    |   |                             |       |
| Required gen-set load in parallel to mains operation. |   |                             |       |

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## Base Power Factor

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Process Control  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0,60 .. 1,20 [-] |                             |       |
| <b>Default value</b>  | 1,00 [-]         | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 0,01 [-]         |                             |       |
| <b>Comm object</b>  | 8640             | <b>Related applications</b> | SPtM  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| Required gen-set power factor when the gen-set is running in parallel to the mains. |                  |                             |       |

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## Import Load

|  |  |                             |       |          |  |  |  |               |  |  |  |
|--|--|-----------------------------|-------|----------|--|--|--|---------------|--|--|--|
| <b>Setpoint group</b>  | Process Control  | <b>Related FW</b>           | 1.0.0 |          |  |  |  |               |  |  |  |
| <b>Range [units]</b>   | -32 000 .. 32 000 [kW]   |                             |       |          |  |  |  |               |  |  |  |
| <b>Default value</b>   | 0 kW   | <b>Alternative config</b>   | NO    |          |  |  |  |               |  |  |  |
| <b>Step</b>  | 1 kW   |                             |       |          |  |  |  |               |  |  |  |
| <b>Comm object</b>   | 8641   | <b>Related applications</b> | SPtM  |          |  |  |  |               |  |  |  |
| <b>Config level</b>  | Standard   |                             |       |          |  |  |  |               |  |  |  |
| <b>Setpoint visibility</b>   | Always   |                             |       |          |  |  |  |               |  |  |  |
| <b>Description</b>   |  |                             |       |          |  |  |  |               |  |  |  |
| Defines maximal limit of load for import/export. Behavior of setpoint depends on setpoint <b>Load Control PTM (page 230)</b> .   |  |                             |       |          |  |  |  |               |  |  |  |
| <table border="1"> <tr> <td>Baseload</td> <td colspan="3">Setpoint adjust the maximal value of import/export. Also <b>Import/Export Limitation (page 235)</b> setpoint has to be set to Enabled.</td> </tr> <tr> <td>Import/Export</td> <td colspan="3">Setpoint adjust requested value of constant import/export.</td> </tr> </table> |  |                             |       | Baseload | Setpoint adjust the maximal value of import/export. Also <b>Import/Export Limitation (page 235)</b> setpoint has to be set to Enabled. |  |  | Import/Export | Setpoint adjust requested value of constant import/export. |  |  |
| Baseload   | Setpoint adjust the maximal value of import/export. Also <b>Import/Export Limitation (page 235)</b> setpoint has to be set to Enabled. |                             |       |          |  |  |  |               |  |  |  |
| Import/Export  | Setpoint adjust requested value of constant import/export.   |                             |       |          |  |  |  |               |  |  |  |
| If the value of the setpoint is >0 the power is imported from the mains, if the setpoint value is <0, then the power is exported to the mains.   |  |                             |       |          |  |  |  |               |  |  |  |

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## Import PF

|  |   |                             |       |          |   |  |  |               |   |  |  |
|--|---|-----------------------------|-------|----------|---|--|--|---------------|---|--|--|
| <b>Setpoint group</b>  | Process Control   | <b>Related FW</b>           | 1.0.0 |          |   |  |  |               |   |  |  |
| <b>Range [units]</b>   | 0,60 .. 1,20 [-]  |                             |       |          |   |  |  |               |   |  |  |
| <b>Default value</b>   | 1,00 [-]  | <b>Alternative config</b>   | NO    |          |   |  |  |               |   |  |  |
| <b>Step</b>  | 0,01 [-]  |                             |       |          |   |  |  |               |   |  |  |
| <b>Comm object</b>   | 8642  | <b>Related applications</b> | SPtM  |          |   |  |  |               |   |  |  |
| <b>Config level</b>  | Standard  |                             |       |          |   |  |  |               |   |  |  |
| <b>Setpoint visibility</b>   | Always  |                             |       |          |   |  |  |               |   |  |  |
| <b>Description</b>   |   |                             |       |          |   |  |  |               |   |  |  |
| Defines maximal limit of power factor for import/export. Behavior of setpoint depends on setpoint <b>PF Control PTM (page 231)</b> .   |   |                             |       |          |   |  |  |               |   |  |  |
| <table border="1"> <tr> <td>Baseload</td> <td colspan="3">Setpoint adjust the maximal value of import. Also <b>Import/Export Limitation (page 235)</b> setpoint has to be set to Enabled.</td> </tr> <tr> <td>Import/Export</td> <td colspan="3">Setpoint adjust requested value of constant import.</td> </tr> </table> |   |                             |       | Baseload | Setpoint adjust the maximal value of import. Also <b>Import/Export Limitation (page 235)</b> setpoint has to be set to Enabled. |  |  | Import/Export | Setpoint adjust requested value of constant import. |  |  |
| Baseload   | Setpoint adjust the maximal value of import. Also <b>Import/Export Limitation (page 235)</b> setpoint has to be set to Enabled. |                             |       |          |   |  |  |               |   |  |  |
| Import/Export  | Setpoint adjust requested value of constant import.   |                             |       |          |   |  |  |               |   |  |  |

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## Import/Export Limitation

|  |                        |                             |       |
|--|------------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Process Control        | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | ENABLED / DISABLED [-] |                             |       |
| <b>Default value</b>   | Disabled               | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | [-]                    |                             |       |
| <b>Comm object</b>   | 9592                   | <b>Related applications</b> | SPtM  |
| <b>Config level</b>  | Standard               |                             |       |
| <b>Setpoint visibility</b>   | Always                 |                             |       |
| <b>Description</b>   |                        |                             |       |
| <p>Enable or disable limitation for import/export. If function is enabled, then the request for the power of the gen set is limited to prevent the Import/Export go below the limits. Limits are adjusted via setpoints <b>Import Load (page 234)</b> and <b>Import PF (page 234)</b>.</p> <p><b>Example:</b> Baseload = 1000 kW, load = 700 kW, Import load = 100 kW. Then the Baseload request will be limited to 600 kW to prevent the Import power go below 100 kW.</p> <p><b>Example:</b> Baseload = 1000 kW, load = 700 kW, Import load = -100 kW. Then the Baseload request will be limited to 800 kW to prevent the Import power go below -100 kW (actually it is limitation of the export).</p> |                        |                             |       |

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## #System BaseLoad

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Process Control  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 32 000 [kW] |                             |       |
| <b>Default value</b>  | 1 000 kW         | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 kW             |                             |       |
| <b>Comm object</b>  | 8775             | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| <p>Required total load of the gen-set group in parallel to mains operation in baseload mode (setpoint <b>#System Load Control PTM (page 232)</b> = Baseload).</p> |                  |                             |       |

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## #System Power Factor

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Process Control  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 0,60 .. 1,20 [-] |                             |       |
| <b>Default value</b>   | 1,00 [-]         | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 0,01 [-]         |                             |       |
| <b>Comm object</b>   | 8776             | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Standard         |                             |       |
| <b>Setpoint visibility</b>   | Always           |                             |       |
| <b>Description</b>   |                  |                             |       |
| Required gen-set power factor when the group of gen-sets is running parallel to the mains. The PF is regulated locally in each controller by PF control regulation loop, VARsharing is not active. |                  |                             |       |

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## Subgroup: Neutral Contactor

### #Neutral Contactor Control

|                            |                   |                             |            |
|----------------------------|-------------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Process Control   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Each / Common [-] |                             |            |
| <b>Default value</b>       | Each              | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | [-]               |                             |            |
| <b>Comm object</b>         | 9890              | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard          |                             |            |
| <b>Setpoint visibility</b> | Always            |                             |            |

#### Description

Setpoint changes behavior of binary output **NCB CLOSE/OPEN (PAGE 730)** which is used for neutral contactor control.

|        |   |
|--------|---|
| Each   | <p>The EACH option should be used if each gen-set has it's own neutral contactor. Four-pole GCB must be used in this case.</p> <ul style="list-style-type: none"> <li>▶ The output is always opened while the gen-set is not running</li> <li>▶ The output is always opened while the MCB is closed</li> <li>▶ While the gen-set is running and GCB is open, the output closes when generator voltage in at least one phase exceeds 85% of the nominal voltage. It opens when the generator voltage in all phases drops below 50% of the nominal voltage</li> <li>▶ While the gen-set is running, MCB is open and GCB is closed, then the position of the output is given by an internal algorithm, which ensures, that always exactly one gen-set connected to the bus has the neutral contactor closed. It is always the gen-set with lowest CAN address</li> </ul> |
| Common | <p>The COMMON option should be used if there is one common neutral contactor for the whole site. The <b>NCB CLOSE/OPEN (PAGE 730)</b> outputs from all controllers are combined together and the combined signal is used to control the breaker. Three-pole GCB must be used in this case.</p> <ul style="list-style-type: none"> <li>▶ The output is always opened while the gen-set is not running</li> <li>▶ The output is always opened while the MCB is closed</li> <li>▶ While the gen-set is running the output closes when generator voltage in at least one phase exceeds 85% of the nominal voltage. It opens when the generator voltage in all phases drops below 50% of the nominal voltage. That means if at least one gen-set in the site is running and having proper voltage, the neutral contactor is closed</li> </ul>                              |

**Note:** Logical binary input **NCB FEEDBACK (PAGE 673)** has to be configured for proper functionality.

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## Subgroup: Process Limitation

### CB Control In MAN Mode

|                            |  |                             |       |
|----------------------------|--|-----------------------------|-------|
| <b>Setpoint group</b>      | Process Control                        | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>       | Full Ctrl / Aut Trans / IsInd Disl [-] |                             |       |
| <b>Default value</b>       | Full Ctrl                              | <b>Alternative config</b>   | NO    |
| <b>Step</b>                | [-]                                    |                             |       |
| <b>Comm object</b>         | 14962                                  | <b>Related applications</b> | SPtM  |
| <b>Config level</b>        | Standard                               |                             |       |
| <b>Setpoint visibility</b> | Always                                 |                             |       |

#### Description

The behavior of transition of load in MAN mode is adjusted via this setpoint.

|            |  |
|------------|--|
| Full Ctrl  | No limitation of CB control in MAN mode (operator can close any breaker manually or evoke the synchronization and consequential operation in parallel to mains)  |
| Aut Trans  | <p>Operator can control both MCB or GCB breaker. However once transition is evoked the controller performs the automatic transfer of the load (depends on adjustment of setpoints <b>Transfer BusGen To Mains (page 352)</b> and <b>Transfer Mains To Gen Bus (page 351)</b>).</p> <p>Controller performs synchronisation accross MCB, if GCB is closed and MCB button is pushed. Load transfer is done after synchronisation and GCB is opened automatically.</p> <p>Controller performs synchronisation accross GCB, if MCB is closed and GCB button is pushed. Load transfer is done after synchronisation and MCB is opened automatically.</p> <p>It is also possible to open currently closed breaker and keep the load non-energized. Then it is possible to close MCB or GCB MGC to energize the load from a healthy source.</p> <p><b>Note:</b> Parallel operation with mains continues, if system already operates in parallel with mains and setting is changed to Aut Trans. It is necessary to push MCB or GCB button to open a breaker.</p> <p><b>Note:</b> Open transfer is performed, if the Open option is selected with <b>Transfer BusGen To Mains (page 352)</b> or <b>Transfer Mains To Gen Bus (page 351)</b></p> |
| IsInd Disl | <p>Behaves like the full manual control but the Island operation is disabled.</p> <p><b>Example:</b> When MCB opened and GCB pressed, controller don't go to island.</p> <p><b>Example:</b> In parallel operation when MCB button pressed, MCB is not opened.</p>  |

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## Subgroup: Mains Import Measurement

### Mains Import Measurement

|   |  |                             |       |
|---|--|-----------------------------|-------|
| <b>Setpoint group</b>   | Process Control  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | None/Mains CT/Analog Input [-]   |                             |       |
| <b>Default value</b>  | Mains CT   | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | [-]  |                             |       |
| <b>Comm object</b>  | 10599  | <b>Related applications</b> | SPtM  |
| <b>Config level</b>   | Advanced   |                             |       |
| <b>Setpoint visibility</b>                                      | Visible only in SPtM mode Always   |                             |       |
| <b>Description</b>  |  |                             |       |
| Defines source value of the <b>Mains Import kW (page 574)</b> . |  |                             |       |
| None  | The Mains import is not measured and the duration of the load transfer in direction Mains to Generator is given exactly by the setpoint Speed/Load Control / <b>Close Transfer Max Duration (page 350)</b> .   |                             |       |
| Mains CT  | The <b>Mains Import kW (page 574)</b> value is measured via Mains CTs. The load transfer in direction Mains to Generator is considered to be finished when the mains is unloaded under certain level.  |                             |       |
| Analog Input  | The <b>Mains Import kW (page 574)</b> value is measured via analog input, accordingly LAI: <b>MAINS IMPORT MEASUREMENT (PAGE 773)</b> . The load transfer in direction Mains to Generator is considered to be finished when the mains is unloaded under certain level. |                             |       |

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## Subgroup: Peak Shaving

### Peak Shaving

|  |  |                             |       |
|--|--|-----------------------------|-------|
| <b>Setpoint group</b>                  | Process Control  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>                   | Enabled / Disabled [-]   |                             |       |
| <b>Default value</b>                   | Disable  | <b>Alternative config</b>   | NO    |
| <b>Step</b>                            | [-]  |                             |       |
| <b>Comm object</b>                     | 11601  | <b>Related applications</b> | SPtM  |
| <b>Config level</b>                    | Advanced   |                             |       |
| <b>Setpoint visibility</b>             | Always   |                             |       |
| <b>Description</b>                     |  |                             |       |
| The behavior of peak shaving functions |  |                             |       |
| Enabled                                | The Peak Shaving function is active and the start command is activated when the conditions for Peaks Shaving activation were fulfilled.          |                             |       |
| Disabled                               | The Peak Shaving function is BLOCKED and the start command can not be activated even the conditions for Peaks Shaving activation were fulfilled. |                             |       |

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## Peak Shaving Start Level

|   |  |                             |       |
|---|--|-----------------------------|-------|
| <b>Setpoint group</b>   | Process Control  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | Peak Shaving Stop Level (page 240) .. 32000 [kW]         |                             |       |
| <b>Default value</b>  | 1000 kW  | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 kW   |                             |       |
| <b>Comm object</b>  | 8643   | <b>Related applications</b> | SPtM  |
| <b>Config level</b>   | Advanced   |                             |       |
| <b>Setpoint visibility</b>  | Visible only if <b>Peak Shaving (page 239)</b> = enabled |                             |       |
| <b>Description</b>  |  |                             |       |
| <p>This setpoint starts genset, when the value of the load consumption Load kW exceeds the value given by this setpoint for the time of <b>Peak Shaving Start/Stop Delay (page 241)</b>.</p> <p>The gen-set is synchronized to the Mains (kept in the parallel to the Mains) and the genset power is controlled according to the settings in the Group Process Control/Load Control.</p> <p>The gen-set stays running until the conditions for Peak Shaving run are active. Conditions of deactivation are given by the setpoint <b>Peak Shaving Stop Level (page 240)</b> and <b>Peak Shaving Start/Stop Delay (page 241)</b>.</p> |  |                             |       |

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## Peak Shaving Stop Level

|   |  |                             |       |
|---|--|-----------------------------|-------|
| <b>Setpoint group</b>   | Process Control  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. Peak Shaving Start Level (page 240) [kW]            |                             |       |
| <b>Default value</b>  | 900 kW   | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 kW   |                             |       |
| <b>Comm object</b>  | 8644   | <b>Related applications</b> | SPtM  |
| <b>Config level</b>   | Advanced   |                             |       |
| <b>Setpoint visibility</b>  | Visible only if <b>Peak Shaving (page 239)</b> = enabled |                             |       |
| <b>Description</b>  |  |                             |       |
| <p>This setpoint stops gen-set, of the load consumption Load kW decreases under the value given by this setpoint for the time of <b>Peak Shaving Start/Stop Delay (page 241)</b>.</p> |  |                             |       |

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## Peak Shaving Start/Stop Delay

|  |  |                             |       |
|--|--|-----------------------------|-------|
| <b>Setpoint group</b>  | Process Control  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 0 .. 600 [s]   |                             |       |
| <b>Default value</b>   | 600 s  | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 1 s  |                             |       |
| <b>Comm object</b>   | 9989   | <b>Related applications</b> | SPtM  |
| <b>Config level</b>  | Advanced   |                             |       |
| <b>Setpoint visibility</b>   | Visible only if <b>Peak Shaving (page 239)</b> = enabled |                             |       |
| <b>Description</b>   |  |                             |       |
| <p>Defines of the delay of activation or deactivation of the Peak Shaving. Starts when:</p> <ul style="list-style-type: none"> <li>▶ The value of the load consumption Load kW exceeds the value given by the setpoint <b>Peak Shaving Start Level (page 240)</b>.</li> <li>▶ The value of the load consumption Load kW decreases under the value given by the setpoint <b>Peak Shaving Stop Level (page 240)</b></li> </ul> |  |                             |       |

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## Group: Basic settings

### Subgroup: Name

#### Gen-Set Controller Name

|  |                        |                             |            |
|--|------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 15 characters [-] |                             |            |
| <b>Default value</b>   | InteliGen              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                    |                             |            |
| <b>Comm object</b>   | 8637                   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard               |                             |            |
| <b>Setpoint visibility</b>   | Always                 |                             |            |
| <b>Description</b>   |                        |                             |            |
| User defined name, used for the controller identification at remote phone or mobile connection. Gen-Set Name is maximally 15 characters long and can be entered using IntelliConfig or from controller's configuration menu. |                        |                             |            |
| <p><b>Note:</b> If the Gen-Set Name is "TurboRunHours", the running hours will be counted faster - 1 minute in real will represent 1 hour.</p>   |                        |                             |            |

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### Subgroup: Power settings

#### Nominal Power

|   |                 |                             |            |
|---|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 5 000 [kW] |                             |            |
| <b>Default value</b>  | 200 kW          | <b>Alternative config</b>   | Yes        |
| <b>Step</b>   | 1 kW            |                             |            |
| <b>Comm object</b>  | 8276            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard        |                             |            |
| <b>Setpoint visibility</b>  | Always          |                             |            |
| <b>Description</b>  |                 |                             |            |
| Nominal power of the gen-set. Generator <b>Overload BOC (page 304)</b> protection is based on this setpoint.  |                 |                             |            |
| <p><b>Note:</b> This setpoint is used when setpoint <b>Connection type (page 244)</b> is adjusted to <i>Monophase or Splitphase or 3Ph3Wire or High Leg D or 3Ph4Wire</i> or when <b>Autodetect</b> detects connection type as <i>3Ph3Wire or High Leg D or 3Ph4Wire</i>.</p> |                 |                             |            |
| <p><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Power 1 (page 455)</b>, <b>Nominal Power 2 (page 459)</b> and <b>Nominal Power 3 (page 463)</b>.</p>  |                 |                             |            |

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## Nominal Power Split Phase

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 1 .. 5 000 [kW]   |                             |            |
| <b>Default value</b>   | 200 kW  | <b>Alternative config</b>   | Yes        |
| <b>Step</b>  | 1 kW  |                             |            |
| <b>Comm object</b>   | 9977  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Connection type (page 244)</b> |                             |            |
| <b>Description</b>   |   |                             |            |
| Nominal power of the gen-set for detected split-phase or mono phase connection. Generator <b>Overload BOC (page 304)</b> protection is based on this setpoint.   |   |                             |            |
| <p><b>Note:</b> This setpoint is used when setpoint <b>Connection type (page 244)</b> is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.</p>   |   |                             |            |
| <p><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Power Split Phase 1 (page 455)</b>, <b>Nominal Power Split Phase 2 (page 459)</b> and <b>Nominal Power Split Phase 3 (page 463)</b>.</p> |   |                             |            |

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### Subgroup: Current settings

## Nominal Current

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 1 .. 10 000 [A]   |                             |            |
| <b>Default value</b>   | 350 A   | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 A   |                             |            |
| <b>Comm object</b>   | 8275  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Connection type (page 244)</b> . |                             |            |
| <b>Description</b>   |   |                             |            |
| It is current limit for mains current protections and means maximal continuous mains current. Nominal Current can be different from mains rated current value.   |   |                             |            |
| <p><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Current 1 (page 456)</b>, <b>Nominal Current 2 (page 460)</b> and <b>Nominal Current 3 (page 464)</b>.</p> |   |                             |            |

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## CT Ratio

|   |                   |                             |            |
|---|-------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings    | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 5 000 [A/5A] |                             |            |
| <b>Default value</b>  | 2 000 A/5A        | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 A/5A            |                             |            |
| <b>Comm object</b>  | 8274              | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard          |                             |            |
| <b>Setpoint visibility</b>  | Always            |                             |            |
| <b>Description</b>  |                   |                             |            |
| Gen-set Mains import current transformers ratio.  |                   |                             |            |
| <i>Note: Generator Mains currents and power measurement is suppressed if current level is below 1% of CT range.</i> |                   |                             |            |

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## Mains Import CT Ratio

|   |                   |                             |       |
|---|-------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Basic settings    | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 1 .. 2 000 [A/5A] |                             |       |
| <b>Default value</b>  | 500 A/5A          | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 A/5A            |                             |       |
| <b>Comm object</b>  | 8566              | <b>Related applications</b> | SPtM  |
| <b>Config level</b>   | Standard          |                             |       |
| <b>Setpoint visibility</b>  | Always            |                             |       |
| <b>Description</b>  |                   |                             |       |
| Mains current transformers ratio.   |                   |                             |       |
| <i>Note: Generator currents and power measurement is suppressed if current level is below 1% of CT range.</i> |                   |                             |       |

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## Subgroup: Voltage settings

### Connection type

|                            |   |                             |            |
|----------------------------|---|-----------------------------|------------|
| <b>Setpoint group</b>      | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Mono Phase / SplitPhase / 3Ph3Wire / High Leg D / 3Ph4Wire / Autodetect [-] |                             |            |
| <b>Default value</b>       | 3Ph4Wire  | <b>Alternative config</b>   | YES        |
| <b>Step</b>                | [-]   |                             |            |
| <b>Comm object</b>         | 11628   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard  |                             |            |
| <b>Setpoint visibility</b> | Always  |                             |            |
| <b>Description</b>         |   |                             |            |
| Connection type:           |   |                             |            |

|             |  |
|-------------|--|
| Mono Phase  | Single phase voltage measurement L1-N<br>1x CT (Current Transformer)   |
| Split Phase | Double Delta connection<br>Split Phase<br>Two phase voltage measurement L1,L2 with 180° phase shift<br>2x CT (Current Transformer)   |
| 3Ph3Wire    | Ungrounded Delta connection<br>Open Delta<br>Ungrounded Wye<br>Corner-Grounded Delta<br>Split Phase Delta<br>Three phase voltage measurement L1,L2,L3 with 120° phase shift<br>No neutral is available 3x CT (Current Transformer)   |
| High Leg D  | High Leg Delta connection<br>Three phase voltage measurement L1,L2,L3<br>3x CT (Current Transformer)   |
| 3Ph4Wire    | Grounded Star (Grounded Wye) connection – 3PY<br>Three phase voltage measurement L1,L2,L3 with 120° phase shift<br>3x CT (Current Transformer)   |
| Autodetect  | <p>High Leg Delta <span style="float: right;">L1 &gt;=100V; L1 &lt;=140V</span></p> <p style="padding-left: 20px;">or <span style="float: right;">L2 &gt;=140V</span></p> <p style="padding-left: 20px;"><span style="float: right;">L3 &gt;=100V; L3 &lt;=140V</span></p> <p>3PH3Wire or 3Ph4Wire <span style="float: right;">L1 &gt;=100V</span></p> <p style="padding-left: 20px;">or <span style="float: right;">L2 &gt;=100V</span></p> <p style="padding-left: 20px;"><span style="float: right;">L3 &gt;=100V</span></p> <p>Split Phase <span style="float: right;">L1 &gt;=100V</span></p> <p style="padding-left: 20px;">or <span style="float: right;">L2 &lt;= 20V</span></p> <p style="padding-left: 20px;"><span style="float: right;">L3 &gt;=100V</span></p> <p>Mono Phase <span style="float: right;">L1 &gt;=100V</span></p> <p style="padding-left: 20px;">or <span style="float: right;">L2 &lt;= 20V</span></p> <p style="padding-left: 20px;"><span style="float: right;">L3 &lt;= 20V</span></p> <p><b>Voltage Autodetect</b> shutdown</p> |

**Note:** To lock this setpoint against editing you also have to lock setpoint **Connection Type 1** (page 453), **Connection type 2** (page 457) and **Connection type 3** (page 461).

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## Nominal Voltage Ph-N

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 80 .. 20 000 [V]  |                             |            |
| <b>Default value</b>  | 231 V   | <b>Alternative config</b>   | YES        |
| <b>Step</b>   | 1 V   |                             |            |
| <b>Comm object</b>  | 8277  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Connection type (page 244)</b> . |                             |            |
| <b>Description</b>  |   |                             |            |
| Nominal voltage (phase to neutral).   |   |                             |            |
| <p><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Voltage Ph-N 1 (page 457)</b>, <b>Nominal Voltage Ph-N 2 (page 461)</b> and <b>Nominal Voltage Ph-N 3 (page 465)</b>.</p> |   |                             |            |

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## Nominal Voltage Ph-Ph

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 80 .. 40 000 [V]  |                             |            |
| <b>Default value</b>   | 400 V   | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 V   |                             |            |
| <b>Comm object</b>   | 11657   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Connection type (page 244)</b> . |                             |            |
| <b>Description</b>   |   |                             |            |
| Nominal system voltage (phase to phase).   |   |                             |            |
| <p><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Voltage Ph-Ph 1 (page 457)</b>, <b>Nominal Voltage Ph-Ph 2 (page 461)</b> and <b>Nominal Voltage Ph-Ph 3 (page 465)</b>.</p> |   |                             |            |

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## Gen Mains VT Ratio

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings     | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0,1 .. 500,0 [V/V] |                             |            |
| <b>Default value</b>  | 1,0 V/V            | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,1 V/V            |                             |            |
| <b>Comm object</b>  | 9579               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced           |                             |            |
| <b>Setpoint visibility</b>  | Always             |                             |            |
| <b>Description</b>  |                    |                             |            |
| Generator Mains voltage potential transformers ratio. If no PTs are used, adjust the setpoint to 1. |                    |                             |            |

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## Mains/Bus VT Ratio

|   |   |                             |       |
|---|---|-----------------------------|-------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0,1 .. 500,0 [V/V]  |                             |       |
| <b>Default value</b>  | 1,0 V/V   | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 0,1 V/V   |                             |       |
| <b>Comm object</b>  | 9580  | <b>Related applications</b> | SPtM  |
| <b>Config level</b>   | Advanced  |                             |       |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Application Mode Select (page 229)</b> |                             |       |
| <b>Description</b>  |   |                             |       |
| Mains/Bus voltage potential transformers ratio. If no PTs are used, adjust the setpoint to 1. |   |                             |       |

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### Subgroup: Frequency settings


## Nominal Frequency

|  |                |                             |            |
|--|----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 45 .. 65 [Hz]  |                             |            |
| <b>Default value</b>   | 50 Hz          | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 Hz           |                             |            |
| <b>Comm object</b>   | 8278           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard       |                             |            |
| <b>Setpoint visibility</b>   | Always         |                             |            |
| <b>Description</b>   |                |                             |            |
| Nominal system frequency (usually 50 or 60 Hz).  |                |                             |            |
| <p><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal Frequency 1 (page 456)</b>, <b>Nominal Frequency 2 (page 460)</b> and <b>Nominal Frequency 3 (page 464)</b>.</p> |                |                             |            |

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## Gear Teeth

|   |                          |                             |            |
|---|--------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings           | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | FGen->RPM / 1 .. 500 [-] |                             |            |
| <b>Default value</b>  | 120                      | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1                        |                             |            |
| <b>Comm object</b>  | 8252                     | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced                 |                             |            |
| <b>Setpoint visibility</b>  | Always                   |                             |            |
| <b>Description</b>  |                          |                             |            |
| <p>Number of teeth on the engine flywheel where the pick-up is installed. Set to zero if no pick-up is used and the Engine speed will be counted from the generator frequency.</p> <p><i><b>Note:</b> If no pickup is used, the D+ or W terminal should be used to prevent possible overcranking, which can occur if at least 25% of nominal generator voltage is not present immediately after exceeding firing speed.</i></p> |                          |                             |            |

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## Nominal RPM

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings     | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 100 .. 4 000 [RPM] |                             |            |
| <b>Default value</b>  | 1 500 RPM          | <b>Alternative config</b>   | YES        |
| <b>Step</b>   | 1 RPM              |                             |            |
| <b>Comm object</b>  | 8253               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced           |                             |            |
| <b>Setpoint visibility</b>  | Always             |                             |            |
| <b>Description</b>  |                    |                             |            |
| <p>Nominal engine speed (RPM - revolutions per minute).</p> <p><i><b>Note:</b> To lock this setpoint against editing you also have to lock setpoint <b>Nominal RPM 1</b> (page 456), <b>Nominal RPM 2</b> (page 460) and <b>Nominal RPM 3</b> (page 464).</i></p> |                    |                             |            |

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## Subgroup: Controller settings

### Controller mode

|  |                     |                             |            |
|--|---------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | OFF / MAN / AUTO[-] |                             |            |
| <b>Default value</b>   | OFF                 | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                 |                             |            |
| <b>Comm object</b>   | 8315                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced            |                             |            |
| <b>Setpoint visibility</b>   | Always              |                             |            |
| <b>Description</b>   |                     |                             |            |
| This setpoint can be used for changing the Controller mode remotely, e.g. via MODBUS. Use the mode selector on the main screen for changing the mode from the front panel. Use mode selector in the control window for changing the mode from IntelliConfig. |                     |                             |            |

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### Power On Mode

|   |  |                             |            |          |  |     |  |
|---|--|-----------------------------|------------|----------|--|-----|--|
| <b>Setpoint group</b>   | Basic settings   | <b>Related FW</b>           | 1.0.0      |          |  |     |  |
| <b>Range [units]</b>  | Previous / OFF [-]   |                             |            |          |  |     |  |
| <b>Default value</b>  | Previous   | <b>Alternative config</b>   | NO         |          |  |     |  |
| <b>Step</b>   | [-]  |                             |            |          |  |     |  |
| <b>Comm object</b>  | 13000  | <b>Related applications</b> | MINT, SPtM |          |  |     |  |
| <b>Config level</b>   | Advanced   |                             |            |          |  |     |  |
| <b>Setpoint visibility</b>  | Always   |                             |            |          |  |     |  |
| <b>Description</b>  |  |                             |            |          |  |     |  |
| This setpoint adjusts controller mode after power on of controller.   |  |                             |            |          |  |     |  |
| <table border="1"> <tr> <td>Previous</td> <td>When controller is power on, than is switched into last mode before power off.</td> </tr> <tr> <td>OFF</td> <td>When controller is power on, than is switched into OFF mode.</td> </tr> </table>  |  |                             |            | Previous | When controller is power on, than is switched into last mode before power off. | OFF | When controller is power on, than is switched into OFF mode. |
| Previous  | When controller is power on, than is switched into last mode before power off. |                             |            |          |  |     |  |
| OFF   | When controller is power on, than is switched into OFF mode.                   |                             |            |          |  |     |  |
| <p><b>Note:</b> Remote modes - In case that some LBI remote mode is activated during power on of controller than this LBI has higher priority than this setpoint - controller mode is forced into mode selected via LBI. After deactivation of LBI, controller is switched into value selected via setpoint Power On Mode</p> |  |                             |            |          |  |     |  |

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## Reset To Manual

|  |                        |                             |            |
|--|------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Disabled / Enabled [-] |                             |            |
| <b>Default value</b>   | Disabled               | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                    |                             |            |
| <b>Comm object</b>   | 9983                   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced               |                             |            |
| <b>Setpoint visibility</b>   | Always                 |                             |            |
| <b>Description</b>   |                        |                             |            |
| <p>If this function is enabled, the controller will switch automatically to MAN mode when there is a red alarm in the alarm list and fault reset button is pressed. This is a safety function that prevents the gen-set starting again automatically in specific cases when fault reset button is pressed.</p> <p><b>Example:</b> Controller is in AUTO mode and there is red inactive unconfirmed alarm and fault reset button is pressed, controller will start automatically.</p> |                        |                             |            |

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## Backlight Timeout

|   |                           |                             |            |
|---|---------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings            | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Disabled / 1 .. 255 [min] |                             |            |
| <b>Default value</b>  | Disabled                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 min                     |                             |            |
| <b>Comm object</b>  | 10121                     | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced                  |                             |            |
| <b>Setpoint visibility</b>  | Always                    |                             |            |
| <b>Description</b>  |                           |                             |            |
| <p>The display backlight is switched off when this timer exceed. When setpoint is adjusted to disabled then the display will be backlighted all the time.</p> |                           |                             |            |

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## Horn Timeout

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Disabled / 1 .. 599 [s]  |                             |            |
| <b>Default value</b>  | 10 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s  |                             |            |
| <b>Comm object</b>  | 8264   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced   |                             |            |
| <b>Setpoint visibility</b>  | Always   |                             |            |
| <b>Description</b>  |  |                             |            |
| Setting of horn behavior.   |  |                             |            |
| Disabled  | Disabling the Horn sounding function   |                             |            |
| 1 .. 599 [s]  | Timeout for <b>HORN (PAGE 722)</b> binary output. The <b>HORN (PAGE 722)</b> output is opened when this timeout elapsed. |                             |            |
| <p><b>Note:</b> Horn timeout starts again from the beginning if a new alarm appears before previous Horn timeout has elapsed.</p> |  |                             |            |

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## Main Screen

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                                | Basic settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                 | PwrFactor/ATT/Run Hours [-]  |                             |            |
| <b>Default value</b>                                 | PwrFactor  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>                                   | 13346  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                  | Advanced   |                             |            |
| <b>Setpoint visibility</b>                           | Always   |                             |            |
| <b>Description</b>                                   |  |                             |            |
| Setpoint adjust value which is shown on main screen. |  |                             |            |
| PwrFactor:   | Value of power factor is shown on main screen.   |                             |            |
| ATT:   | This option is for Tier IV Final support. In this case value of DEF Level is shown on main screen. |                             |            |
| Run Hours:   | Value of running hours will be shown on main screen.   |                             |            |

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## Subgroup: Phase rotation

### Phase Rotation

|   |                            |                             |            |
|---|----------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Clockwise / CounterCCW [-] |                             |            |
| <b>Default value</b>  | Clockwise                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                        |                             |            |
| <b>Comm object</b>  | 15122                      | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced                   |                             |            |
| <b>Setpoint visibility</b>                                    | All the time               |                             |            |
| <b>Description</b>  |                            |                             |            |
| This setpoint adjust the phase sequence of voltage terminals. |                            |                             |            |

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## Group: Communication Settings

### Subgroup: Controller CAN Address

#### Controller Address

|  |                        |                             |            |
|--|------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Communication Settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 1 .. 32 [-]            |                             |            |
| <b>Default value</b>   | 1                      | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1                      |                             |            |
| <b>Comm object</b>   | 24537                  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard               |                             |            |
| <b>Setpoint visibility</b>   | Always                 |                             |            |
| <b>Description</b>   |                        |                             |            |
| Controller identification number. It is possible to set controller address different from the default value (1) so that more controllers can be interconnected (via RS485) and accessed e.g. from MODBUS terminal. |                        |                             |            |
| <b>Note:</b> When opening connection to the controller it's address has to correspond with the setting in PC tool.   |                        |                             |            |

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## Subgroup: RS485 Settings

### RS485 Mode

|  |   |                             |            |        |   |        |                  |
|--|---|-----------------------------|------------|--------|---|--------|------------------|
| <b>Setpoint group</b>  | Communication Settings                                | <b>Related FW</b>           | 1.0.0      |        |   |        |                  |
| <b>Range [units]</b>   | Direct / MODBUS [-]                                   |                             |            |        |   |        |                  |
| <b>Default value</b>   | Direct  | <b>Alternative config</b>   | NO         |        |   |        |                  |
| <b>Step</b>  | [-]   |                             |            |        |   |        |                  |
| <b>Comm object</b>   | 24134   | <b>Related applications</b> | MINT, SPtM |        |   |        |                  |
| <b>Config level</b>  | Standard  |                             |            |        |   |        |                  |
| <b>Setpoint visibility</b>   | Always  |                             |            |        |   |        |                  |
| <b>Description</b>   |   |                             |            |        |   |        |                  |
| Communication protocol switch for on-board RS485.  |   |                             |            |        |   |        |                  |
| <table border="1"> <tr> <td>Direct</td> <td>InteliConfig communication protocol via serial cable.</td> </tr> <tr> <td>MODBUS</td> <td>MODBUS protocol.</td> </tr> </table> |   |                             |            | Direct | InteliConfig communication protocol via serial cable. | MODBUS | MODBUS protocol. |
| Direct   | InteliConfig communication protocol via serial cable. |                             |            |        |   |        |                  |
| MODBUS   | MODBUS protocol.                                      |                             |            |        |   |        |                  |

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### RS485 Communication Speed

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Communication Settings                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 9600 / 19200 / 38400 / 57600 / 115200 [bps] |                             |            |
| <b>Default value</b>   | 57600 bps                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]   |                             |            |
| <b>Comm object</b>   | 24135                                       | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                                    |                             |            |
| <b>Setpoint visibility</b>   | Always                                      |                             |            |
| <b>Description</b>   |   |                             |            |
| If the direct mode is selected on on-board RS485, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value. |   |                             |            |
| <b>Note:</b> Winscope supports only 19200, 38400, 57600 speeds.  |   |                             |            |

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## RS485 MODBUS Speed

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Communication Settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 9600 / 19200 / 38400 / 57600 / 115200 [bps]  |                             |            |
| <b>Default value</b>   | 9600 bps   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24141  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>COM1 Mode (page 466)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here. |  |                             |            |

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## Group: Ethernet

Subgroup: NTP Settings

### NTP Clock Synchronization

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS; Ethernet   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | DISABLED / ENABLED [-]   |                             |            |
| <b>Default value</b>  | DISABLED   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]  |                             |            |
| <b>Comm object</b>  | 24075  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> (CM-GPRS module) |                             |            |
| <b>Description</b>  |  |                             |            |
| This setpoint is used to enable/disable controller time synchronization with exact time from an NTP server. |  |                             |            |
| <b>Note:</b> This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.                           |  |                             |            |

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## NTP Server

|                            |                                      |                             |            |
|----------------------------|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | [-]                                  |                             |            |
| <b>Default value</b>       | pool.ntp.org                         | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | [-]                                  |                             |            |
| <b>Comm object</b>         | 24074                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                             |                             |            |
| <b>Setpoint visibility</b> | Only if relevant module is installed |                             |            |
| <b>Description</b>         |                                      |                             |            |
| NTP server address.        |                                      |                             |            |

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### Subgroup: TCP/IP Settings

## IP Address Mode

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | FIXED / AUTOMATIC [-]  |                             |            |
| <b>Default value</b>   | AUTOMATIC  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24259  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed   |                             |            |
| <b>Description</b>   |  |                             |            |
| The setpoint is used to select the method how the ethernet connection is adjusted. |  |                             |            |
| <b>DISABLED:</b>   | The Ethernet connection is fixed by means of the setpoints <u>IP Addr</u> , <u>NetMask</u> , <u>GateIP</u> , <u>DNS IP Address</u> .   |                             |            |
|  | This method should be used for a classic Ethernet or internet connection. When this type of connection opens, the controller is specified by its IP address. This means that it would be inconvenient if the IP address were not fixed (static).   |                             |            |
| <b>ENABLED:</b>  | The Ethernet connection setting is obtained <b>automatically from the DHCP server</b> . The obtained settings are then copied to the related setpoints. If the process of obtaining the settings from the DHCP server is not successful, the value <i>000.000.000.000</i> is copied to the setpoint IP address and the module continues to try to obtain the settings. |                             |            |

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## IP Address

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Ethernet   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Valid IP address [-]   |                             |            |
| <b>Default value</b>  | 192.168.1.254  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]  |                             |            |
| <b>Comm object</b>  | 24376  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>IP Address Mode (page 255)</b> |                             |            |
| <b>Description</b>  |  |                             |            |
| <p>The setpoint is used to select the method how the IP Address is adjusted.</p> <p>If <b>IP Address Mode (page 255)</b> is FIXED this setpoint is used to adjust the IP address of the ethernet interface of the controller. Ask your IT specialist for help with this setting.</p> <p>If <b>IP Address Mode (page 255)</b> is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server.</p> |  |                             |            |

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## Subnet Mask

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Valid IP address [-]   |                             |            |
| <b>Default value</b>   | 255.255.255.0  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24375  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>IP Address Mode (page 255)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| <p>The setpoint is used to select the method how the Subnet Mask is adjusted.</p> <p>If <b>IP Address Mode (page 255)</b> is FIXED this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting.</p> <p>If <b>IP Address Mode (page 255)</b> is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.</p> |  |                             |            |

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## Gateway IP

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Valid IP address [-]   |                             |            |
| <b>Default value</b>   | 192.168.1.1  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24373  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>IP Address Mode (page 255)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| <p>The setpoint is used to select the method how the Gateway IP is adjusted.</p> <p>If <b>IP Address Mode (page 255)</b> is DISABLE this setpoint is used to adjust the IP address of the gateway of the network segment where the controller is connected.</p> <p>If <b>IP Address Mode (page 255)</b> is ENABLED this setpoint is used to display the gateway IP address which has been assigned by the DHCP server.</p> <p>A gateway is a device which connects the respective segment with the other segments and/or Internet.</p> |  |                             |            |

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## DNS Mode

|  |                        |                             |            |
|--|------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet               | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Automatic / Manual [-] |                             |            |
| <b>Default value</b>   | Automatic              | <b>Alternative config</b>   |            |
| <b>Step</b>  | [-]                    |                             |            |
| <b>Comm object</b>   | 24101                  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard               |                             |            |
| <b>Setpoint visibility</b>   |                        |                             |            |
| <b>Description</b>   |                        |                             |            |
| <p>This setpoint enables to enter DNS server addresses manually, even with the <b>IP Address Mode (page 255)</b> set to Automatic.</p> <p>Automatic DNS server addresses automatically obtained from a DHCP server are used</p> <p style="padding-left: 40px;"><b>DNS IP Address 1 (page 258)</b> and <b>DNS IP Address 2 (page 258)</b> can be adjusted manually.</p> <p>Manual Use this option to resolve e.g. internet access policy related issue, if local DNS server addresses automatically obtained from a DHCP server do not work</p> |                        |                             |            |

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## DNS IP Address 1

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Valid IP address [-]                 |                             |            |
| <b>Default value</b>  | 8.8.8.8                              | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24362                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| <p>The setpoint is used to select the method how the DNS Address 1 is adjusted.</p> <p>If <b>IP Address Mode (page 255)</b> is FIXED this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.</p> <p>If <b>IP Address Mode (page 255)</b> is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.</p> |                                      |                             |            |

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## DNS IP Address 2

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Valid IP address [-]                 |                             |            |
| <b>Default value</b>  | 8.8.8.8                              | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24331                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| <p>The setpoint is used to select the method how the DNS Address 2 is adjusted.</p> <p>If <b>IP Address Mode (page 255)</b> is FIXED this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.</p> <p>If <b>IP Address Mode (page 255)</b> is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.</p> |                                      |                             |            |

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## IP Firewall

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ENABLED / DISABLED [-]   |                             |            |
| <b>Default value</b>   | DISABLED   | <b>Alternative config</b>   |            |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24092  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   |  |                             |            |
| <b>Description</b>   |  |                             |            |
| This setpoints enables to switch on the built-in Firewall functionality. |  |                             |            |
| DISABLED   | The firewall function is switched off  |                             |            |
| ENABLED  | The firewall function is switched on, use IntelliConfig to setup the firewall rules (configuration card Others - Firewall) |                             |            |

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### Subgroup: AirGate Settings

## AirGate Connection

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>                               | Ethernet   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                | DISABLED / ENABLED [-]   |                             |            |
| <b>Default value</b>                                | ENABLED  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]  |                             |            |
| <b>Comm object</b>                                  | 24365  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                 | Standard   |                             |            |
| <b>Setpoint visibility</b>                          | Only if relevant module is installed   |                             |            |
| <b>Description</b>                                  |  |                             |            |
| This setpoint selects the Ethernet connection mode. |  |                             |            |
| DISABLED:   | This is a standard mode in which the controller listens to the incoming traffic and answers the TCP/IP queries addressed to it. This mode requires the controller to be accessible from the remote device (PC), i.e. it must be accessible at a public and static IP address if you want to connect to it from the internet. |                             |            |
| ENABLED   | This mode enables the AirGate service. The AirGate server address is adjusted by the setpoint <b>AirGate Address (page 260)</b> . Also the standard TCP/IP is enabled.   |                             |            |

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## AirGate Address

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | [-]  |                             |            |
| <b>Default value</b>   | airgate.comap.cz   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24364  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> (CM-GPRS module) |                             |            |
| <b>Description</b>   |  |                             |            |
| This setpoint is used for entering the domain name or IP address of the AirGate server. Use the free AirGate server provided by ComAp at airgate.comap.cz. |  |                             |            |
| <b>Note:</b> This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.  |  |                             |            |

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## AirGate Data Port

|  |                |                             |            |
|--|----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet       | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 65535 [-] |                             |            |
| <b>Default value</b>   | 23             | <b>Alternative config</b>   |            |
| <b>Step</b>  | 1              |                             |            |
| <b>Comm object</b>   | 24096          | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard       |                             |            |
| <b>Setpoint visibility</b>   |                |                             |            |
| <b>Description</b>   |                |                             |            |
| This port is used for TCP data communication with the AirGate server.    |                |                             |            |
| <b>Note:</b> Use port 21, 23 or 6127 for standard ComAp AirGate service. |                |                             |            |

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## AirGate Signalling Port

|   |                |                             |            |
|---|----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Ethernet       | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 65535 [-] |                             |            |
| <b>Default value</b>  | 6127           | <b>Alternative config</b>   |            |
| <b>Step</b>   | [-]            |                             |            |
| <b>Comm object</b>  | 24358          | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard       |                             |            |
| <b>Setpoint visibility</b>  |                |                             |            |
| <b>Description</b>  |                |                             |            |
| This port is used for UDP signalling communication with the AirGate server. |                |                             |            |
| <i>Note: Use port 6127 for standard ComAp AirGate service.</i>              |                |                             |            |

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## Subgroup: Messages Settings

### Event Message

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 10926                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables Event Messages.                    |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## Wrn Message

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 8482                                 | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables Wrn Messages.                      |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## BOC Message

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 10566                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables BOC Messages.                      |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## Sd Messages

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 8484                                 | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables Sd Messages.                       |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## Time Zone

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | GMT-12:00 .. GMT+13:00 [hours]       |                             |            |
| <b>Default value</b>   | GMT+1:00 hour                        | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24366                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| <p>This setpoint is used to select the time zone where the controller is located. See your computer time zone setting (click on the time indicator located in the rightmost position of the Windows task bar) if you are not sure about your time zone.</p> <p><b>Note:</b> <i>If the time zone is not selected properly the active e-mails may contain incorrect information about sending time, which may result in confusion when the respective problem actually occurred.</i></p> <p><b>Note:</b> <i>This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i></p> |                                      |                             |            |

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## E-mail/SMS Language

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | [-]                                  |                             |            |
| <b>Default value</b>   | English                              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24299                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| <p>Use this setpoint to set the language of SMS and e-mail.</p> <p><b>Note:</b> <i>Numbers correspond with languages in language list.</i></p> <p>This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</p> |                                      |                             |            |

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## Subgroup: E-mail Settings

### Email Address 1

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24298                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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### Email Address 2

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24297                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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### Email Address 3

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24145                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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## Email Address 4

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24144                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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## SMTP UserName

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>  | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24370                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication. |                                      |                             |            |

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## SMTP User Password

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..15 characters [-]                 |                             |            |
| <b>Default value</b>  | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24369                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication. |                                      |                             |            |

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## SMTP Server Address

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>  | airgate.comap.cz:9925                | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24368                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| <p>This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information.</p> |                                      |                             |            |

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## SMTP Sender Address

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24367                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| <p>Enter an existing email address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller.</p> <p><i><b>Note:</b> It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.</i></p> <p><b>IMPORTANT: This item is obligatory when emails are configured.</b></p> |                                      |                             |            |

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## Subgroup: SNMP Settings

### SNMP Agent

|                                  |                                      |                             |            |
|----------------------------------|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>            | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>             | DISABLED / ENABLED [-]               |                             |            |
| <b>Default value</b>             | DISABLED                             | <b>Alternative config</b>   | NO         |
| <b>Step</b>                      | [-]                                  |                             |            |
| <b>Comm object</b>               | 24336                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>              | Standard                             |                             |            |
| <b>Setpoint visibility</b>       | Only if relevant module is installed |                             |            |
| <b>Description</b>               |                                      |                             |            |
| Enable or disable SNMP v1 Agent. |                                      |                             |            |

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### SNMP RD Community String

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                   | Ethernet  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                    | 0..31 characters [-]  |                             |            |
| <b>Default value</b>                    | public  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                             | [-]   |                             |            |
| <b>Comm object</b>                      | 24335   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                     | Standard  |                             |            |
| <b>Setpoint visibility</b>              | Only if relevant module is installed + conditioned by the setpoint <b>SNMP Agent (page 267)</b> |                             |            |
| <b>Description</b>                      |   |                             |            |
| SNMP Community String only for reading. |   |                             |            |

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### SNMP WR Community String

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>                          | Ethernet  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                           | 0..31 characters [-]  |                             |            |
| <b>Default value</b>                           | private   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                    | [-]   |                             |            |
| <b>Comm object</b>                             | 24334   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                            | Standard  |                             |            |
| <b>Setpoint visibility</b>                     | Only if relevant module is installed + conditioned by the setpoint <b>SNMP Agent (page 267)</b> |                             |            |
| <b>Description</b>                             |   |                             |            |
| SNMP Community String for writing and reading. |   |                             |            |

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### SNMP Traps IP Address 1

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Valid IP address [-]                 |                             |            |
| <b>Default value</b>   | DISABLED                             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24294                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| IP address 1 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send. |                                      |                             |            |

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### SNMP Traps IP Address 2

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Valid IP address [-]                 |                             |            |
| <b>Default value</b>   | DISABLED                             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24293                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| IP address 2 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send. |                                      |                             |            |

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### SNMP Trap Format

|  |                                      |                             |            |         |                            |            |                                     |           |                               |
|--|--------------------------------------|-----------------------------|------------|---------|----------------------------|------------|-------------------------------------|-----------|-------------------------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |         |                            |            |                                     |           |                               |
| <b>Range [units]</b>   | v1 Trap / v2 Notific / v2 Inform [-] |                             |            |         |                            |            |                                     |           |                               |
| <b>Default value</b>   | v2 Inform                            | <b>Alternative config</b>   |            |         |                            |            |                                     |           |                               |
| <b>Step</b>  | [-]                                  |                             |            |         |                            |            |                                     |           |                               |
| <b>Comm object</b>   | 24136                                | <b>Related applications</b> | MINT, SPtM |         |                            |            |                                     |           |                               |
| <b>Config level</b>  | Standard                             |                             |            |         |                            |            |                                     |           |                               |
| <b>Setpoint visibility</b>   |                                      |                             |            |         |                            |            |                                     |           |                               |
| <b>Description</b>   |                                      |                             |            |         |                            |            |                                     |           |                               |
| This setpoint enables to select format of the SNMP trap messages.  |                                      |                             |            |         |                            |            |                                     |           |                               |
| <table border="1"> <tr> <td>v1 Trap</td> <td>SNMPv1 trap format is used</td> </tr> <tr> <td>v2 Notific</td> <td>SNMPv2c Notification format is used</td> </tr> <tr> <td>v2 Inform</td> <td>SNMPv2c Inform format is used</td> </tr> </table> |                                      |                             |            | v1 Trap | SNMPv1 trap format is used | v2 Notific | SNMPv2c Notification format is used | v2 Inform | SNMPv2c Inform format is used |
| v1 Trap  | SNMPv1 trap format is used           |                             |            |         |                            |            |                                     |           |                               |
| v2 Notific   | SNMPv2c Notification format is used  |                             |            |         |                            |            |                                     |           |                               |
| v2 Inform  | SNMPv2c Inform format is used        |                             |            |         |                            |            |                                     |           |                               |

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## Subgroup: MODBUS Settings

### MODBUS Server

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | DISABLED / ENABLED [-]               |                             |            |
| <b>Default value</b>   | Disabled                             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24337                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>                                     | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enable or disable MODBUS communication via ethernet interface. |                                      |                             |            |

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### MODBUS Client Inactivity Timeout

|  |                |                             |            |
|--|----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet       | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 65535 [s] |                             |            |
| <b>Default value</b>   | 60 s           | <b>Alternative config</b>   |            |
| <b>Step</b>  | 1 s            |                             |            |
| <b>Comm object</b>   | 24097          | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard       |                             |            |
| <b>Setpoint visibility</b>   |                |                             |            |
| <b>Description</b>   |                |                             |            |
| Modbus connection (TCP socket) is closed by controller, if a Modbus client does not communicate for this time. |                |                             |            |

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## Subgroup: ComAp Client Settings

### Direct Connection

|  |                        |                             |            |
|--|------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet               | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Disabled / Enabled [-] |                             |            |
| <b>Default value</b>   | Enabled                | <b>Alternative config</b>   |            |
| <b>Step</b>  | [-]                    |                             |            |
| <b>Comm object</b>   | 24099                  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard               |                             |            |
| <b>Setpoint visibility</b>   |                        |                             |            |
| <b>Description</b>   |                        |                             |            |
| Use this to enable/disable direct connection of a ComAp client (e.g. IntelliConfig) to the IP address of the controller. |                        |                             |            |
| <b>Note:</b> For Direct connection the controller IP address must be reachable from the client IP address.               |                        |                             |            |

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## Direct Connection Port

|   |                |                             |            |
|---|----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Ethernet       | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 65535 [-] |                             |            |
| <b>Default value</b>  | 23             | <b>Alternative config</b>   |            |
| <b>Step</b>   | [-]            |                             |            |
| <b>Comm object</b>  | 24374          | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard       |                             |            |
| <b>Setpoint visibility</b>  |                |                             |            |
| <b>Description</b>  |                |                             |            |
| This port is used to listen for an incoming TCP connection if Direct Connection is ENABLED. |                |                             |            |

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## ComAp Client Inactivity Timeout

|   |                |                             |            |
|---|----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Ethernet       | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 65535 [s] |                             |            |
| <b>Default value</b>  | 60 s           | <b>Alternative config</b>   |            |
| <b>Step</b>   | 1 s            |                             |            |
| <b>Comm object</b>  | 24098          | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard       |                             |            |
| <b>Setpoint visibility</b>  |                |                             |            |
| <b>Description</b>  |                |                             |            |
| Connection (TCP socket) is closed by controller, if a client (e.g. IntelliConfig) does not communicate for this time. This timeout applies to both direct and AirGate connection. |                |                             |            |

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## Group: Engine settings

Subgroup: Starting

## Fuel Solenoid

|  |                  |                             |            |
|--|------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Diesel / Gas [-] |                             |            |
| <b>Default value</b>   | Diesel           | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]              |                             |            |
| <b>Comm object</b>   | 9100             | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced         |                             |            |
| <b>Setpoint visibility</b>   | Always           |                             |            |
| <b>Description</b>   |                  |                             |            |
| Determines behavior of the Binary output <b>FUEL SOLENOID (PAGE 715)</b>   |                  |                             |            |
| Diesel: Output closes before binary output <b>STARTER (PAGE 737)</b> . Lead of output is adjusted via setpoint <b>Fuel Solenoid Lead (page 276)</b> . The output opens if Emergency Stop comes or gen-set is stopped and in pause between repeated starts. |                  |                             |            |
| Gas: Output closes together with binary output <b>IGNITION (PAGE 723)</b> if RPM is over the 30 RPM (fixed value). Output opens after stop command or in pause between repeated start.   |                  |                             |            |

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## Cranking Attempts

|                                      |                 |                             |            |
|--------------------------------------|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>                | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                 | 1 .. 10 [-]     |                             |            |
| <b>Default value</b>                 | 3               | <b>Alternative config</b>   | NO         |
| <b>Step</b>                          | 1               |                             |            |
| <b>Comm object</b>                   | 8255            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                  | Standard        |                             |            |
| <b>Setpoint visibility</b>           | Always          |                             |            |
| <b>Description</b>                   |                 |                             |            |
| Maximal number of cranking attempts. |                 |                             |            |

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## Maximum Cranking Time

|  |                 |                             |            |
|--|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 1 .. 255 [s]    |                             |            |
| <b>Default value</b>   | 5 s             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 s             |                             |            |
| <b>Comm object</b>   | 8256            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced        |                             |            |
| <b>Setpoint visibility</b>   | Always          |                             |            |
| <b>Description</b>   |                 |                             |            |
| Maximum time limit of cranking time.   |                 |                             |            |
| <p><b>IMPORTANT:</b> There is a protection against broken pinion on starter. In case that there are no RPM after 5 seconds of starting, cranking is interrupted and cranking fail pause follows.</p> |                 |                             |            |

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## Cranking Fail Pause

|  |                 |                             |            |
|--|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 5 .. 60 [s]     |                             |            |
| <b>Default value</b>   | 8 s             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 s             |                             |            |
| <b>Comm object</b>   | 8257            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced        |                             |            |
| <b>Setpoint visibility</b>   | Always          |                             |            |
| <b>Description</b>   |                 |                             |            |
| Pause between <b>Cranking Attempts (page 271)</b> . <b>PRESTART (PAGE 732)</b> output is active in this pause until Cranking Fail Pause elapses. |                 |                             |            |

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## Prestart Time

|                            |                 |                             |            |
|----------------------------|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 0 .. 600 [s]    |                             |            |
| <b>Default value</b>       | 2 s             | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 s             |                             |            |
| <b>Comm object</b>         | 8394            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard        |                             |            |
| <b>Setpoint visibility</b> | Always          |                             |            |

### Description

Time of closing of the **PRESTART (PAGE 732)** output prior to the engine start. Set to zero if you want to leave the output **PRESTART (PAGE 732)** open.

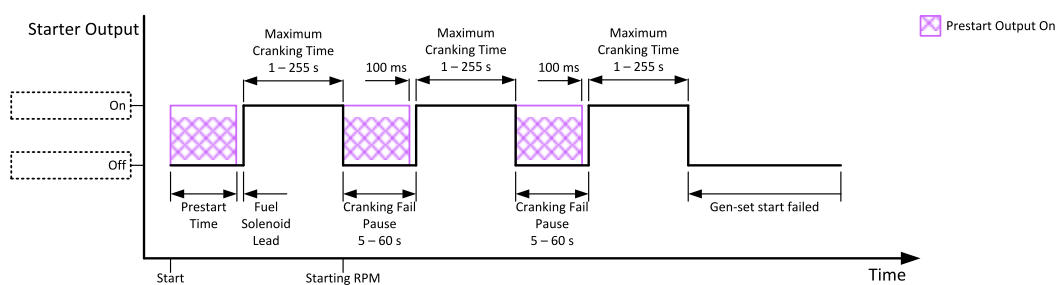


Image 9.1 Prestart Time

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## Starting RPM

|                            |                               |                             |            |
|----------------------------|-------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings               | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 5 .. 50 [%]                   |                             |            |
| <b>Default value</b>       | 25%                           | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 % of Nominal RPM (page 248) |                             |            |
| <b>Comm object</b>         | 8254                          | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced                      |                             |            |
| <b>Setpoint visibility</b> | Always                        |                             |            |

### Description

This setpoint defines the “firing” speed level as percent value of the **Nominal RPM (page 248)**. If this level is exceeded the engine is considered as started.

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## Starting Oil Pressure

|  |                   |                             |            |
|--|-------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 10,0 [bar] |                             |            |
| <b>Default value</b>   | 4,5 bar           | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 bar           |                             |            |
| <b>Comm object</b>   | 9681              | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard          |                             |            |
| <b>Setpoint visibility</b>   | Always            |                             |            |
| <b>Description</b>   |                   |                             |            |
| Oil pressure limit for starting. The controller will stop cranking ( <b>STARTER (PAGE 737)</b> goes OFF) if the oil pressure rises above this limit. |                   |                             |            |
| <b>IMPORTANT: Value from analog input has higher priority than value from ECU.</b>   |                   |                             |            |

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## D+ Function

|                            |                                     |                             |            |
|----------------------------|-------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings                     | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Enabled / ChargeFail / Disabled [-] |                             |            |
| <b>Default value</b>       | Disabled                            | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | [-]                                 |                             |            |
| <b>Comm object</b>         | 9683                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                            |                             |            |
| <b>Setpoint visibility</b> | Always                              |                             |            |

### Description

Behavior of D+ terminal.

- Enabled            The D+ terminal is used for both functions – “running engine” detection and charge fail detection.
- ChargeFail        The D+ terminal is used for charge fail detection only
- Disabled          The D+ terminal is not used.

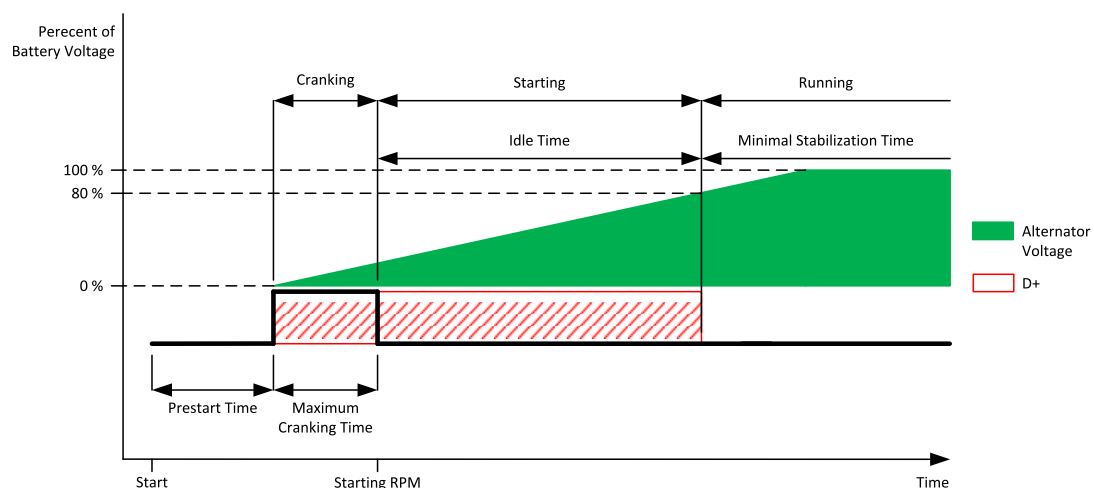


Image 9.2 D+ Function 1



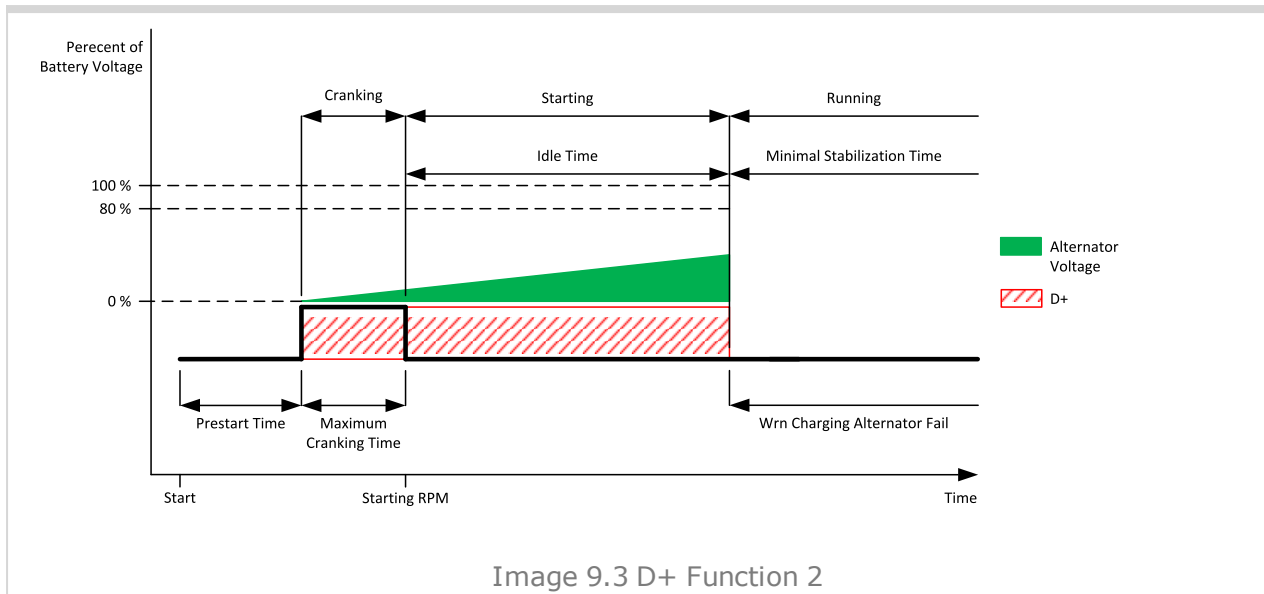


Image 9.3 D+ Function 2

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### Glow Plugs Time

|   |                                   |                             |            |
|---|-----------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. Prestart Time (page 273) [s] |                             |            |
| <b>Default value</b>  | 0 s                               | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s                               |                             |            |
| <b>Comm object</b>  | 14412                             | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                          |                             |            |
| <b>Setpoint visibility</b>  | Always                            |                             |            |
| <b>Description</b>  |                                   |                             |            |
| This setpoint defines the time before starting when logical binary output <b>GLOW PLUGS</b> (PAGE 720) will be close. |                                   |                             |            |

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## Subgroup: Starting Timers

### Fuel Solenoid Lead

|                            |                 |                             |            |
|----------------------------|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 0,0 .. 25,0 [s] |                             |            |
| <b>Default value</b>       | 0,5 s           | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 0,1 s           |                             |            |
| <b>Comm object</b>         | 10525           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced        |                             |            |
| <b>Setpoint visibility</b> | Always          |                             |            |

#### Description

Delay between **FUEL SOLENOID (PAGE 715)** and **STARTER (PAGE 737)** logical binary inputs. **FUEL SOLENOID (PAGE 715)** is closed before **STARTER (PAGE 737)**. Lead time is adjusted via this setpoint.

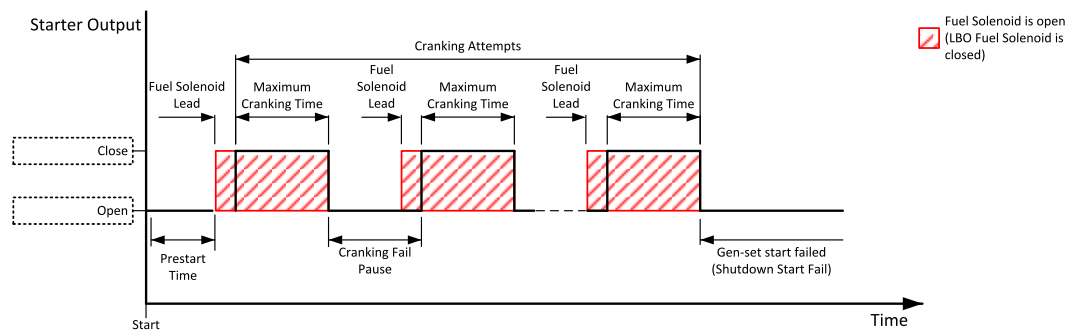


Image 9.4 Fuel Solenoid Lead

**Note:** LBO PRESTART (PAGE 732) goes to logical zero when Fuel Solenoid Lead goes to logical one.

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### Idle Time

|                            |                 |                             |            |
|----------------------------|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 0 .. 600 [s]    |                             |            |
| <b>Default value</b>       | 12 s            | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 s             |                             |            |
| <b>Comm object</b>         | 9097            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard        |                             |            |
| <b>Setpoint visibility</b> | Always          |                             |            |

#### Description

Idle Time delay starts when RPM exceeds **Starting RPM (page 273)**. Start fail is detected when during Idle state RPM decreases below 2 RPM.

The output **IDLE/NOMINAL (PAGE 723)** remains inactive during the idle period. Binary output Idle/Nominal opens during Cooling period again. This output can be used for switching the governor between idle and nominal speed.

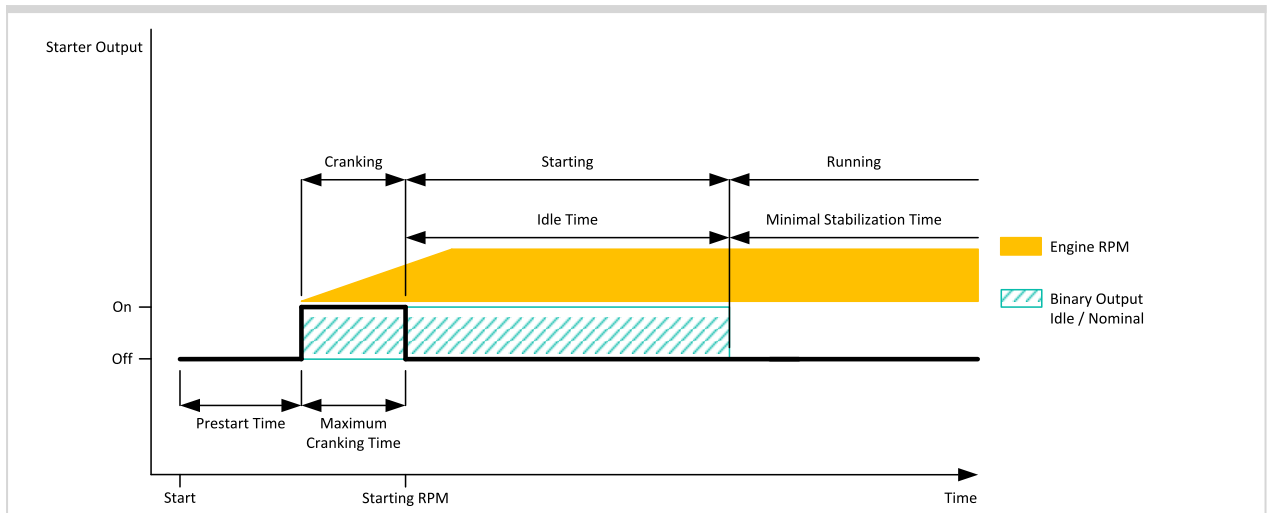


Image 9.5 Idle Time 1

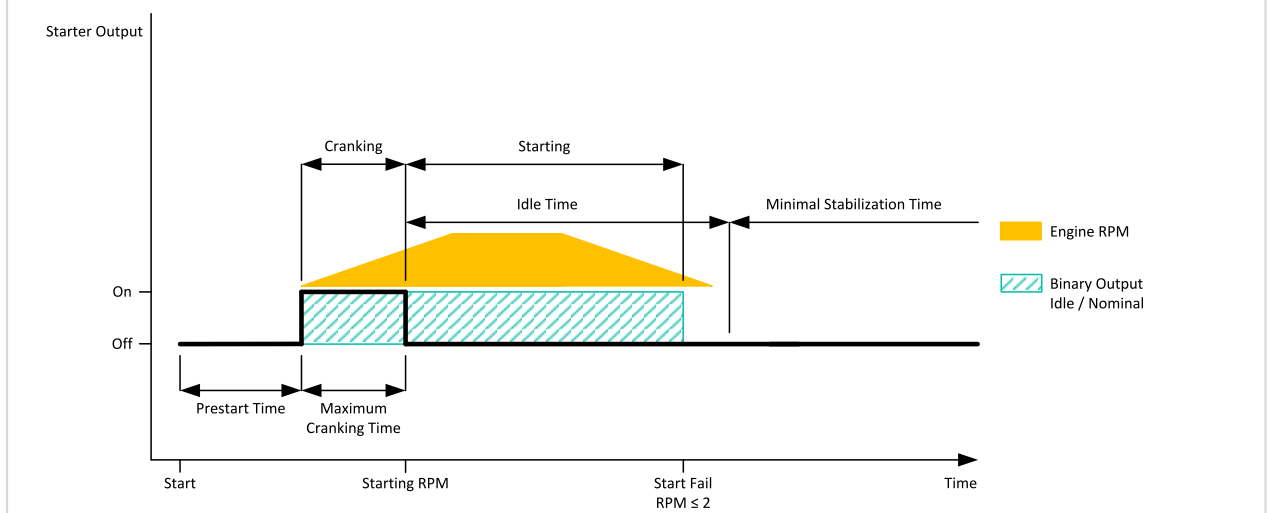


Image 9.6 Idle Time 2

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## Minimal Stabilization Time

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings                                | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 1 .. Maximal Stabilization Time (page 279) [s] |                             |            |
| <b>Default value</b>       | 2 s  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 s  |                             |            |
| <b>Comm object</b>         | 8259   | <b>Related applications</b> | MINT, SPTM |
| <b>Config level</b>        | Standard                                       |                             |            |
| <b>Setpoint visibility</b> | Always   |                             |            |

### Description

When the gen-set has been started and the idle timer has elapsed, the controller will wait for a period adjusted by this setpoint before closing GCB, even if the generator voltage and frequency are already in limits.

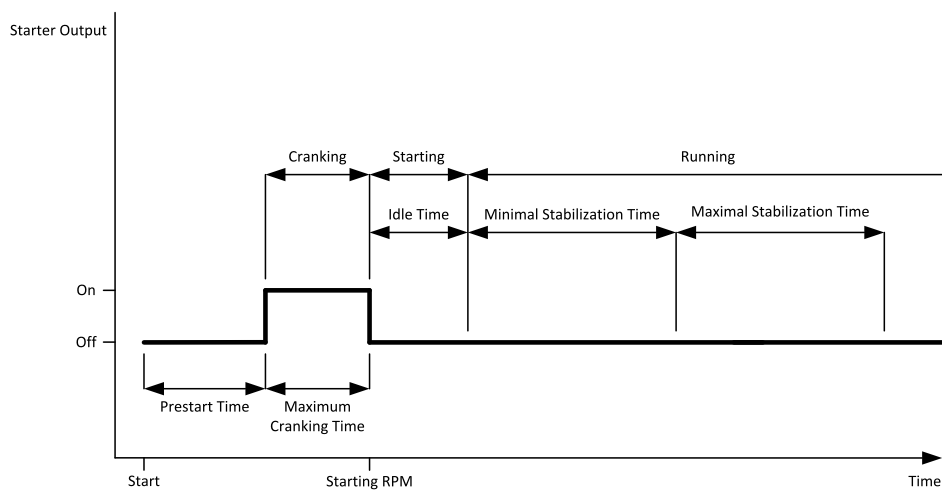


Image 9.7 Minimal Stabilization Time

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## Maximal Stabilization Time

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings                                  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Minimal Stabilization Time (page 278) .. 300 [s] |                             |            |
| <b>Default value</b>       | 10 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 s  |                             |            |
| <b>Comm object</b>         | 8313   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced   |                             |            |
| <b>Setpoint visibility</b> | Always   |                             |            |

### Description

When the gen-set has been started and the idle timer has elapsed, the generator voltage and frequency must get within limits within this period of time, otherwise an appropriate shutdown alarm (generator voltage and/or frequency) is issued.

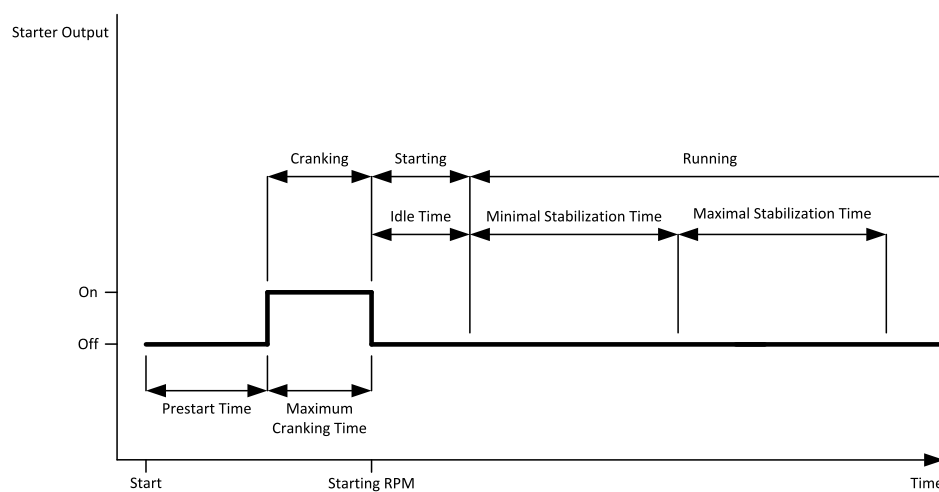


Image 9.8 Maximal Stabilization Time

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## Protection Hold Off

|                            |                  |                             |            |
|----------------------------|------------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 0,0 .. 300,0 [s] |                             |            |
| <b>Default value</b>       | 5,0 s            | <b>Alternative config</b>   | YES        |
| <b>Step</b>                | 0,1 s            |                             |            |
| <b>Comm object</b>         | 10023            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced         |                             |            |
| <b>Setpoint visibility</b> | Always           |                             |            |

### Description

During the start of the gen-set, some engine protections have to be blocked (e.g. Oil pressure). The protections are unblocked after the Protect Hold Off. The time starts after reaching Starting RPM.

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## Sd Ventilation Time

|  |                 |                             |            |
|--|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 60 [s]     |                             |            |
| <b>Default value</b>   | 5 s             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 s             |                             |            |
| <b>Comm object</b>   | 9695            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced        |                             |            |
| <b>Setpoint visibility</b>   | Always          |                             |            |
| <b>Description</b>   |                 |                             |            |
| In case <b>Fuel Solenoid (page 271)</b> is set to GAS, the Sd Ventilation Time adjusts the time of the starter to be switched on for engine pre-ventilation in the case of a first start attempt after shutdown or controller switch-on. |                 |                             |            |

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### Subgroup: Stopping

## Cooling Speed

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Idle / Nominal [-]  |                             |            |
| <b>Default value</b>  | Nominal   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 10046   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced  |                             |            |
| <b>Setpoint visibility</b>  | Always  |                             |            |
| <b>Description</b>  |   |                             |            |
| Selects the function of the binary output <b>IDLE/NOMINAL (PAGE 723)</b> during engine cooling state.   |   |                             |            |
| Idle  | Cooling is executed at Idle speed and generator protections are switched off. |                             |            |
| Nominal   | Cooling is executed at Nominal speed and generator protections are active.    |                             |            |
| <b>Note:</b> When ECU is connected the predefined value 900 RPM for Idle speed is requested.  |   |                             |            |
| <b>Note:</b> Binary output <b>IDLE/NOMINAL (PAGE 723)</b> must be configured and connected to speed governor. Engine Idle speed must be adjusted on speed governor. |   |                             |            |

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## Subgroup: Stopping Timers

### Cooling Time

|   |                 |                             |            |
|---|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 3 600 [s]  |                             |            |
| <b>Default value</b>  | 30 s            | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s             |                             |            |
| <b>Comm object</b>  | 8258            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard        |                             |            |
| <b>Setpoint visibility</b>                                      | Always          |                             |            |
| <b>Description</b>  |                 |                             |            |
| Runtime of the unloaded gen-set to cool the engine before stop. |                 |                             |            |

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### Stop Time

|                            |                 |                             |            |
|----------------------------|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 0 .. 600 [s]    |                             |            |
| <b>Default value</b>       | 60 s            | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 s             |                             |            |
| <b>Comm object</b>         | 9815            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced        |                             |            |
| <b>Setpoint visibility</b> | Always          |                             |            |

#### Description

Under normal conditions the engine must certainly stop within this period after the **FUEL SOLENOID (PAGE 715)** has been de-energized and the **STOP SOLENOID (PAGE 738)** energized. The Stop Solenoid output is deactivated 12 s after last running engine indication went off.

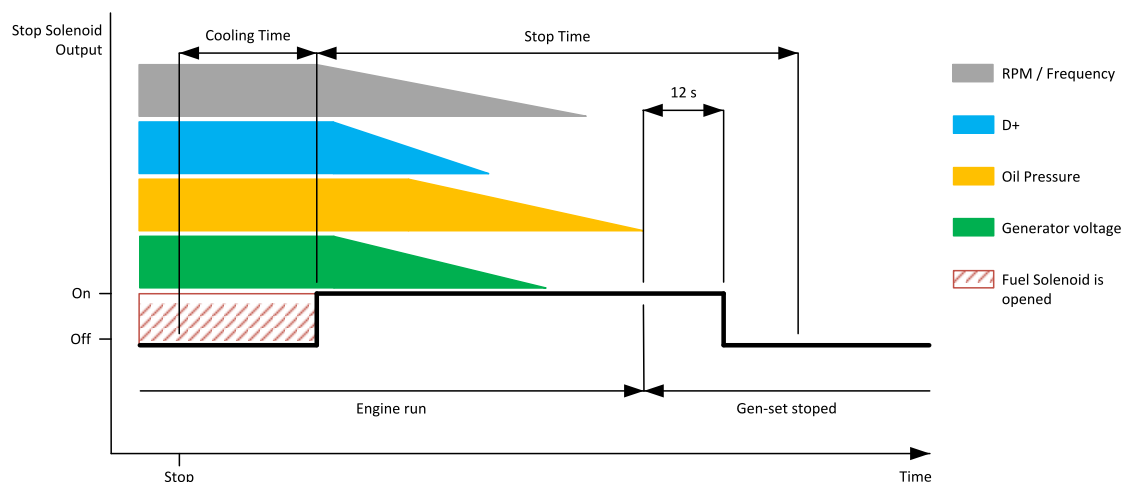
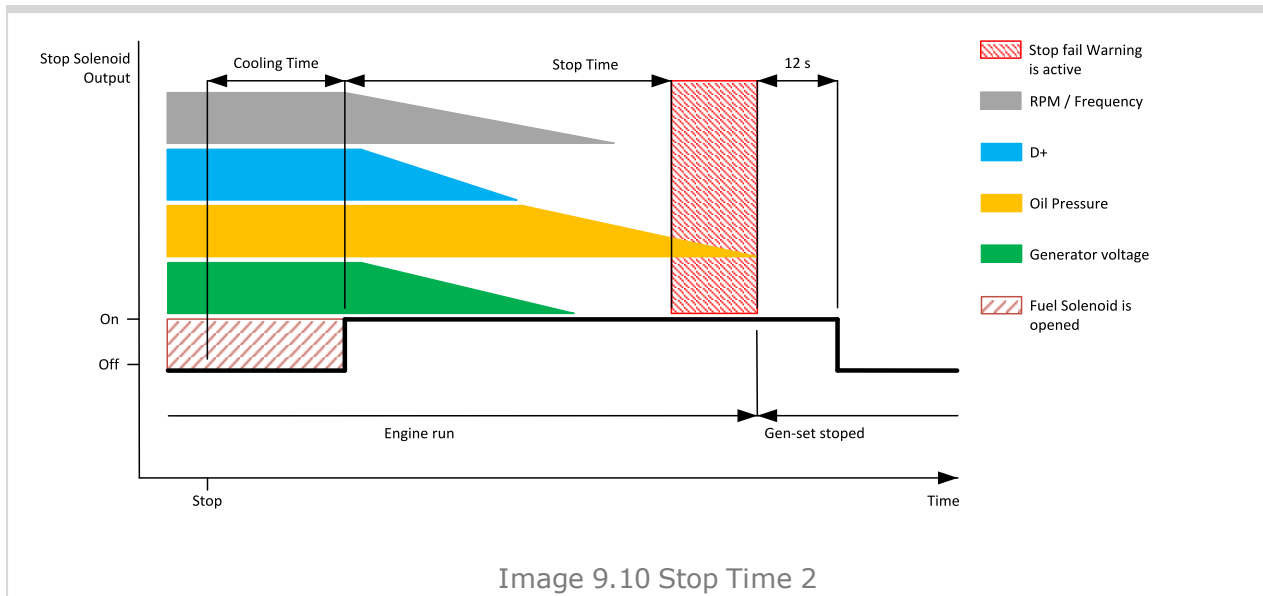


Image 9.9 Stop Time 1



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### After Cooling Time

|   |                 |                             |            |
|---|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 3 600 [s]  |                             |            |
| <b>Default value</b>  | 180 s           | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s             |                             |            |
| <b>Comm object</b>  | 8662            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard        |                             |            |
| <b>Setpoint visibility</b>  | Always          |                             |            |
| <b>Description</b>  |                 |                             |            |
| Runtime of engine after cooling pump. Binary output Cooling pump is closed when the engine starts and opens AfterCool time delayed after gen-set stops. |                 |                             |            |

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### Subgroup: Power switch

#### Power Switch On

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 32 000 [kW]  |                             |            |
| <b>Default value</b>   | 100 kW  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 kW  |                             |            |
| <b>Comm object</b>   | 11658   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced  |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical binary output <b>POWER SWITCH (PAGE 732)</b> is configured. |                             |            |
| <b>Description</b>   |   |                             |            |
| Threshold level for switching the binary output <b>POWER SWITCH (PAGE 732)</b> on. |   |                             |            |





Image 9.11 Power Switch Level On < Level Off



Image 9.12 Power Switch Level On > Level Off

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### Power Switch Off

|                            |   |                             |            |
|----------------------------|---|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 0 .. 32 000 [kW]  |                             |            |
| <b>Default value</b>       | 50 kW   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 kW  |                             |            |
| <b>Comm object</b>         | 11659   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced  |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>POWER SWITCH (PAGE 732)</b> is configured. |                             |            |

**Description**

Threshold level for switching the binary output **POWER SWITCH (PAGE 732)** on.

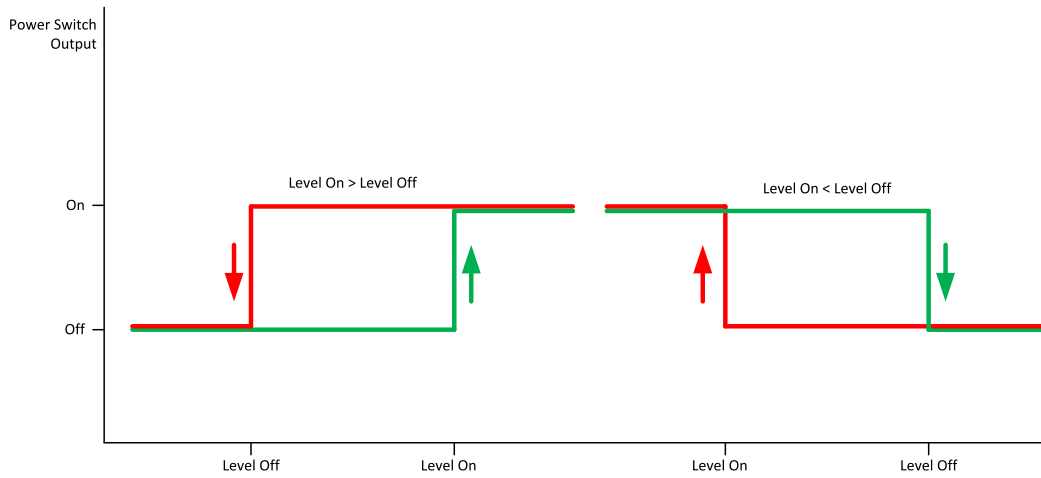


Image 9.13 Power Switch Level On < Level Off

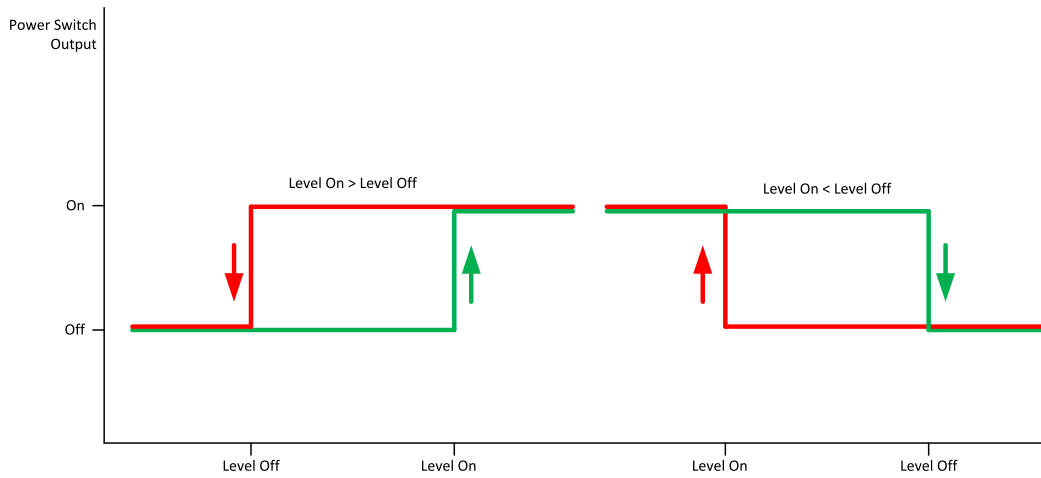


Image 9.14 Power Switch Level On > Level Off

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## Subgroup: Engine Protections

**Overspeed Sd**

|   |                               |                             |            |
|---|-------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings               | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 50 .. 200 [%]                 |                             |            |
| <b>Default value</b>  | 115%                          | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 % of Nominal RPM (page 248) |                             |            |
| <b>Comm object</b>  | 8263                          | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                      |                             |            |
| <b>Setpoint visibility</b>  | Always                        |                             |            |
| <b>Description</b>  |                               |                             |            |
| Threshold for over speed protection. Relative to the nominal speed. |                               |                             |            |

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## Starting Overspeed Sd

|                            |                 |                             |            |
|----------------------------|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 100 ..200 [%]   |                             |            |
| <b>Default value</b>       | 115 %           | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 %             |                             |            |
| <b>Comm object</b>         | 11033           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard        |                             |            |
| <b>Setpoint visibility</b> | Always          |                             |            |

### Description

The rise up threshold for overspeed protection. The time for which this level is accepted is defined as **Starting Overspeed Time (page 287)**. This period starts to be counted once the RPM exceeds the value **Starting RPM (page 273)**. The threshold **Overspeed Sd (page 285)** starts to be valid once this period elapsed.

The type of reaction of the overspeed protection within the **Starting Overspeed Time (page 287)** is defined by the setpoint **Starting Overspeed Protection (page 287)**, so it is either considered as Sd Overspeed or unsuccessful start attempt. Then the next start attempt is enabled once the engine was stopped. History record Starting Overspeed should be written in this case.

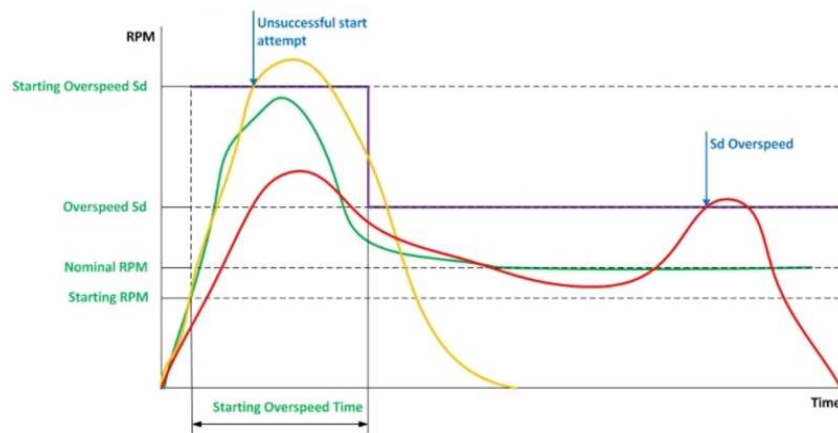


Image 9.15 Starting speed overshoot > Overspeed Sd

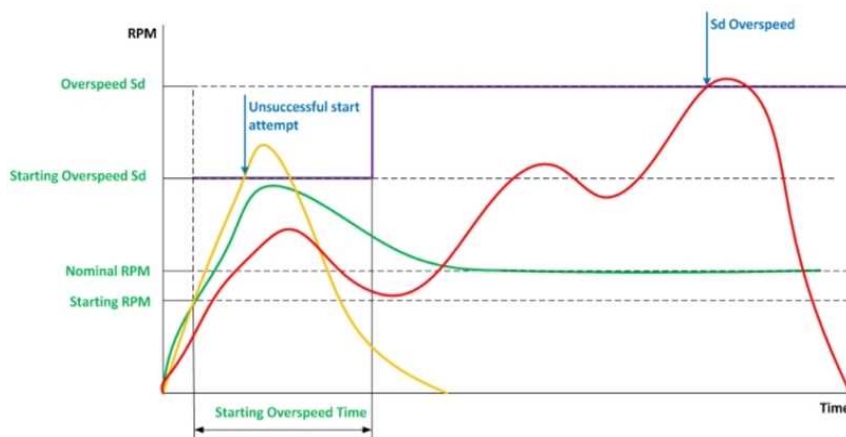


Image 9.16 Starting speed overshoot < Overspeed Sd

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### Starting Overspeed Time

|   |                 |                             |            |
|---|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 255 [s]    |                             |            |
| <b>Default value</b>  | 5 s             | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s             |                             |            |
| <b>Comm object</b>  | 14108           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard        |                             |            |
| <b>Setpoint visibility</b>  | Always          |                             |            |
| <b>Description</b>  |                 |                             |            |
| Time when <b>Starting Overspeed Sd (page 286)</b> level is used for overspeed protection. This time starts countdown when starting RPM are reached. |                 |                             |            |

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### Starting Overspeed Protection

|  |                              |                             |            |
|--|------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings              | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | OverSpd Sd / NextStartAt [-] |                             |            |
| <b>Default value</b>   | OverSpd Sd                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                          |                             |            |
| <b>Comm object</b>   | 15808                        | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                     |                             |            |
| <b>Setpoint visibility</b>   | Always                       |                             |            |
| <b>Description</b>   |                              |                             |            |
| Time of protection of the overspeed in <b>Starting Overspeed Time (page 287)</b> |                              |                             |            |

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### Oil Pressure Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 12895   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>OIL PRESSURE (PAGE 774)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>OIL PRESSURE (PAGE 774)</b> . |   |                             |            |

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## Oil Pressure Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 12779   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>                                    | Visible only if the logical analog input <b>OIL PRESSURE (PAGE 774)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown threshold level for <b>OIL PRESSURE (PAGE 774)</b> . |   |                             |            |

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## Oil Pressure Delay

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                      | Engine settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                       | 0 .. 900 [s]   |                             |            |
| <b>Default value</b>                       | 3 s  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                | 1 s  |                             |            |
| <b>Comm object</b>                         | 14341  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                        | Standard   |                             |            |
| <b>Setpoint visibility</b>                 | Visible only if the logical analog input <b>OIL PRESSURE (PAGE 774)</b> is configured or logical binary input <b>OIL PRESSURE (PAGE 674)</b> is configured |                             |            |
| <b>Description</b>                         |  |                             |            |
| Delay for <b>OIL PRESSURE (PAGE 774)</b> . |  |                             |            |

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## ECU Oil Pressure Wrn

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by ECU sensor curve |                             |            |
| <b>Default value</b>   | the value is defined by ECU sensor curve | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | the step is defined by ECU sensor curve  |                             |            |
| <b>Comm object</b>   | 14426                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                                 |                             |            |
| <b>Setpoint visibility</b>                                       | Visible only if ECU is configured        |                             |            |
| <b>Description</b>   |  |                             |            |
| Warning threshold level for Oil pressure which is send from ECU. |  |                             |            |

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### ECU Oil Pressure Sd

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by ECU sensor curve |                             |            |
| <b>Default value</b>  | the value is defined by ECU sensor curve | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by ECU sensor curve  |                             |            |
| <b>Comm object</b>  | 14425                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                                 |                             |            |
| <b>Setpoint visibility</b>  | Visible only if ECU is configured        |                             |            |
| <b>Description</b>  |  |                             |            |
| Shutdown threshold level for Oil pressure which is send from ECU. |  |                             |            |

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### ECU Oil Pressure Delay

|  |                                   |                             |            |
|--|-----------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>                          | Engine settings                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                           | 0 .. 900 [s]                      |                             |            |
| <b>Default value</b>                           | 3 s                               | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                    | 1 s                               |                             |            |
| <b>Comm object</b>                             | 14427                             | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                            | Standard                          |                             |            |
| <b>Setpoint visibility</b>                     | Visible only if ECU is configured |                             |            |
| <b>Description</b>                             |                                   |                             |            |
| Delay for Oil pressure which is send from ECU. |                                   |                             |            |

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### Coolant Temperature Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 12896   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>COOLANT TEMP (PAGE 771)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>COOLANT TEMP (PAGE 771)</b> . |   |                             |            |

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## Coolant Temperature Sd

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>   | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>   | 12780   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical analog input <b>COOLANT TEMP (PAGE 771)</b> is configured |                             |            |
| <b>Description</b>   |   |                             |            |
| Shutdown or BOC threshold level for <b>COOLANT TEMP (PAGE 771)</b> . |   |                             |            |

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## Coolant Temperature Delay

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                      | Engine settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                       | 0 .. 900 [s]   |                             |            |
| <b>Default value</b>                       | 5 s  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                | 1 s  |                             |            |
| <b>Comm object</b>                         | 14342  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                        | Standard   |                             |            |
| <b>Setpoint visibility</b>                 | Visible only if the logical analog input <b>COOLANT TEMP (PAGE 771)</b> is configured or logical binary input <b>COOLANT TEMP (PAGE 664)</b> is configured |                             |            |
| <b>Description</b>                         |  |                             |            |
| Delay for <b>COOLANT TEMP (PAGE 771)</b> . |  |                             |            |

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## ECU Coolant Temperature Wrn

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by ECU sensor curve |                             |            |
| <b>Default value</b>  | the value is defined by ECU sensor curve | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by ECU sensor curve  |                             |            |
| <b>Comm object</b>  | 14429                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                                 |                             |            |
| <b>Setpoint visibility</b>  | Visible only if ECU is configured        |                             |            |
| <b>Description</b>  |  |                             |            |
| Warning threshold level for Coolant temperature which is send from ECU. |  |                             |            |

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## ECU Coolant Temperature Sd

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by ECU sensor curve |                             |            |
| <b>Default value</b>  | the value is defined by ECU sensor curve | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by ECU sensor curve  |                             |            |
| <b>Comm object</b>  | 14428                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                                 |                             |            |
| <b>Setpoint visibility</b>  | Visible only if ECU is configured        |                             |            |
| <b>Description</b>  |  |                             |            |
| Shutdown or BOC threshold level for Coolant temperature which is send from ECU. |  |                             |            |

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## ECU Coolant Temperature Delay

|   |                                   |                             |            |
|---|-----------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>                                 | Engine settings                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                  | 0 .. 900 [s]                      |                             |            |
| <b>Default value</b>                                  | 5 s                               | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s                               |                             |            |
| <b>Comm object</b>                                    | 14430                             | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                   | Standard                          |                             |            |
| <b>Setpoint visibility</b>                            | Visible only if ECU is configured |                             |            |
| <b>Description</b>                                    |                                   |                             |            |
| Delay for Coolant temperature which is send from ECU. |                                   |                             |            |

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## Oil Temp Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve                                       |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve                                       | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 15747   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>OIL TEMP (PAGE 775)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>OIL TEMP (PAGE 775)</b> . |   |                             |            |

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## Oil Temp Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                                     | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                      | the range is defined by analog sensor curve                                       |                             |            |
| <b>Default value</b>                                      | the value is defined by analog sensor curve                                       | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 15748   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                       | Standard  |                             |            |
| <b>Setpoint visibility</b>                                | Visible only if the logical analog input <b>OIL TEMP (PAGE 775)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown threshold level for <b>OIL TEMP (PAGE 775)</b> . |   |                             |            |

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## Oil Temp Delay

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>                  | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                   | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>                   | 3 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                            | 1 s   |                             |            |
| <b>Comm object</b>                     | 15749   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                    | Standard  |                             |            |
| <b>Setpoint visibility</b>             | Visible only if the logical analog input <b>OIL TEMP (PAGE 775)</b> is configured |                             |            |
| <b>Description</b>                     |   |                             |            |
| Delay for <b>OIL TEMP (PAGE 775)</b> . |   |                             |            |

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## ECU Oil Temp Wrn

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by ECU sensor curve |                             |            |
| <b>Default value</b>  | the value is defined by ECU sensor curve | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by ECU sensor curve  |                             |            |
| <b>Comm object</b>  | 15637                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                                 |                             |            |
| <b>Setpoint visibility</b>  | Visible only if ECU is configured        |                             |            |
| <b>Description</b>  |  |                             |            |
| Warning threshold level for Oil temperature which is send from ECU. |  |                             |            |

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## ECU Oil Temp Sd

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by ECU sensor curve |                             |            |
| <b>Default value</b>   | the value is defined by ECU sensor curve | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by ECU sensor curve  |                             |            |
| <b>Comm object</b>   | 15636                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                                 |                             |            |
| <b>Setpoint visibility</b>   | Visible only if ECU is configured        |                             |            |
| <b>Description</b>   |  |                             |            |
| Shutdown threshold level for Oil temperature which is send from ECU. |  |                             |            |

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## ECU Oil Temp Delay

|   |                                   |                             |            |
|---|-----------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>                             | Engine settings                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                              | 0 .. 900 [s]                      |                             |            |
| <b>Default value</b>                              | 3 s                               | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                       | 1 s                               |                             |            |
| <b>Comm object</b>                                | 15638                             | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                               | Standard                          |                             |            |
| <b>Setpoint visibility</b>                        | Visible only if ECU is configured |                             |            |
| <b>Description</b>                                |                                   |                             |            |
| Delay for Oil temperature which is send from ECU. |                                   |                             |            |

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## Temperature Switch On

|                            |   |                             |            |
|----------------------------|---|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is define by sensor curve (analog or ECU)   |                             |            |
| <b>Default value</b>       | the value is defined by sensor curve (analog or ECU)  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by sensor curve (analog or ECU)   |                             |            |
| <b>Comm object</b>         | 8688  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard  |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>TEMPERATURE SWITCH (PAGE 740)</b> is configured. |                             |            |

### Description

Threshold level for switching the binary output **TEMPERATURE SWITCH (PAGE 740)** on.

**Note:** Value from analog input has higher priority than ECU.

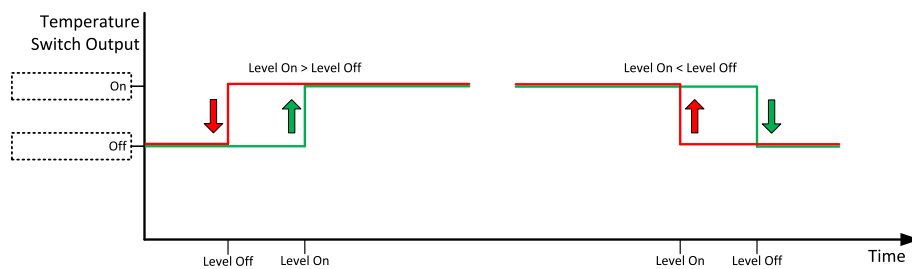


Image 9.17 Temperature Switch

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## Temperature Switch Off

|                            |   |                             |            |
|----------------------------|---|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is define by sensor curve (analog or ECU)   |                             |            |
| <b>Default value</b>       | the value is defined by sensor curve (analog or ECU)  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by sensor curve (analog or ECU)   |                             |            |
| <b>Comm object</b>         | 8689  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard  |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>TEMPERATURE SWITCH (PAGE 740)</b> is configured. |                             |            |

### Description

Threshold level for switching the binary output **TEMPERATURE SWITCH (PAGE 740)** off.

**Note:** Value from analog input has higher priority than ECU.

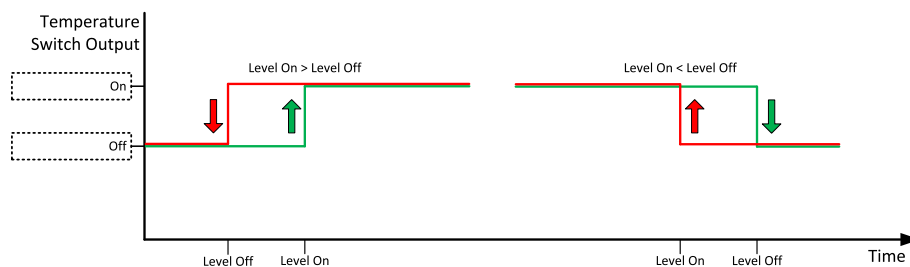


Image 9.18 Temperature Switch

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## Coolant Temperature Low Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | YES        |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9684  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>COOLANT TEMP (PAGE 771)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Threshold level for lower limit of <b>COOLANT TEMP (PAGE 771)</b> . |   |                             |            |

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## Coolant Temperature Low Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                                     | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                      | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>                                      | 5 s   | <b>Alternative config</b>   | YES        |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 10270   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                       | Advanced  |                             |            |
| <b>Setpoint visibility</b>                                | Visible only if the logical analog input <b>COOLANT TEMP (PAGE 771)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>Coolant Temperature Low Wrn (page 295)</b> . |   |                             |            |

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## Fuel Level Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 12897   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>FUEL LEVEL (PAGE 772)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>FUEL LEVEL (PAGE 772)</b> . |   |                             |            |

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## Fuel Level Sd

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>   | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>   | 12898   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical analog input <b>FUEL LEVEL (PAGE 772)</b> is configured |                             |            |
| <b>Description</b>   |   |                             |            |
| Shutdown or BOC threshold level for <b>FUEL LEVEL (PAGE 772)</b> . |   |                             |            |

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## Fuel Level Delay

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                    | Engine settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                     | 0 .. 900 [s]   |                             |            |
| <b>Default value</b>                     | 10 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                              | 1 s  |                             |            |
| <b>Comm object</b>                       | 14343  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                      | Standard   |                             |            |
| <b>Setpoint visibility</b>               | Visible only if the logical analog input <b>FUEL LEVEL (PAGE 772)</b> is configured or logical binary input <b>FUEL LEVEL (PAGE 667)</b> is configured |                             |            |
| <b>Description</b>                       |  |                             |            |
| Delay for <b>FUEL LEVEL (PAGE 772)</b> . |  |                             |            |

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## ECU Fuel Level Wrn

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by ECU sensor curve |                             |            |
| <b>Default value</b>   | the value is defined by ECU sensor curve | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by ECU sensor curve  |                             |            |
| <b>Comm object</b>   | 14432                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                                 |                             |            |
| <b>Setpoint visibility</b>                                     | Visible only if ECU is configured        |                             |            |
| <b>Description</b>   |  |                             |            |
| Warning threshold level for Fuel level which is send from ECU. |  |                             |            |

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## ECU Fuel Level Sd

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by ECU sensor curve |                             |            |
| <b>Default value</b>   | the value is defined by ECU sensor curve | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by ECU sensor curve  |                             |            |
| <b>Comm object</b>   | 14431                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                                 |                             |            |
| <b>Setpoint visibility</b>   | Visible only if ECU is configured        |                             |            |
| <b>Description</b>   |  |                             |            |
| Shutdown or BOC threshold level for Fuel level which is send from ECU. |  |                             |            |

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## ECU Fuel Level Delay

|  |                                   |                             |            |
|--|-----------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>                        | Engine settings                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                         | 0 .. 900 [s]                      |                             |            |
| <b>Default value</b>                         | 10 s                              | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                  | 1 s                               |                             |            |
| <b>Comm object</b>                           | 14433                             | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                          | Standard                          |                             |            |
| <b>Setpoint visibility</b>                   | Visible only if ECU is configured |                             |            |
| <b>Description</b>                           |                                   |                             |            |
| Delay for Fuel level which is send from ECU. |                                   |                             |            |

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## Fuel Tank Volume

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                   | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                    | 0 .. 10 000 [l]   |                             |            |
| <b>Default value</b>                    | 200 l   | <b>Alternative config</b>   | YES        |
| <b>Step</b>                             | 1 l   |                             |            |
| <b>Comm object</b>                      | 11103   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                     | Advanced  |                             |            |
| <b>Setpoint visibility</b>              | Visible only if the logical analog input <b>FUEL LEVEL (PAGE 772)</b> is or ECU is configured |                             |            |
| <b>Description</b>                      |   |                             |            |
| Define a capacity of gen-set fuel tank. |   |                             |            |

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## Maximal Fuel Drop

|  |                          |                             |            |
|--|--------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Disabled / 1 .. 50 [%/h] |                             |            |
| <b>Default value</b>   | 25 %/h                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1%/h                     |                             |            |
| <b>Comm object</b>   | 12373                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced                 |                             |            |
| <b>Setpoint visibility</b>   | Always                   |                             |            |
| <b>Description</b>   |                          |                             |            |
| Setpoint indicates the maximum allowable drop of fuel in fuel tank per running hour. When the engine is not running the maximal allowed fuel drop-off is preset to 5% of total tank volume per hour. |                          |                             |            |

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## Maximal Fuel Drop Delay

|   |                 |                             |            |
|---|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 600 [s]    |                             |            |
| <b>Default value</b>  | 5 s             | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | s               |                             |            |
| <b>Comm object</b>  | 14683           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced        |                             |            |
| <b>Setpoint visibility</b>  | Always          |                             |            |
| <b>Description</b>  |                 |                             |            |
| When the value of fuel drop per hour is higher than <b>Maximal Fuel Drop (page 298)</b> this delay starts count down. After count down of this delay alarm <b>Wrn Fuel Theft (page 803)</b> is activated. |                 |                             |            |

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## Fuel Pump On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 0 .. Fuel Pump Off (page 300) [%]  |                             |            |
| <b>Default value</b>       | 20 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 %  |                             |            |
| <b>Comm object</b>         | 10100  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>FUEL PUMP (PAGE 715)</b> is configured and logical binary input <b>FUEL PUMP ON/OFF (PAGE 667)</b> isn't configured |                             |            |

### Description

Threshold level for switching the binary output **FUEL PUMP (PAGE 715)** on.

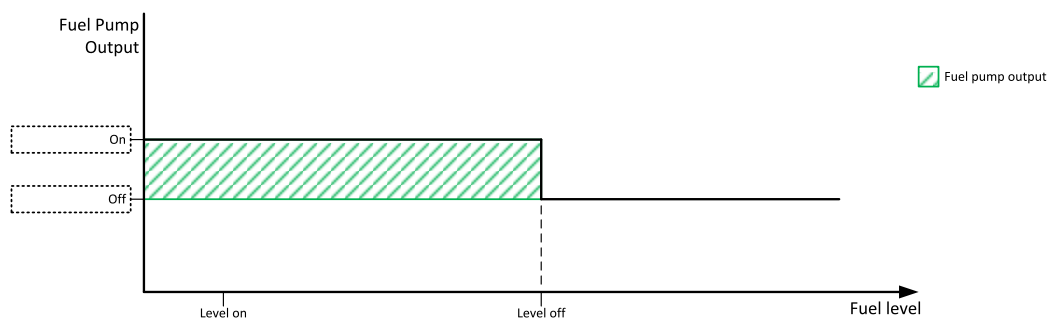


Image 9.19 Fuel Pump On

**IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 667) is configured then binary output FUEL PUMP (PAGE 715) is control by this binary input. Setpoints Fuel Pump On and Fuel Pump Off (page 300) are not evaluated!**

**Note:** Value from analog input has higher priority than ECU.

**Note:** This setpoint is visible only if the logical binary output **FUEL PUMP (PAGE 715)** is configured.

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## Fuel Pump Off

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | Engine settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Fuel Pump On (page 299) .. 100 [%]   |                             |            |
| <b>Default value</b>       | 90 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 %  |                             |            |
| <b>Comm object</b>         | 10101  | <b>Related applications</b> | MINT, SPTM |
| <b>Config level</b>        | Advanced   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>FUEL PUMP (PAGE 715)</b> is configured and logical binary input <b>FUEL PUMP ON/OFF (PAGE 667)</b> isn't configured |                             |            |

### Description

Threshold level for switching the binary output **FUEL PUMP (PAGE 715)** off.

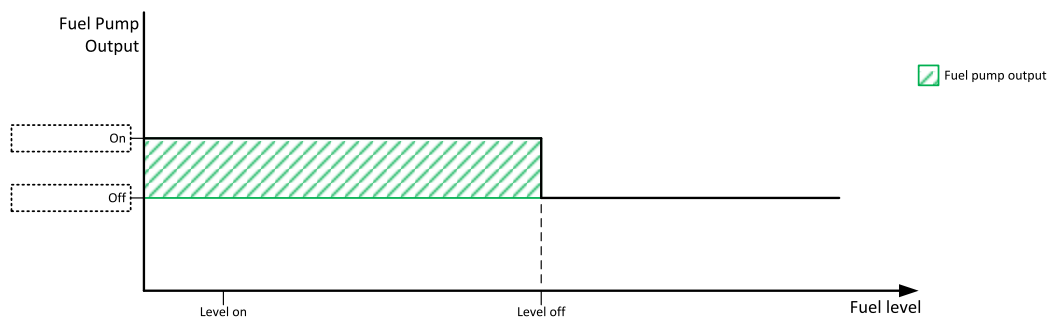


Image 9.20 Fuel Pump Off

**IMPORTANT:** When binary input **FUEL PUMP ON/OFF (PAGE 667)** is configured then binary output **FUEL PUMP (PAGE 715)** is control by this binary input. Setpoints **Fuel Pump On (page 299)** and **Fuel Pump Off** are not evaluated!

**Note:** Value from analog input has higher priority than ECU.

**Note:** This setpoint is visible only if the logical binary output **FUEL PUMP (PAGE 715)** is configured.

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## Transfer Wrn Delay

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Disabled / 1 .. 60 [s]  |                             |            |
| <b>Default value</b>   | 30 s  | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 s   |                             |            |
| <b>Comm object</b>   | 10685   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced  |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical binary output <b>FUEL PUMP (PAGE 715)</b> is configured |                             |            |
| <b>Description</b>   |   |                             |            |
| <p>If the controller does not see the fuel increase during fuel transfer within this time alarm <b>Wrn Fuel Transfer Failed (page 818)</b> will be displayed and the <b>FUEL PUMP (PAGE 715)</b> will be turned off. Alarm <b>Wrn Fuel Transfer Failed (page 818)</b> will be displayed but this alarm becomes immediately inactive and it will be possible to delete this message by the Fault reset button. If the fault is deleted the controller will initiate the transfer again.</p> |   |                             |            |

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### Subgroup: Battery Protections

## Battery Undervoltage

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                      | Engine settings                                    | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                       | 8,0 V .. <b>Battery Overvoltage (page 301)</b> [V] |                             |            |
| <b>Default value</b>                       | 18,0 V   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                | 0,1 V  |                             |            |
| <b>Comm object</b>                         | 8387   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                        | Standard   |                             |            |
| <b>Setpoint visibility</b>                 | Always   |                             |            |
| <b>Description</b>                         |  |                             |            |
| Warning threshold for low battery voltage. |  |                             |            |

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## Battery Overvoltage

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>                       | Engine settings                                    | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                        | <b>Battery Undervoltage (page 301)</b> .. 40,0 [V] |                             |            |
| <b>Default value</b>                        | 36,0 V   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                 | 0,1 V  |                             |            |
| <b>Comm object</b>                          | 9587   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                         | Standard   |                             |            |
| <b>Setpoint visibility</b>                  | Always   |                             |            |
| <b>Description</b>                          |  |                             |            |
| Warning threshold for high battery voltage. |  |                             |            |

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## Battery <> Voltage Delay

|  |                 |                             |            |
|--|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 600 [s]    |                             |            |
| <b>Default value</b>   | 5 s             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 s             |                             |            |
| <b>Comm object</b>   | 8383            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard        |                             |            |
| <b>Setpoint visibility</b>   | Always          |                             |            |
| <b>Description</b>   |                 |                             |            |
| Delay for <b>Battery Undervoltage (page 301)</b> and <b>Battery Overvoltage (page 301)</b> protection. |                 |                             |            |

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## Battery Charger Fail Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                     | Engine settings                                 | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                      | 0 .. 15 [min]                                   |                             |            |
| <b>Default value</b>                      | 5 min   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                               | 1 min   |                             |            |
| <b>Comm object</b>                        | 11374   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                       | Advanced  |                             |            |
| <b>Setpoint visibility</b>                | Conditioned with LBI BATTERY CHARGER (PAGE 616) |                             |            |
| <b>Description</b>                        |   |                             |            |
| Delay for LBI BATTERY CHARGER (PAGE 616). |   |                             |            |

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## Subgroup: Maintenance

### Maintenance Timer 1

|  |                                  |                             |            |
|--|----------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings                  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | -10 000 ... 9 999 [h] / Disabled |                             |            |
| <b>Default value</b>   | 1 000 h                          | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 h                              |                             |            |
| <b>Comm object</b>   | 10528                            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                         |                             |            |
| <b>Setpoint visibility</b>   | Always                           |                             |            |
| <b>Description</b>   |                                  |                             |            |
| Maintenance timer 1 counts down when engine is running. If reaches zero, an alarm appears, but the timer still counting down into negative values. When the value 10000 is set, than the Maintenance function is disabled and counter does not count. Counter value disappear from controllers statistics. |                                  |                             |            |

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## Maintenance Timer 2

|  |                                  |                             |            |
|--|----------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings                  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | -10 000 ... 9 999 [h] / Disabled |                             |            |
| <b>Default value</b>   | 1 000 h                          | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 h                              |                             |            |
| <b>Comm object</b>   | 10529                            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                         |                             |            |
| <b>Setpoint visibility</b>   | Always                           |                             |            |
| <b>Description</b>   |                                  |                             |            |
| Maintenance timer 2 counts down when engine is running. If reaches zero, an alarm appears, but the timer still counting down into negative values. When the value 10000 is set, than the Maintenance function is disabled and counter does not count. Counter value disappear from controllers statistics. |                                  |                             |            |

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## Maintenance Timer 3

|  |                                  |                             |            |
|--|----------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Engine settings                  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | -10 000 ... 9 999 [h] / Disabled |                             |            |
| <b>Default value</b>   | 1 000 h                          | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 h                              |                             |            |
| <b>Comm object</b>   | 10530                            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                         |                             |            |
| <b>Setpoint visibility</b>   | Always                           |                             |            |
| <b>Description</b>   |                                  |                             |            |
| Maintenance timer 3 counts down when engine is running. If reaches zero, an alarm appears, but the timer still counting down into negative values. When the value 10000 is set, than the Maintenance function is disabled and counter does not count. Counter value disappear from controllers statistics. |                                  |                             |            |

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## Group: Generator settingsMains Settings

### Subgroup: Overload Protection

#### Overload BOC

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Generator settings                        | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | <b>Overload Wrn (page 304) .. 200 [%]</b> |                             |            |
| <b>Default value</b>  | 120 %                                     | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 % of <b>Nominal Power (page 242)</b>    |                             |            |
| <b>Comm object</b>  | 8280                                      | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                                  |                             |            |
| <b>Setpoint visibility</b>  | Always                                    |                             |            |
| <b>Description</b>  |   |                             |            |
| Threshold level for generator overload (in % of Nominal power) protection. Protection is BOC (Breaker Open and gen-set Cooldown). |   |                             |            |
| <i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i>  |   |                             |            |

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#### Overload Wrn

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Generator settings                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. <b>Overload BOC (page 304) [%]</b> |                             |            |
| <b>Default value</b>   | 120 %                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 % of <b>Nominal Power (page 242)</b>  |                             |            |
| <b>Comm object</b>   | 9685                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                                |                             |            |
| <b>Setpoint visibility</b>   | Always                                  |                             |            |
| <b>Description</b>   |   |                             |            |
| Threshold level for generator overload (in % of Nominal power) protection. This is only warning. |   |                             |            |

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#### Overload Delay

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Generator settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 600,0 [s]   |                             |            |
| <b>Default value</b>   | 5,0 s              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 s              |                             |            |
| <b>Comm object</b>   | 8281               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard           |                             |            |
| <b>Setpoint visibility</b>   | Always             |                             |            |
| <b>Description</b>   |                    |                             |            |
| Delay for <b>Overload BOC (page 304)Overload BOC (page 304)</b> and <b>Overload Wrn (page 304)</b> protection. |                    |                             |            |

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## Subgroup: Underload Protection

### Minimal Power PTM

|  |                                 |                      |            |
|--|---------------------------------|----------------------|------------|
| Setpoint group   | Generator settings              | Related FW           | 1.0.0      |
| Range [units]  | 0 .. 100 [%]                    |                      |            |
| Default value  | 5 %                             | Alternative config   | NO         |
| Step   | 1 % of Nominal Power (page 242) |                      |            |
| Comm object  | 9241                            | Related applications | MINT, SPtM |
| Config level   | Standard                        |                      |            |
| Setpoint visibility  | Always                          |                      |            |
| <b>Description</b>   |                                 |                      |            |
| Minimal power of the gen-set. Value of this setpoint is used in Load Control PTM (page 230). |                                 |                      |            |

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## Subgroup: Current Protection

### Short Circuit BOC

|  |                                   |                      |            |
|--|-----------------------------------|----------------------|------------|
| Setpoint group   | Generator settings                | Related FW           | 1.0.0      |
| Range [units]  | 100 .. 500 [%]                    |                      |            |
| Default value  | 250 %                             | Alternative config   | NO         |
| Step   | 1 % of Nominal Current (page 243) |                      |            |
| Comm object  | 8282                              | Related applications | MINT, SPtM |
| Config level   | Standard                          |                      |            |
| Setpoint visibility  | Always                            |                      |            |
| <b>Description</b>   |                                   |                      |            |
| BOC occurs when generator current reaches this preset threshold.                         |                                   |                      |            |
| <i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i> |                                   |                      |            |

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### Short Circuit BOC MPR Delay

|  |                    |                      |            |
|--|--------------------|----------------------|------------|
| Setpoint group                                     | Generator settings | Related FW           | 1.0.0      |
| Range [units]                                      | 0,00 .. 10,00 [s]  |                      |            |
| Default value                                      | 0,04 s             | Alternative config   | YES        |
| Step   | 0,01 s             |                      |            |
| Comm object  | 9991               | Related applications | MINT, SPtM |
| Config level                                       | Advanced           |                      |            |
| Setpoint visibility                                | Always             |                      |            |
| <b>Description</b>                                 |                    |                      |            |
| Delay for Short Circuit BOC (page 305) protection. |                    |                      |            |

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## IDMT Overcurrent Delay

|                            |                    |                             |            |
|----------------------------|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Generator settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | 1,0 .. 600,0 [s]   |                             |            |
| <b>Default value</b>       | 4,0 s              | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 0,1 s              |                             |            |
| <b>Comm object</b>         | 8283               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard           |                             |            |
| <b>Setpoint visibility</b> | Always             |                             |            |

### Description

IDMT curve shape selection. IDMT Overcurrent Delay is a reaction time of IDMT protection for 200% overcurrent  $I_{gen} = 2 \cdot \text{Nominal Current}$  (page 243)

IDMT is “very inverse” over current protection. Reaction time is not constant but depends on over current level according to the following formula:

$$\text{Reaction time} = \frac{\text{Overcurrent IDMT Delay} * \text{Nominal Current}}{I_{gen} * \text{Nominal Current}}$$

**Note:** Reaction time is limited to 3600 s = 60 minutes. IDMT protection is not active for Reaction time values longer than 60 minutes.

$I_{gen}$  is maximal value of all measured phases of generator Mains current.

Table 9.1 EXAMPLE of Reaction time for different over current levels

|               | Overcurrent IDMT Delay | Overcurrent |        |       |
|---------------|------------------------|-------------|--------|-------|
|               |                        | ≤ 100 %     | 101 %  | 110 % |
| Reaction time | 0,2 s                  | No action   | 20 s   | 2 s   |
|               | 2 s                    | No action   | 200 s  | 20 s  |
|               | 20 s                   | No action   | 2000 s | 200 s |

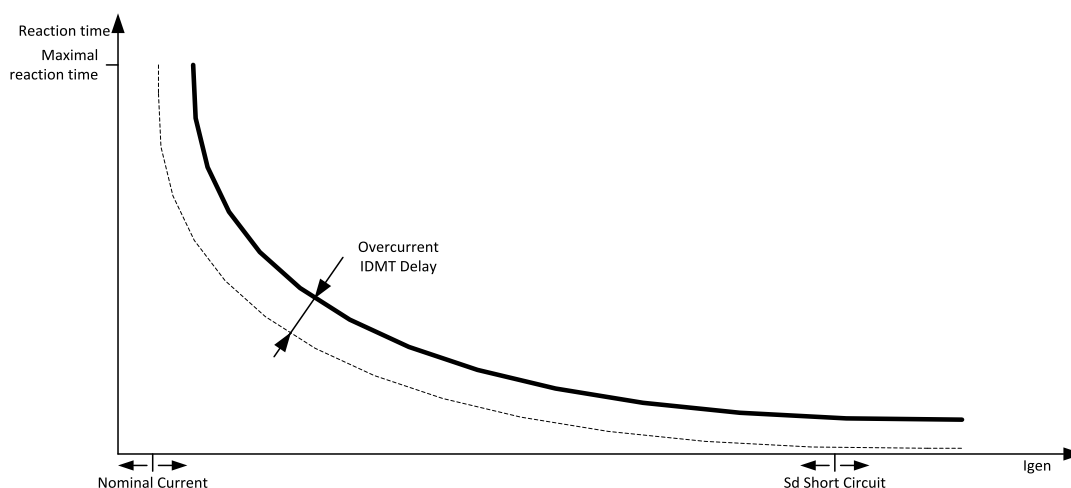


Image 9.21 IDMT Overcurrent Delay

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## Current Unbalance BOC

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Generator settings                                     | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 200 [%] of Nominal Current (page 243)             |                             |            |
| <b>Default value</b>  | 50 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 % of Nominal Current (page 243)                      |                             |            |
| <b>Comm object</b>  | 8284   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced   |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint Connection type (page 244) |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold for generator current asymmetry (unbalance).<br>Protection is BOC (Breaker Open and genset Cooldown). |  |                             |            |
| <i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i>                        |  |                             |            |

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## Current Unbalance BOC Delay

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                                  | Generator settings                                     | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                   | 0,0 .. 600,0 [s]                                       |                             |            |
| <b>Default value</b>                                   | 5,0 s  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 s  |                             |            |
| <b>Comm object</b>                                     | 8285   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                    | Advanced   |                             |            |
| <b>Setpoint visibility</b>                             | Conditioned by the setpoint Connection type (page 244) |                             |            |
| <b>Description</b>                                     |  |                             |            |
| Delay for Current Unbalance BOC (page 307) protection. |  |                             |            |

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## Subgroup: Voltage Protection

### Generator Overvoltage Sd

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Generator settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Generator Overvoltage Wrn (page 308) .. 200 [%]                            |                             |            |
| <b>Default value</b>  | 110 %  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 % of Nominal Voltage Ph-N (page 246) or Nominal Voltage Ph-Ph (page 246) |                             |            |
| <b>Comm object</b>  | 8291   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Always   |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold for generator overvoltage protection. All three phases are checked. Maximum out of three is used. |  |                             |            |
| <i>Note: Phase to phase and phase to neutral voltages are used for this protection.</i>                     |  |                             |            |

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## Generator Overvoltage Wrn

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Generator settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Generator Undervoltage Wrn (page 309) .. Generator Overvoltage Sd (page 307) [%] |                             |            |
| <b>Default value</b>  | 110 %  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 % of Nominal Voltage Ph-N (page 246) or Nominal Voltage Ph-Ph (page 246)       |                             |            |
| <b>Comm object</b>  | 9686   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Always   |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold for generator overvoltage protection. All three phases are checked. Maximum out of three is used. |  |                             |            |
| <i>Note: Phase to phase and phase to neutral voltages are used for this protection.</i>                     |  |                             |            |

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## Generator Undervoltage BOC

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Generator settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. Generator Undervoltage Wrn (page 309) [%]                             |                             |            |
| <b>Default value</b>   | 70 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 % of Nominal Voltage Ph-N (page 246) or Nominal Voltage Ph-Ph (page 246) |                             |            |
| <b>Comm object</b>   | 8293   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Always   |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold for generator undervoltage protection. All three phases are checked. Minimum out of three is used. |  |                             |            |
| <i>Note: Phase to phase and phase to neutral voltages are used for this protection.</i>                      |  |                             |            |
| <i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i>                     |  |                             |            |

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## Generator Undervoltage Wrn

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Generator settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | <b>Generator Undervoltage BOC (page 308) .. Generator Overvoltage Wrn (page 308) [%]</b> |                             |            |
| <b>Default value</b>   | 70 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 % of <b>Nominal Voltage Ph-N (page 246)</b> or <b>Nominal Voltage Ph-Ph (page 246)</b> |                             |            |
| <b>Comm object</b>   | 9687   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Always   |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold for generator undervoltage protection. All three phases are checked. Minimum out of three is used. |  |                             |            |
| <i>Note: Phase to phase and phase to neutral voltages are used for this protection.</i>                      |  |                             |            |

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## Generator <> Voltage Delay

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Generator settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 600,0 [s]   |                             |            |
| <b>Default value</b>   | 3,0 s              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 s              |                             |            |
| <b>Comm object</b>   | 9103               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard           |                             |            |
| <b>Setpoint visibility</b>   | Always             |                             |            |
| <b>Description</b>   |                    |                             |            |
| Delay for <b>Generator Overvoltage Sd (page 307)</b> , <b>Generator Overvoltage Wrn (page 308)</b> , <b>Generator Undervoltage BOC (page 308)</b> and <b>Generator Undervoltage Wrn (page 309)</b> protection. |                    |                             |            |

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## Voltage Unbalance BOC

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Generator settingsBus Settings                                | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 1 .. 200 [%] of <b>Nominal Voltage Ph-Ph (page 246)</b>       |                             |            |
| <b>Default value</b>   | 10 %  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 % of <b>Nominal Voltage Ph-Ph (page 246)</b>                |                             |            |
| <b>Comm object</b>   | 8288  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Connection type (page 244)</b> |                             |            |
| <b>Description</b>   |   |                             |            |
| Threshold for generator voltage unbalance alarm.   |   |                             |            |
| <i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i> |   |                             |            |

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## Bus Voltage Unbalance BOC Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Generator settingsBus Settings                                | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0,0 .. 600,0 [s]  |                             |            |
| <b>Default value</b>  | 3,0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,1 s   |                             |            |
| <b>Comm object</b>  | 8289  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced  |                             |            |
| <b>Setpoint visibility</b>                                    | Conditioned by the setpoint <b>Connection type (page 244)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>Voltage Unbalance BOC (page 309)</b> protection. |   |                             |            |

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### Subgroup: Frequency Protection

## Generator Overfrequency BOC

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Generator settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | <b>Generator Overfrequency Wrn (page 310) .. 200,0 [%]</b> |                             |            |
| <b>Default value</b>   | 110,0 %  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 % of <b>Nominal Frequency (page 247)</b>               |                             |            |
| <b>Comm object</b>   | 8296   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Always   |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold for generator phase L1 overfrequency.  |  |                             |            |
| <i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i> |  |                             |            |

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## Generator Overfrequency Wrn

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>                           | Generator settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                            | <b>Generator Underfrequency Wrn (page 311) .. Generator Overfrequency BOC (page 310) [%]</b> |                             |            |
| <b>Default value</b>                            | 110,0 %  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                     | 0,1 % of <b>Nominal Frequency (page 247)</b>   |                             |            |
| <b>Comm object</b>                              | 9688   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                             | Standard   |                             |            |
| <b>Setpoint visibility</b>                      | Always   |                             |            |
| <b>Description</b>                              |  |                             |            |
| Threshold for generator phase L1 overfrequency. |  |                             |            |

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## Generator Underfrequency BOC

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Generator settings                                 | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. Generator Underfrequency Wrn (page 311) [%] |                             |            |
| <b>Default value</b>   | 85,0 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 % of Nominal Frequency (page 247)              |                             |            |
| <b>Comm object</b>   | 8298   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Always   |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold for generator phase L1 underfrequency.   |  |                             |            |
| <i>Note: When there is no control of breakers, the type of protection is Sd not BOC.</i> |  |                             |            |

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## Generator Underfrequency Wrn

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>                            | Generator settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                             | Generator Underfrequency BOC (page 311) .. Generator Overfrequency Wrn (page 310) [%] |                             |            |
| <b>Default value</b>                             | 85,0 %  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                      | 0,1 % of Nominal Frequency (page 247)   |                             |            |
| <b>Comm object</b>                               | 9689  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                              | Standard  |                             |            |
| <b>Setpoint visibility</b>                       | Always  |                             |            |
| <b>Description</b>                               |   |                             |            |
| Threshold for generator phase L1 underfrequency. |   |                             |            |

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## Generator <> Frequency Delay

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Generator settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0,0 .. 600,0 [s]   |                             |            |
| <b>Default value</b>  | 3,0 s              | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,1 s              |                             |            |
| <b>Comm object</b>  | 8297               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard           |                             |            |
| <b>Setpoint visibility</b>  | Always             |                             |            |
| <b>Description</b>  |                    |                             |            |
| Delay for Generator Overfrequency BOC (page 310), Generator Overfrequency Wrn (page 310), Generator Underfrequency Wrn (page 311) and Generator Underfrequency BOC (page 311) protection. |                    |                             |            |

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## Subgroup: Reverse Power Protection

### Reverse Power Level

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                                    | Generator settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                     | 0 .. 50 [%]  |                             |            |
| <b>Default value</b>                                     | 10 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 % of Nominal Power (page 242)                                  |                             |            |
| <b>Comm object</b>                                       | 8486   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                      | Standard   |                             |            |
| <b>Setpoint visibility</b>                               | Conditioned by the setpoint Reverse Power Protection (page 317). |                             |            |
| <b>Description</b>                                       |  |                             |            |
| Level for generator Reverse Power Protection (page 317). |  |                             |            |

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### Reverse Power Delay

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                                    | Generator settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                     | 0,0 .. 600 [s]   |                             |            |
| <b>Default value</b>                                     | 5,0 s  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 s  |                             |            |
| <b>Comm object</b>                                       | 8552   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                      | Standard   |                             |            |
| <b>Setpoint visibility</b>                               | Conditioned by the setpoint Reverse Power Protection (page 317). |                             |            |
| <b>Description</b>                                       |  |                             |            |
| Delay for generator Reverse Power Protection (page 317). |  |                             |            |

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## Subgroup: Excitation Loss Protection

### Excitation Loss Level

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                                      | Generator settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                       | 0 .. 150 [%]   |                             |            |
| <b>Default value</b>                                       | 30 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 % of Nominal Power (page 242)                                    |                             |            |
| <b>Comm object</b>   | 12486  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>                                 | Conditioned by the setpoint Excitation Loss Protection (page 318). |                             |            |
| <b>Description</b>   |  |                             |            |
| Level for generator Excitation Loss Protection (page 318). |  |                             |            |

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## Excitation Loss Delay

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Generator settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 600,0 [s]   |                             |            |
| <b>Default value</b>   | 5,0 s  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 s  |                             |            |
| <b>Comm object</b>   | 12487  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Excitation Loss Protection (page 318)</b> . |                             |            |
| <b>Description</b>   |  |                             |            |
| Delay for generator <b>Excitation Loss Protection (page 318)</b> . |  |                             |            |

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## Group: Protections

### Subgroup: Overload Protection

#### Overload Protection

|   |  |                             |            |          |  |           |                         |             |  |
|---|--|-----------------------------|------------|----------|--|-----------|-------------------------|-------------|--|
| <b>Setpoint group</b>   | Protections  | <b>Related FW</b>           | 1.0.0      |          |  |           |                         |             |  |
| <b>Range [units]</b>  | Enabled/Disabled/ExtDisable [-]  |                             |            |          |  |           |                         |             |  |
| <b>Default value</b>  | Enabled  | <b>Alternative config</b>   | NO         |          |  |           |                         |             |  |
| <b>Step</b>   | [-]  |                             |            |          |  |           |                         |             |  |
| <b>Comm object</b>  | 15664  | <b>Related applications</b> | MINT, SPtM |          |  |           |                         |             |  |
| <b>Config level</b>   | Advanced   |                             |            |          |  |           |                         |             |  |
| <b>Setpoint visibility</b>  | Always   |                             |            |          |  |           |                         |             |  |
| <b>Description</b>  |  |                             |            |          |  |           |                         |             |  |
| This setpoint adjusts the behavior of generator Overload protection.  |  |                             |            |          |  |           |                         |             |  |
| <table border="1"> <tr> <td>Enabled:</td> <td>Protection is enabled. Behavior of protection is adjusted via setpoints <b>Overload BOC (page 304)</b>, <b>Overload Wrn (page 304)</b> and <b>Overload Delay (page 304)</b>.</td> </tr> <tr> <td>Disabled:</td> <td>Protection is disabled.</td> </tr> <tr> <td>ExtDisable:</td> <td>Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b></td> </tr> </table> |  |                             |            | Enabled: | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Overload BOC (page 304)</b> , <b>Overload Wrn (page 304)</b> and <b>Overload Delay (page 304)</b> . | Disabled: | Protection is disabled. | ExtDisable: | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b> |
| Enabled:  | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Overload BOC (page 304)</b> , <b>Overload Wrn (page 304)</b> and <b>Overload Delay (page 304)</b> . |                             |            |          |  |           |                         |             |  |
| Disabled:   | Protection is disabled.  |                             |            |          |  |           |                         |             |  |
| ExtDisable:   | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b>   |                             |            |          |  |           |                         |             |  |

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## Subgroup: Current Protection

### IDMT Overcurrent Protection

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Protections   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Enabled / Disabled / ExtDisable[-]  |                             |            |
| <b>Default value</b>   | Enabled   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]   |                             |            |
| <b>Comm object</b>   | 15666   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced  |                             |            |
| <b>Setpoint visibility</b>   | Always  |                             |            |
| <b>Description</b>   |   |                             |            |
| This setpoint adjusts the behavior of generator IDMT Overcurrent protection. |   |                             |            |
| Enabled:   | Protection is enabled. Behavior of protection is adjusted via setpoint <b>IDMT Overcurrent Delay (page 306)</b> . |                             |            |
| Disabled:  | Protection is disabled.   |                             |            |
| ExtDisable:  | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b>                  |                             |            |

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### Current Unbalance Protection

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Protections   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Enabled / Disabled / ExtDisable[-]  |                             |            |
| <b>Default value</b>  | Enabled   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 15667   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced  |                             |            |
| <b>Setpoint visibility</b>  | Always  |                             |            |
| <b>Description</b>  |   |                             |            |
| This setpoint adjusts the behavior of generator Current Unbalance protection. |   |                             |            |
| Enabled:  | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Current Unbalance BOC (page 307)</b> and <b>Current Unbalance BOC Delay (page 307)</b> . |                             |            |
| Disabled:   | Protection is disabled.   |                             |            |
| ExtDisable:   | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b>  |                             |            |

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## Subgroup: Voltage Protection

### Generator <> Voltage Protection

|  |   |                             |            |          |   |           |                         |             |  |
|--|---|-----------------------------|------------|----------|---|-----------|-------------------------|-------------|--|
| <b>Setpoint group</b>  | Protections   | <b>Related FW</b>           | 1.0.0      |          |   |           |                         |             |  |
| <b>Range [units]</b>   | Enabled / Disabled / ExtDisable [-]   |                             |            |          |   |           |                         |             |  |
| <b>Default value</b>   | Enabled   | <b>Alternative config</b>   | NO         |          |   |           |                         |             |  |
| <b>Step</b>  | [-]   |                             |            |          |   |           |                         |             |  |
| <b>Comm object</b>   | 15668   | <b>Related applications</b> | MINT, SPtM |          |   |           |                         |             |  |
| <b>Config level</b>  | Advanced  |                             |            |          |   |           |                         |             |  |
| <b>Setpoint visibility</b>   | Always  |                             |            |          |   |           |                         |             |  |
| <b>Description</b>   |   |                             |            |          |   |           |                         |             |  |
| This setpoint adjusts the behavior of generator Generator <> Voltage protection. GCB closing is blocked, if the protection is disabled!  |   |                             |            |          |   |           |                         |             |  |
| <table border="1"> <tr> <td>Enabled:</td> <td>Protection is enabled. Behavior of protection is adjusted via setpoints <b>Generator Overvoltage Sd (page 307)</b>, <b>Generator Overvoltage Wrn (page 308)</b>, <b>Generator Undervoltage BOC (page 308)</b>, <b>Generator Undervoltage Wrn (page 309)</b> and <b>Generator &lt;&gt; Voltage Delay (page 309)</b>.</td> </tr> <tr> <td>Disabled:</td> <td>Protection is disabled.</td> </tr> <tr> <td>ExtDisable:</td> <td>Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b></td> </tr> </table> |   |                             |            | Enabled: | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Generator Overvoltage Sd (page 307)</b> , <b>Generator Overvoltage Wrn (page 308)</b> , <b>Generator Undervoltage BOC (page 308)</b> , <b>Generator Undervoltage Wrn (page 309)</b> and <b>Generator &lt;&gt; Voltage Delay (page 309)</b> . | Disabled: | Protection is disabled. | ExtDisable: | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b> |
| Enabled:   | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Generator Overvoltage Sd (page 307)</b> , <b>Generator Overvoltage Wrn (page 308)</b> , <b>Generator Undervoltage BOC (page 308)</b> , <b>Generator Undervoltage Wrn (page 309)</b> and <b>Generator &lt;&gt; Voltage Delay (page 309)</b> . |                             |            |          |   |           |                         |             |  |
| Disabled:  | Protection is disabled.   |                             |            |          |   |           |                         |             |  |
| ExtDisable:  | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b>  |                             |            |          |   |           |                         |             |  |
| GCB closing, generator voltage regulation and synchronization are disabled (blocked), if the parameter is set to Disabled. It is blocked as well, if the parameter is set to ExtDisable and <b>LB IFORCE PROTECTION DISABLE (PAGE 666)</b> is active.  |   |                             |            |          |   |           |                         |             |  |

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### Voltage Unbalance Protection

|   |   |                             |            |          |   |           |                         |             |  |
|---|---|-----------------------------|------------|----------|---|-----------|-------------------------|-------------|--|
| <b>Setpoint group</b>   | Protections   | <b>Related FW</b>           | 1.0.0      |          |   |           |                         |             |  |
| <b>Range [units]</b>  | Enabled / Disabled / ExtDisable [-]   |                             |            |          |   |           |                         |             |  |
| <b>Default value</b>  | Enabled   | <b>Alternative config</b>   | NO         |          |   |           |                         |             |  |
| <b>Step</b>   | [-]   |                             |            |          |   |           |                         |             |  |
| <b>Comm object</b>  | 15669   | <b>Related applications</b> | MINT, SPtM |          |   |           |                         |             |  |
| <b>Config level</b>   | Advanced  |                             |            |          |   |           |                         |             |  |
| <b>Setpoint visibility</b>  | Always  |                             |            |          |   |           |                         |             |  |
| <b>Description</b>  |   |                             |            |          |   |           |                         |             |  |
| This setpoint adjusts the behavior of generator Voltage Unbalance protection.   |   |                             |            |          |   |           |                         |             |  |
| <table border="1"> <tr> <td>Enabled:</td> <td>Protection is enabled. Behavior of protection is adjusted via setpoints <b>Voltage Unbalance BOC (page 309)</b> and <b>Bus Voltage Unbalance BOC Delay (page 310)</b>.</td> </tr> <tr> <td>Disabled:</td> <td>Protection is disabled.</td> </tr> <tr> <td>ExtDisable:</td> <td>Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b></td> </tr> </table> |   |                             |            | Enabled: | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Voltage Unbalance BOC (page 309)</b> and <b>Bus Voltage Unbalance BOC Delay (page 310)</b> . | Disabled: | Protection is disabled. | ExtDisable: | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b> |
| Enabled:  | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Voltage Unbalance BOC (page 309)</b> and <b>Bus Voltage Unbalance BOC Delay (page 310)</b> . |                             |            |          |   |           |                         |             |  |
| Disabled:   | Protection is disabled.   |                             |            |          |   |           |                         |             |  |
| ExtDisable:   | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b>  |                             |            |          |   |           |                         |             |  |

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## Subgroup: Frequency Protection

### Generator Frequency Protection

|                            |                                     |                             |            |
|----------------------------|-------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Protections                         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Enabled / Disabled / ExtDisable [-] |                             |            |
| <b>Default value</b>       | Enabled                             | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | [-]                                 |                             |            |
| <b>Comm object</b>         | 15670                               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced                            |                             |            |
| <b>Setpoint visibility</b> | Always                              |                             |            |

#### Description

This setpoint adjusts the behavior of generator Generator Frequency protection. GCB closing is blocked, if the protection is disabled!.

|             |  |
|-------------|--|
| Enabled:    | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Generator Overfrequency BOC (page 310)</b> , <b>Generator Overfrequency Wrn (page 310)</b> , <b>Generator Underfrequency BOC (page 311)</b> , <b>Generator Underfrequency Wrn (page 311)</b> , and <b>Generator &lt;&gt; Frequency Delay (page 311)</b> . |
| Disabled:   | Protection is disabled.  |
| ExtDisable: | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b>   |

GCB closing, generator frequency regulation and synchronization are disabled (blocked), if the parameter is set to Disabled. It is blocked as well, if the parameter is set to ExtDisable and **LBI FORCE PROTECTION DISABLE (PAGE 666)** is active.

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## Subgroup: Reverse Power Protection

### Reverse Power Protection

|  |   |                             |            |          |   |           |                         |             |   |
|--|---|-----------------------------|------------|----------|---|-----------|-------------------------|-------------|---|
| <b>Setpoint group</b>  | Protections   | <b>Related FW</b>           | 1.0.0      |          |   |           |                         |             |   |
| <b>Range [units]</b>   | Enabled / Disabled / ExtDisable [-]   |                             |            |          |   |           |                         |             |   |
| <b>Default value</b>   | Enabled   | <b>Alternative config</b>   | NO         |          |   |           |                         |             |   |
| <b>Step</b>  | [-]   |                             |            |          |   |           |                         |             |   |
| <b>Comm object</b>   | 13230   | <b>Related applications</b> | MINT, SPtM |          |   |           |                         |             |   |
| <b>Config level</b>  | Standard  |                             |            |          |   |           |                         |             |   |
| <b>Setpoint visibility</b>   | Always  |                             |            |          |   |           |                         |             |   |
| <b>Description</b>   |   |                             |            |          |   |           |                         |             |   |
| <p>The protection of the generator against the reverse (negative) active power. Protection gets active when the level of active power [kW] gets under limit given by setpoint <b>Reverse Power Level (page 312)</b> for time longer than the value of setpoint <b>Reverse Power Delay (page 312)</b>.</p> <p>This setpoint adjusts behavior of generator Reverse power protection.</p>                                   |   |                             |            |          |   |           |                         |             |   |
| <table border="1"> <tr> <td>Enabled:</td> <td>Protection is enabled. Behavior of protection is adjusted via setpoints <b>Reverse Power Level (page 312)</b>, <b>Reverse Power Delay (page 312)</b></td> </tr> <tr> <td>Disabled:</td> <td>Protection is disabled.</td> </tr> <tr> <td>ExtDisable:</td> <td>Protection is enabled or disabled by the state of LBI FORCE PROTECTION DISABLE (PAGE 666)</td> </tr> </table> |   |                             |            | Enabled: | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Reverse Power Level (page 312)</b> , <b>Reverse Power Delay (page 312)</b> | Disabled: | Protection is disabled. | ExtDisable: | Protection is enabled or disabled by the state of LBI FORCE PROTECTION DISABLE (PAGE 666) |
| Enabled:   | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Reverse Power Level (page 312)</b> , <b>Reverse Power Delay (page 312)</b> |                             |            |          |   |           |                         |             |   |
| Disabled:  | Protection is disabled.   |                             |            |          |   |           |                         |             |   |
| ExtDisable:  | Protection is enabled or disabled by the state of LBI FORCE PROTECTION DISABLE (PAGE 666)   |                             |            |          |   |           |                         |             |   |

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## Subgroup: Excitation Loss Protection

### Excitation Loss Protection

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Protections   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Enabled / Disabled / ExtDisable [-]   |                             |            |
| <b>Default value</b>  | Disabled  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 13269   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Always  |                             |            |
| <b>Description</b>  |   |                             |            |
| The protection protect the generator against negative value of reactive power. Protection gets active when the level of reactive power [kVAr] gets under limit given by setpoint <b>Excitation Loss Level (page 312)</b> for time longer than the value of setpoint <b>Excitation Loss Delay (page 313)</b> . |   |                             |            |
| Enabled:  | Protection is enabled. Behavior of protection is adjusted via setpoints <b>Excitation Loss Level (page 312)</b> , <b>Excitation Loss Delay (page 313)</b> |                             |            |
| Disabled:   | Protection is disabled.   |                             |            |
| ExtDisable:   | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b>  |                             |            |

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## Subgroup: Speed Protection

### Underspeed Protection

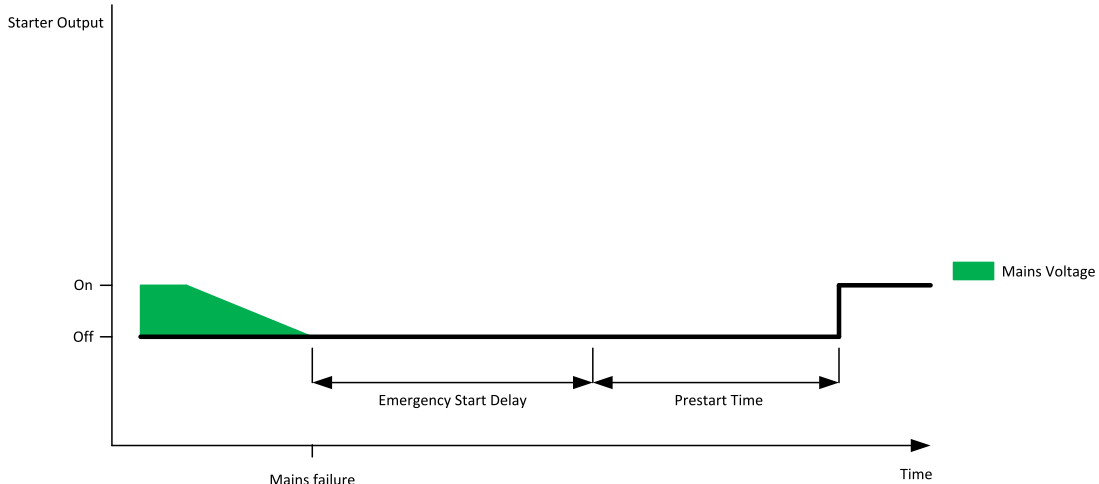
|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Protections  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Enabled / Disabled / ExtDisable [-]  |                             |            |
| <b>Default value</b>   | Enabled  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 15671  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced   |                             |            |
| <b>Setpoint visibility</b>   | Always   |                             |            |
| <b>Description</b>   |  |                             |            |
| This setpoint adjusts the behavior of generator Underspeed protection. |  |                             |            |
| Enabled:   | Protection is enabled.   |                             |            |
| Disabled:  | Protection is disabled.  |                             |            |
| ExtDisable:  | Protection is enabled or disabled by the state of <b>LBI FORCE PROTECTION DISABLE (PAGE 666)</b> |                             |            |

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## Group: Mains settings

### Subgroup: AMF Timers

#### Emergency Start Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 6 000 [s]  |                             |            |
| <b>Default value</b>  | 5 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 8301  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Application Mode Select (page 229)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay after the mains failure to the start command of the gen-set.                  |   |                             |            |
|  |   |                             |            |
| Image 9.22 Emergency Start Delay  |   |                             |            |

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#### Mains Return Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 3 600 [s]  |                             |            |
| <b>Default value</b>  | 20 s  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 8302  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Application Mode Select (page 229)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| This setpoint adjust the delay, how long mains has to be returned after mains fail to start load transfer to mains. |   |                             |            |

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## MCB Close Delay

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 600,0 [s]  |                             |            |
| <b>Default value</b>   | 1,0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 s   |                             |            |
| <b>Comm object</b>   | 8389  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Application Mode Select (page 229)</b> |                             |            |
| <b>Description</b>   |   |                             |            |
| Delay after mains returns to MCB closing, if the gen-set is not running(e.g. is in start-up procedure) |   |                             |            |

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## AMF Start

|   |                               |                             |       |
|---|-------------------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Process ControlMains settings | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | ENABLED / DISABLED [-]        |                             |       |
| <b>Default value</b>  | ENABLED                       | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | [-]                           |                             |       |
| <b>Comm object</b>  | 9238                          | <b>Related applications</b> | SPtM  |
| <b>Config level</b>   | Standard                      |                             |       |
| <b>Setpoint visibility</b>  | Always                        |                             |       |
| <b>Description</b>  |                               |                             |       |
| Use this setpoint to enable or disable the <b>AMF operation (page 77)</b> . |                               |                             |       |

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## Subgroup: Mains Voltage Limits

### Mains Overvoltage

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | <b>Mains Undervoltage (page 321) .. 150 [%]</b>                       |                             |            |
| <b>Default value</b>   | 110 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 % of <b>Nominal Voltage Ph-Ph (page 246)</b>                        |                             |            |
| <b>Comm object</b>   | 8305  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Application Mode Select (page 229)</b> |                             |            |
| <b>Description</b>   |   |                             |            |
| Threshold for mains overvoltage. All three phases are checked. Maximum out of three is used. |   |                             |            |

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## Mains Undervoltage

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Mains settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 50 .. Mains Overvoltage (page 320) [%]                         |                             |            |
| <b>Default value</b>   | 60 %   | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 % of Nominal Voltage Ph-Ph (page 246)                        |                             |            |
| <b>Comm object</b>   | 8307   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint Application Mode Select (page 229) |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold for mains undervoltage. All three phases are checked. Minimum voltage out of three phases is used. |  |                             |            |

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## Mains <> Voltage Delay

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Mains settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 600,0 [s]   |                             |            |
| <b>Default value</b>   | 2,0 s  | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 0,1 s  |                             |            |
| <b>Comm object</b>   | 8306   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint Application Mode Select (page 229) |                             |            |
| <b>Description</b>   |  |                             |            |
| Delay for Mains Undervoltage (page 321) and Mains Overvoltage (page 320) protection. |  |                             |            |

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## Mains Voltage Unbalance

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                  | Mains settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                   | 1 .. 150 [%] of Nominal Voltage Ph-Ph (page 246)               |                             |            |
| <b>Default value</b>                   | 10 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                            | 1 % of Nominal Voltage Ph-Ph (page 246)                        |                             |            |
| <b>Comm object</b>                     | 8446   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                    | Advanced   |                             |            |
| <b>Setpoint visibility</b>             | Conditioned by the setpoint Application Mode Select (page 229) |                             |            |
| <b>Description</b>                     |  |                             |            |
| Threshold for mains voltage unbalance. |  |                             |            |

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## Mains Voltage Unbalance Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0,0 .. 600,0 [s]  |                             |            |
| <b>Default value</b>  | 2,0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,1 s   |                             |            |
| <b>Comm object</b>  | 8447  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced  |                             |            |
| <b>Setpoint visibility</b>                                      | Conditioned by the setpoint <b>Application Mode Select (page 229)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>Mains Voltage Unbalance (page 321)</b> protection. |   |                             |            |

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### Subgroup: Mains Frequency Limits

## Mains Overfrequency

|                                    |   |                             |            |
|------------------------------------|---|-----------------------------|------------|
| <b>Setpoint group</b>              | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>               | <b>Mains Underfrequency (page 322) .. 150 [%]</b>                     |                             |            |
| <b>Default value</b>               | 102,0 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                        | 1,0 % of <b>Nominal Frequency (page 247)</b>                          |                             |            |
| <b>Comm object</b>                 | 8310  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                | Standard  |                             |            |
| <b>Setpoint visibility</b>         | Conditioned by the setpoint <b>Application Mode Select (page 229)</b> |                             |            |
| <b>Description</b>                 |   |                             |            |
| Threshold for mains overfrequency. |   |                             |            |

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## Mains Underfrequency

|                                     |   |                             |            |
|-------------------------------------|---|-----------------------------|------------|
| <b>Setpoint group</b>               | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                | 50 .. <b>Mains Overfrequency (page 322) [%]</b>                       |                             |            |
| <b>Default value</b>                | 98,0 %  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                         | 1,0 % of <b>Nominal Frequency (page 247)</b>                          |                             |            |
| <b>Comm object</b>                  | 8312  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                 | Standard  |                             |            |
| <b>Setpoint visibility</b>          | Conditioned by the setpoint <b>Application Mode Select (page 229)</b> |                             |            |
| <b>Description</b>                  |   |                             |            |
| Threshold for mains underfrequency. |   |                             |            |

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## Mains < > Frequency Delay

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 600,0 [s]  |                             |            |
| <b>Default value</b>   | 0,5 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 s   |                             |            |
| <b>Comm object</b>   | 8311  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Application Mode Select (page 229)</b> |                             |            |
| <b>Description</b>   |   |                             |            |
| Delay for <b>Mains Underfrequency (page 322)</b> and <b>Mains Overfrequency (page 322)</b> protection. |   |                             |            |

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### Subgroup: MCB Control

## MCB Logic

|                            |   |                             |            |
|----------------------------|---|-----------------------------|------------|
| <b>Setpoint group</b>      | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Close On / Close Off [-]  |                             |            |
| <b>Default value</b>       | Close Off   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | [-]   |                             |            |
| <b>Comm object</b>         | 8444  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced  |                             |            |
| <b>Setpoint visibility</b> | Conditioned by the setpoint <b>Application Mode Select (page 229)</b> |                             |            |

### Description

The set point influences the behavior of the output **MCB CLOSE/OPEN (PAGE 726)**.

Close On When the output **MCB CLOSE/OPEN (PAGE 726)** is closed – MCB should be closed.

Close Off When the output **MCB CLOSE/OPEN (PAGE 726)** is closed – MCB should be opened.

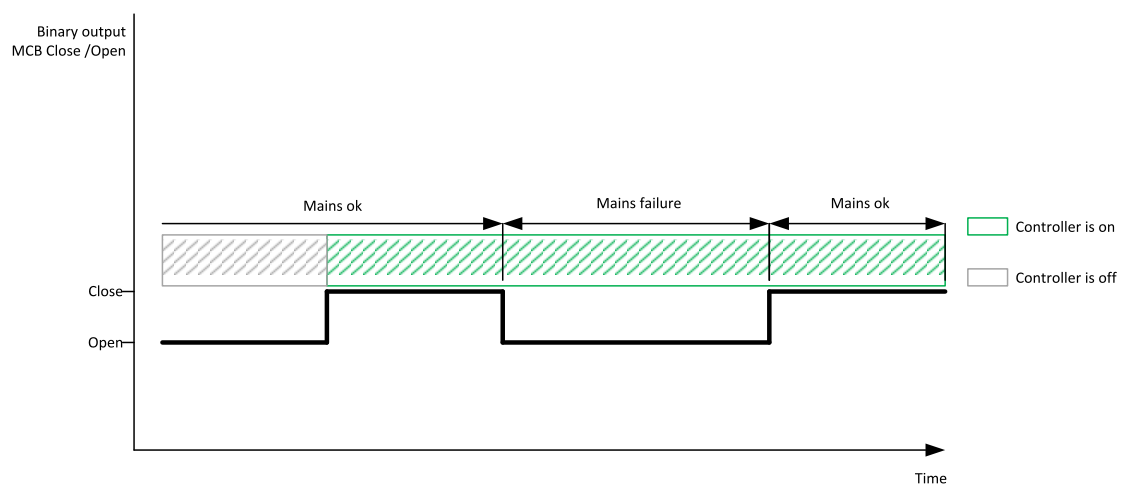


Image 9.23 MCB Logic 1

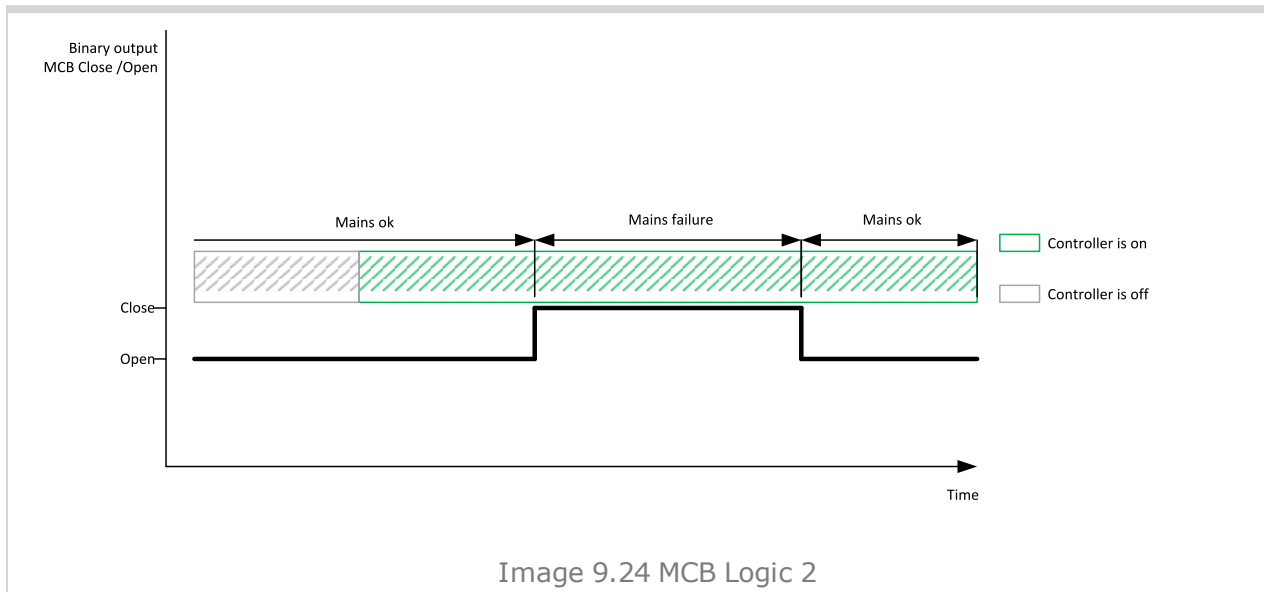


Image 9.24 MCB Logic 2

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### Subgroup: AMF Settings

#### Return From Island

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Manual / Auto [-]   |                             |            |
| <b>Default value</b>  | Auto  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 9590  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Application Mode Select (page 229)</b>   |                             |            |
| <b>Description</b>  |   |                             |            |
| Setpoint adjust the behavior of closing MCB when the mains returns. |   |                             |            |
| Manual  | When Return From Island = MANUAL and there is a Mains Fail, gen-set is started and take the load. After mains return the load have to manually transfer to mains. Also in Alarmlist will be displayed <b>Manual Restore (page 815)</b> alarm. |                             |            |
|   | <b>Note:</b> Select MANUAL in case you need to manually control the moment when the load is transferred back to the mains.  |                             |            |
| Auto  | No automatic mode change is performed.  |                             |            |

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## MCB Opens On

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Mains settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Mains Fail / Gen Run [-]  |                             |            |
| <b>Default value</b>  | Gen Run   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 9850  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Application Mode Select (page 229)</b>   |                             |            |
| <b>Description</b>  |   |                             |            |
| Setpoint adjust the behavior of opening MCB in AUTO mode when there is mains fail.                                      |   |                             |            |
| Mains Fail  | The command to open the MCB is given immediately after mains fail condition is evaluated.<br>If the mains will return into parameters after MCB was opened and before GCB is closed, timer <b>MCB Close Delay (page 320)</b> is applied before MCB closing. |                             |            |
| Gen Run   | MCB will be opened when engine will be running and it will be possible to transfer load from Mains to gen-set (after stabilisation phase).  |                             |            |
| <p><b>Note:</b> This option should be used for MCBs using 230V control and not equipped with the undervoltage coil.</p> |   |                             |            |

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## Subgroup: Mains Decoupling Protection

### Vector Shift Protection

|  |  |                             |       |          |  |               |  |         |  |
|--|--|-----------------------------|-------|----------|--|---------------|--|---------|--|
| <b>Setpoint group</b>  | Mains settings   | <b>Related FW</b>           | 1.0.0 |          |  |               |  |         |  |
| <b>Range [units]</b>   | Enabled / Parallel Only / Disabled [-]   |                             |       |          |  |               |  |         |  |
| <b>Default value</b>   | Disabled   | <b>Alternative config</b>   | NO    |          |  |               |  |         |  |
| <b>Step</b>  | [-]  |                             |       |          |  |               |  |         |  |
| <b>Comm object</b>   | 10551  | <b>Related applications</b> | SPtM  |          |  |               |  |         |  |
| <b>Config level</b>  | Standard   |                             |       |          |  |               |  |         |  |
| <b>Setpoint visibility</b>   | Always   |                             |       |          |  |               |  |         |  |
| <b>Description</b>   |  |                             |       |          |  |               |  |         |  |
| This setpoint selects the function of the built-in vector shift protection.  |  |                             |       |          |  |               |  |         |  |
| <table border="1"> <tr> <td>Disabled</td> <td>The vector shift protection is disabled.</td> </tr> <tr> <td>Parallel Only</td> <td>The vector shift protection is enabled only while the gen-set is running parallel to the mains, i.e. the both MCB and GCB MGCB are closed.</td> </tr> <tr> <td>Enabled</td> <td>The vector shift protection is active always while the MCB is closed, regardless of the GCB MGCB position.</td> </tr> </table> |  |                             |       | Disabled | The vector shift protection is disabled. | Parallel Only | The vector shift protection is enabled only while the gen-set is running parallel to the mains, i.e. the both MCB and GCB MGCB are closed. | Enabled | The vector shift protection is active always while the MCB is closed, regardless of the GCB MGCB position. |
| Disabled   | The vector shift protection is disabled.   |                             |       |          |  |               |  |         |  |
| Parallel Only  | The vector shift protection is enabled only while the gen-set is running parallel to the mains, i.e. the both MCB and GCB MGCB are closed. |                             |       |          |  |               |  |         |  |
| Enabled  | The vector shift protection is active always while the MCB is closed, regardless of the GCB MGCB position.                                 |                             |       |          |  |               |  |         |  |
| <p><b>Note:</b> The vectorshift protection is recorded into the history file, however it is not indicated in the Alarm list. When it occurs the controller opens either MCB or GCB MGCB depending on the setpoint <b>Vector Shift CB Selector (page 328)</b>. If the MCB is not controlled in the particular application then GCB MGCB is opened.</p>  |  |                             |       |          |  |               |  |         |  |
| <p><b>Note:</b> If a vector shift is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is then reclosed again after <b>Mains Return Delay (page 319)</b>, as the mains is evaluated as healthy.</p>   |  |                             |       |          |  |               |  |         |  |

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### Vector Shift Limit

|  |                |                             |       |
|--|----------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Mains settings | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 1 .. 45 [°]    |                             |       |
| <b>Default value</b>   | 10 °           | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 1 °            |                             |       |
| <b>Comm object</b>   | 9843           | <b>Related applications</b> | SPtM  |
| <b>Config level</b>  | Standard       |                             |       |
| <b>Setpoint visibility</b>   | Always         |                             |       |
| <b>Description</b>   |                |                             |       |
| This setpoint adjusts the threshold level for the vector shift protection.   |                |                             |       |
| <p><b>Note:</b> To adjust this setpoint properly, check the value <b>Max Vector ShiftMaxVectorS (page 575)</b>. The value is available in <i>InteliConfig</i>, contains the maximal measured vector shift value since the gen-set has been synchronized to the mains and after opening of GCB or MCB it is "frozen". In normal conditions the value should not be higher than 3 ° and the most common setting of the threshold is about 7 °.</p> |                |                             |       |

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## ROCOF Protection

|   |   |                             |       |          |                                   |               |   |         |   |
|---|---|-----------------------------|-------|----------|-----------------------------------|---------------|---|---------|---|
| <b>Setpoint group</b>   | Mains settings  | <b>Related FW</b>           | 1.0.0 |          |                                   |               |   |         |   |
| <b>Range [units]</b>  | Enabled / Parallel Only / Disabled [-]  |                             |       |          |                                   |               |   |         |   |
| <b>Default value</b>  | Disabled  | <b>Alternative config</b>   | NO    |          |                                   |               |   |         |   |
| <b>Step</b>   | [-]   |                             |       |          |                                   |               |   |         |   |
| <b>Comm object</b>  | 9840  | <b>Related applications</b> | SPtM  |          |                                   |               |   |         |   |
| <b>Config level</b>   | Standard  |                             |       |          |                                   |               |   |         |   |
| <b>Setpoint visibility</b>  | Always  |                             |       |          |                                   |               |   |         |   |
| <b>Description</b>  |   |                             |       |          |                                   |               |   |         |   |
| This setpoint selects the function of the built-in ROCOF protection.  |   |                             |       |          |                                   |               |   |         |   |
| <table border="1"> <tr> <td>Disabled</td> <td>The ROCOF protection is disabled.</td> </tr> <tr> <td>Parallel Only</td> <td>The ROCOF protection is enabled only while the gen-set is running parallel to the mains, i.e. the both MCB and GCB MGCB are closed.</td> </tr> <tr> <td>Enabled</td> <td>The ROCOF protection is active always while the MCB is closed, regardless of the GCB MGCB position.</td> </tr> </table> |   |                             |       | Disabled | The ROCOF protection is disabled. | Parallel Only | The ROCOF protection is enabled only while the gen-set is running parallel to the mains, i.e. the both MCB and GCB MGCB are closed. | Enabled | The ROCOF protection is active always while the MCB is closed, regardless of the GCB MGCB position. |
| Disabled  | The ROCOF protection is disabled.   |                             |       |          |                                   |               |   |         |   |
| Parallel Only   | The ROCOF protection is enabled only while the gen-set is running parallel to the mains, i.e. the both MCB and GCB MGCB are closed. |                             |       |          |                                   |               |   |         |   |
| Enabled   | The ROCOF protection is active always while the MCB is closed, regardless of the GCB MGCB position.                                 |                             |       |          |                                   |               |   |         |   |
| <p><b>Note:</b> The ROCOF protection is recorded into the history file, however it is not indicated in the Alarm list. When it occurs the controller opens either MCB or GCB MGCB depending on the setpoint <b>Vector Shift CB Selector</b> (page 328). If the MCB is not controlled in the particular application then GCB MGCB is opened.</p>   |   |                             |       |          |                                   |               |   |         |   |
| <p><b>Note:</b> If a ROCOF is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is then reclosed again after <b>Mains Return Delay</b> (page 319), as the mains is evaluated as healthy.</p>   |   |                             |       |          |                                   |               |   |         |   |

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## ROCOF Windows Length

|  |                |                             |       |
|--|----------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Mains settings | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 3 .. 30 [-]    |                             |       |
| <b>Default value</b>   | 5              | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 1 [-]          |                             |       |
| <b>Comm object</b>   | 9990           | <b>Related applications</b> | SPtM  |
| <b>Config level</b>  | Standard       |                             |       |
| <b>Setpoint visibility</b>   | Always         |                             |       |
| <b>Description</b>   |                |                             |       |
| This setpoint adjusts the averaging level for the <b>ROCOF Protection</b> (page 327). It defines number of periods of the mains voltage in which the ROCOF protection is evaluated. The higher length of ROCOF window means less sensitive protection for short oscillations of the frequency to both directions from the nominal value. Also delay of evaluation is higher. |                |                             |       |

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## ROCOF df/dt

|  |                    |                             |       |
|--|--------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Mains settings     | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 0,1 .. 10,0 [Hz/s] |                             |       |
| <b>Default value</b>   | 1,0 Hz/s           | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 0,1 Hz/s           |                             |       |
| <b>Comm object</b>   | 9844               | <b>Related applications</b> | SPtM  |
| <b>Config level</b>  | Standard           |                             |       |
| <b>Setpoint visibility</b>   | Always             |                             |       |
| <b>Description</b>   |                    |                             |       |
| This setpoint adjusts the trip level for <b>ROCOF Protection (page 327)</b> (Rate Of Change Of Frequency). |                    |                             |       |

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## Vector Shift CB Selector

|  |                    |                             |       |
|--|--------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Mains settings     | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | MCB / GCB MGCB [-] |                             |       |
| <b>Default value</b>   | MCB                | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | [-]                |                             |       |
| <b>Comm object</b>   | 10552              | <b>Related applications</b> | SPtM  |
| <b>Config level</b>  | Standard           |                             |       |
| <b>Setpoint visibility</b>   | Always             |                             |       |
| <b>Description</b>   |                    |                             |       |
| This setpoint selects which breaker will be opened when the <b>Vector Shift Protection (page 326)</b> or <b>ROCOF Protection (page 327)</b> protection is detected.  |                    |                             |       |
| <p><b>Note:</b> <i>If the GCB MGCB is selected and a mains failure occurs the GCB MGCB will be opened immediately when the vectorshift or ROCOF is detected, however also MCB will be opened consequently due to other mains protection as underfrequency or undervoltage.</i></p> |                    |                             |       |

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## Group: Load Shedding

### Load Shedding Active

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | Load Shedding  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Disabled / Island only / ISL+Trip paral / All the time [-] |                             |            |
| <b>Default value</b>       | Disabled   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | [-]  |                             |            |
| <b>Comm object</b>         | 11001  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced   |                             |            |
| <b>Setpoint visibility</b> | Visible always   |                             |            |

#### Description

This setpoint is used for adjustment when the load shedding function is active.

|                |   |
|----------------|---|
| Disabled       | The Load shedding function is disabled. All the outputs are open.   |
| Island only    | <p>In Island operation (e.g. MCB is open and (M)GCB is closed) Load shedding outputs are controlled by load shedding function.</p> <ul style="list-style-type: none"> <li>▶ Load shedding outputs are activated/Deactivated one by one in island operation</li> <li>▶ All Loadshedding outputs are tripped once the genset comes into the island operation from "NO LOAD" operation (MCB and (M)GCB were opened -&gt; Genset started and (M)GCB closed).</li> </ul>   |
| ISL+Trip paral | <p>This setting adjusts the same behavior as ISLAND ONLY but in addition to it all load shedding outputs are closed when gen-set group goes from parallel operation into the island operation.</p> <ul style="list-style-type: none"> <li>▶ Load shedding outputs are activated/Deactivated one by one in island operation.</li> <li>▶ All Loadshedding outputs are tripped at once when the genset comes into the island operation from "NO LOAD" operation (MCB and (M)GCB were opened -&gt; Genset started and (M)GCB closed).</li> <li>▶ All Loadshedding outputs are tripped at once when the genset comes from Parallel operation (MCB, (M)GCB closed) to island operation (MCB opens, (M)GCB stays closed). This scenario is also valid when Test On Load is taken.</li> </ul> |
| All the time   | <p>Load shedding Outputs are controlled by the load shedding function regardless of breaker positions.</p> <ul style="list-style-type: none"> <li>▶ Loadshedding is active in island operation, in parallel operation too.</li> <li>▶ All Loadshedding outputs are never tripped at once.</li> </ul>  |

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## Load Shedding Level

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Load Shedding  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Load Reconnection Level .. 200 [%] of Nominal Power (page 242)     |                             |            |
| <b>Default value</b>  | 80 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 %  |                             |            |
| <b>Comm object</b>  | 8884   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if <b>Load Shedding Active (page 329)</b> is disabled |                             |            |
| <b>Description</b>  |  |                             |            |
| This setpoint is used to proceeds the next Load shedding stage. When gen-set load exceeds this level for more than <b>Load Shedding Delay (page 330)</b> time |  |                             |            |

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## Load Shedding Delay

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Load Shedding  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0,0..600,0 [s]   |                             |            |
| <b>Default value</b>  | 10 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s  |                             |            |
| <b>Comm object</b>  | 8887   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if <b>Load Shedding Active (page 329)</b> is disabled |                             |            |
| <b>Description</b>  |  |                             |            |
| This setpoint is used to proceeds the next Load shedding stage. When gen-set load exceeds this level for more than <b>Load Shedding Level (page 330)</b> time |  |                             |            |

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## Load Reconnection Level

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Load Shedding  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. Load Shedding Level (page 330)                                |                             |            |
| <b>Default value</b>  | 20 %   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 %  |                             |            |
| <b>Comm object</b>  | 8890   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if <b>Load Shedding Active (page 329)</b> is disabled |                             |            |
| <b>Description</b>  |  |                             |            |
| This setpoint is used to proceeds the next Load shedding stage. When gen-set load exceeds this level for more than <b>Load Shedding Delay (page 330)</b> time |  |                             |            |

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## Load Reconnection Delay

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Load Shedding  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..600 [s]   |                             |            |
| <b>Default value</b>  | 10 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s  |                             |            |
| <b>Comm object</b>  | 8893   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if <b>Load Shedding Active (page 329)</b> is disabled |                             |            |
| <b>Description</b>  |  |                             |            |
| <p>This setpoint is used to proceeds the lower Load shedding stage. When gen-set load drops under <b>Load Reconnection Level (page 330)</b> for more than this delay time. The binary output for higher stage is opened. Automatic load reconnection works only when <b>Auto Load Reconnection (page 331)</b> = Enabled</p> |  |                             |            |

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## Auto Load Reconnection

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Load Shedding  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Disabled / Enabled [-]   |                             |            |
| <b>Default value</b>   | Enabled  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 9649   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced   |                             |            |
| <b>Setpoint visibility</b>   | Visible only if <b>Load Shedding Active (page 329)</b> is disabled |                             |            |
| <b>Description</b>   |  |                             |            |
| <p>Switch between manual and automatic reconnection of shedded load..</p> <p><b>Disabled</b> Rising edge on binary input MANUAL LD RECON resets controller to the lower stage, but only if the load is under the <b>Load Reconnection Level (page 330)</b>. <b>Load Reconnection Delay (page 331)</b> is not taken into account in this case.</p> <p><b>Enabled</b> Load reconnection is automatic depend on setpoints <b>Load Reconnection Level (page 330)</b> and <b>Load Reconnection Delay (page 331)</b>. Binary input <b>MANUAL LOAD RECONNECTION (PAGE 671)</b> has no function.</p> |  |                             |            |

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## Group: Power Management

### Subgroup: Power Management Control

#### Power Management

|  |                        |                             |       |
|--|------------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Power Management       | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | Enabled / Disabled [-] |                             |       |
| <b>Default value</b>   | Enabled                | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | [-]                    |                             |       |
| <b>Comm object</b>   | 8551                   | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Standard               |                             |       |
| <b>Setpoint visibility</b>   | Always                 |                             |       |
| <b>Description</b>   |                        |                             |       |
| <p>This setpoint is used to enable or disable the <b>Power management (page 79)</b> function in the particular controller. It performs automatic load dependent starts and stops or load demand swap. If the function is disabled the gen-set's nominal power is not part of the power management calculation and the start and stop of the gen-set is performed only according to the position of the binary input <b>REMOTE START/STOP (PAGE 677)</b> i.e. if the input is active the gen-set is running and vice versa.</p> |                        |                             |       |

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#### Power Management Delay

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 3600 [s]    |                             |       |
| <b>Default value</b>  | 0 s              | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 s              |                             |       |
| <b>Comm object</b>  | 12488            | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| <p>Setpoint defines delay of the <b>Power management (page 79)</b>. When <b>REMOTE START/STOP (PAGE 677)</b> signal is activated and the gen-sets should start, all the engines (where <b>Power Management (page 332)</b> is enabled) are started and stay running for time period specified by this parameter. After this period elapses, only the gen-set(s) needed according to the Power Management calculation stay running and the rest is stopped.</p> <p><b>Example:</b> This delay is useful, when you need to start gen-sets to an unknown load. Setting for example 360s (6 minutes) and activating <b>REMOTE START/STOP (PAGE 677)</b> will force all gen-sets to start and run for 6 minutes despite of the power management setting.</p> <p><b>Note:</b> By setting "0" the Power Management function is enabled immediately.</p> |                  |                             |       |

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## #Power Management Mode

|   |  |                             |       |
|---|--|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management   | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | ABS [kW] / REL [%]   |                             |       |
| <b>Default value</b>  | ABS  | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | [-]  |                             |       |
| <b>Comm object</b>  | 9874   | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard   |                             |       |
| <b>Setpoint visibility</b>  | Always   |                             |       |
| <b>Description</b>  |  |                             |       |
| This setpoint is used to select the <b>Power management (page 79)</b> mode. |  |                             |       |
| ABS [kW]  | The power management is based on actual active power and gen-set nominal power. The reserves are calculated and adjusted in kW.              |                             |       |
| REL [%]   | The power management is based on the relative load, i.e. ratio active power to nominal power. The reserves are calculated and adjusted in %. |                             |       |

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## Priority

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 1 .. 32 [-]      |                             |       |
| <b>Default value</b>  | 1                | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1                |                             |       |
| <b>Comm object</b>  | 8488             | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| This setpoint adjusts the priority of the gen-set within the group. A lower number represents a “higher” priority, i.e. a gen-set with lower number will start before another one with higher number. |                  |                             |       |
| <i><b>Note:</b> If the binary input <b>Top Priority (page 680)</b> is active, the gen-set gets the highest priority (0) independent of the setpoint setting.</i>                                      |                  |                             |       |
| <i><b>Note:</b> If more than one gen-set have the same priority they will act as “one big” gen-set.</i>   |                  |                             |       |
| <b>IMPORTANT: Value of the setpoint Priority is taken into account only for absolute mode of power management (#Power Management Mode (page 333) = ABS).</b>  |                  |                             |       |

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## #Priority Auto Swap

|   |  |                             |       |          |  |                 |   |           |  |
|---|--|-----------------------------|-------|----------|--|-----------------|---|-----------|--|
| <b>Setpoint group</b>   | Power Management   | <b>Related FW</b>           | 1.0.0 |          |  |                 |   |           |  |
| <b>Range [units]</b>  | Disabled / Run Hours Equal / Efficient [-]   |                             |       |          |  |                 |   |           |  |
| <b>Default value</b>  | Disabled   | <b>Alternative config</b>   | NO    |          |  |                 |   |           |  |
| <b>Step</b>   | [-]  |                             |       |          |  |                 |   |           |  |
| <b>Comm object</b>  | 10593  | <b>Related applications</b> | MINT, |          |  |                 |   |           |  |
| <b>Config level</b>   | Standard   |                             |       |          |  |                 |   |           |  |
| <b>Setpoint visibility</b>  | Always   |                             |       |          |  |                 |   |           |  |
| <b>Description</b>  |  |                             |       |          |  |                 |   |           |  |
| This setpoint adjusts priority auto swapping.   |  |                             |       |          |  |                 |   |           |  |
| <table border="1"> <tr> <td>Disabled</td> <td>Optimization is disabled. Priorities are given directly by the values adjusted in the setpoints <b>Priority (page 333)</b>.</td> </tr> <tr> <td>Run Hours Equal</td> <td>This method changes the priorities (not the setpoints itself) to equalize running hours of the gen-sets or to keep constant difference of running hours by the controller (adjusted via setpoint <b>#Run Hours Max Difference (page 342)</b>).</td> </tr> <tr> <td>Efficient</td> <td> <p>This method changes the priorities (not the setpoints itself) to optimize which gen-sets are running according to their capacities and actual load demand.</p> <p><b>IMPORTANT: This priority swapping function is only for absolute mode of power management (#Power Management Mode (page 333) = ABS).</b></p> <p>Optimal power band (number of running gen-sets) is calculated based on the nominal power of each gen-set, their Run Hours and requested Load reserve. For gen-sets with the same nominal power also run hour equalization is being performed.</p> </td> </tr> </table> |  |                             |       | Disabled | Optimization is disabled. Priorities are given directly by the values adjusted in the setpoints <b>Priority (page 333)</b> . | Run Hours Equal | This method changes the priorities (not the setpoints itself) to equalize running hours of the gen-sets or to keep constant difference of running hours by the controller (adjusted via setpoint <b>#Run Hours Max Difference (page 342)</b> ). | Efficient | <p>This method changes the priorities (not the setpoints itself) to optimize which gen-sets are running according to their capacities and actual load demand.</p> <p><b>IMPORTANT: This priority swapping function is only for absolute mode of power management (#Power Management Mode (page 333) = ABS).</b></p> <p>Optimal power band (number of running gen-sets) is calculated based on the nominal power of each gen-set, their Run Hours and requested Load reserve. For gen-sets with the same nominal power also run hour equalization is being performed.</p> |
| Disabled  | Optimization is disabled. Priorities are given directly by the values adjusted in the setpoints <b>Priority (page 333)</b> .   |                             |       |          |  |                 |   |           |  |
| Run Hours Equal   | This method changes the priorities (not the setpoints itself) to equalize running hours of the gen-sets or to keep constant difference of running hours by the controller (adjusted via setpoint <b>#Run Hours Max Difference (page 342)</b> ).  |                             |       |          |  |                 |   |           |  |
| Efficient   | <p>This method changes the priorities (not the setpoints itself) to optimize which gen-sets are running according to their capacities and actual load demand.</p> <p><b>IMPORTANT: This priority swapping function is only for absolute mode of power management (#Power Management Mode (page 333) = ABS).</b></p> <p>Optimal power band (number of running gen-sets) is calculated based on the nominal power of each gen-set, their Run Hours and requested Load reserve. For gen-sets with the same nominal power also run hour equalization is being performed.</p> |                             |       |          |  |                 |   |           |  |
| <p><b>IMPORTANT: Binary input Top Priority (page 680) can be used only if #Priority Auto Swap = Disabled.</b></p>   |  |                             |       |          |  |                 |   |           |  |

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## #System Start Delay

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 600 [-]     |                             |       |
| <b>Default value</b>  | 5                | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1                |                             |       |
| <b>Comm object</b>  | 8549             | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| This setpoint adjusts the delay of the system activation after the binary input <b>REMOTE START/STOP (PAGE 677)</b> has been activated. |                  |                             |       |

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## #System Stop Delay

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 600 [-]     |                             |       |
| <b>Default value</b>  | 30               | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1                |                             |       |
| <b>Comm object</b>  | 8550             | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| This setpoint adjusts the delay of the system deactivation after the binary input <b>REMOTE START/STOP (PAGE 677)</b> has been deactivated. |                  |                             |       |

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### Subgroup: Load Reserve Set 1

## #Starting Load Reserve 1

|   |   |                             |       |
|---|---|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management                              | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. #Stopping Load Reserve 1 (page 336) [kW] |                             |       |
| <b>Default value</b>  | 60 kW   | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 kW  |                             |       |
| <b>Comm object</b>  | 8489  | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard                                      |                             |       |
| <b>Setpoint visibility</b>  | Always  |                             |       |
| <b>Description</b>  |   |                             |       |
| This setpoint is used to adjust the load reserve for start of next gen-set in absolute mode. i.e. #Power Management Mode (page 333) = ABS.            |   |                             |       |
| <p><b>IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 670) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.</b></p> |   |                             |       |
| <p><i>Note: See Power management (page 79) chapter for more information.</i></p>  |   |                             |       |

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## #Stopping Load Reserve 1

|   |  |                      |       |
|---|--|----------------------|-------|
| Setpoint group  | Power Management                                   | Related FW           | 1.0.0 |
| Range [units]   | #Starting Load Reserve 1 (page 335) .. 32 000 [kW] |                      |       |
| Default value   | 110 kW   | Alternative config   | NO    |
| Step  | 1 kW   |                      |       |
| Comm object   | 8491   | Related applications | MINT  |
| Config level  | Standard   |                      |       |
| Setpoint visibility   | Always   |                      |       |
| <b>Description</b>  |  |                      |       |
| This setpoint is used to adjust the load reserve for stop of next gen-set in absolute mode. i.e. #Power Management Mode (page 333) = ABS.             |  |                      |       |
| <p><b>IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 670) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.</b></p> |  |                      |       |
| <p><i>Note: See Power management (page 79) chapter for more information.</i></p>  |  |                      |       |

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## #Starting Rel Load Reserve 1

|   |  |                      |       |
|---|--|----------------------|-------|
| Setpoint group  | Power Management                                 | Related FW           | 1.0.0 |
| Range [units]   | 0 .. #Stopping Rel Load Reserve 1 (page 337) [%] |                      |       |
| Default value   | 60 %   | Alternative config   | NO    |
| Step  | 1 %  |                      |       |
| Comm object   | 10648  | Related applications | MINT  |
| Config level  | Standard   |                      |       |
| Setpoint visibility   | Always   |                      |       |
| <b>Description</b>  |  |                      |       |
| This setpoint is used to adjust the load reserve for start of next gen-set in relative mode. i.e. #Power Management Mode (page 333) = REL.            |  |                      |       |
| <p><b>IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 670) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.</b></p> |  |                      |       |
| <p><i>Note: See Power management (page 79) chapter for more information.</i></p>  |  |                      |       |

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## #Stopping Rel Load Reserve 1

|   |  |                      |       |
|---|--|----------------------|-------|
| Setpoint group  | Power Management                                   | Related FW           | 1.0.0 |
| Range [units]   | #Starting Rel Load Reserve 1 (page 336) .. 110 [%] |                      |       |
| Default value   | 80 %   | Alternative config   | NO    |
| Step  | 1 %  |                      |       |
| Comm object   | 10652  | Related applications | MINT  |
| Config level  | Standard   |                      |       |
| Setpoint visibility   | Always   |                      |       |
| <b>Description</b>  |  |                      |       |
| This setpoint is used to adjust the load reserve for stop of next gen-set in relative mode. i.e. #Power Management Mode (page 333) = REL.             |  |                      |       |
| <p><b>IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 670) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.</b></p> |  |                      |       |
| <p><i>Note: See Power management (page 79) chapter for more information.</i></p>  |  |                      |       |

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### Subgroup: Load Reserve Set 2

## #Starting Load Reserve 2

|   |   |                      |       |
|---|---|----------------------|-------|
| Setpoint group  | Power Management                              | Related FW           | 1.0.0 |
| Range [units]   | 0 .. #Stopping Load Reserve 2 (page 338) [kW] |                      |       |
| Default value   | 410 kW  | Alternative config   | NO    |
| Step  | 1 kW  |                      |       |
| Comm object   | 8490  | Related applications | MINT  |
| Config level  | Standard                                      |                      |       |
| Setpoint visibility   | Always  |                      |       |
| <b>Description</b>  |   |                      |       |
| This setpoint is used to adjust the load reserve for start of next gen-set in absolute mode. i.e. #Power Management Mode (page 333) = ABS.          |   |                      |       |
| <p><b>IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 670) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.</b></p> |   |                      |       |
| <p><i>Note: See Power management (page 79) chapter for more information.</i></p>  |   |                      |       |

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## #Stopping Load Reserve 2

|   |  |                      |       |
|---|--|----------------------|-------|
| Setpoint group  | Power Management                                   | Related FW           | 1.0.0 |
| Range [units]   | #Starting Load Reserve 2 (page 337) .. 32 000 [kW] |                      |       |
| Default value   | 460 kW   | Alternative config   | NO    |
| Step  | 1 kW   |                      |       |
| Comm object   | 8633   | Related applications | MINT  |
| Config level  | Standard   |                      |       |
| Setpoint visibility   | Always   |                      |       |
| <b>Description</b>  |  |                      |       |
| This setpoint is used to adjust the load reserve for stop of next gen-set in absolute mode. i.e. #Power Management Mode (page 333) = ABS.           |  |                      |       |
| <p><b>IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 670) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.</b></p> |  |                      |       |
| <p><i>Note: See Power management (page 79) chapter for more information.</i></p>  |  |                      |       |

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## #Starting Rel Load Reserve 2

|   |  |                      |       |
|---|--|----------------------|-------|
| Setpoint group  | Power Management                                 | Related FW           | 1.0.0 |
| Range [units]   | 0 .. #Stopping Rel Load Reserve 2 (page 339) [%] |                      |       |
| Default value   | 60 %   | Alternative config   | NO    |
| Step  | 1 %  |                      |       |
| Comm object   | 10649  | Related applications | MINT  |
| Config level  | Standard   |                      |       |
| Setpoint visibility   | Always   |                      |       |
| <b>Description</b>  |  |                      |       |
| This setpoint is used to adjust the load reserve for start of next gen-set in relative mode. i.e. #Power Management Mode (page 333) = REL.          |  |                      |       |
| <p><b>IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 670) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.</b></p> |  |                      |       |
| <p><i>Note: See Power management (page 79) chapter for more information.</i></p>  |  |                      |       |

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## #Stopping Rel Load Reserve 2

|   |  |                             |       |
|---|--|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management                                   | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | #Starting Rel Load Reserve 2 (page 338) .. 110 [%] |                             |       |
| <b>Default value</b>  | 80 %   | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 %  |                             |       |
| <b>Comm object</b>  | 10653  | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard   |                             |       |
| <b>Setpoint visibility</b>  | Always   |                             |       |
| <b>Description</b>  |  |                             |       |
| <p>This setpoint is used to adjust the load reserve for stop of next gen-set in relative mode. i.e. #Power Management Mode (page 333) = REL.</p> <p><b>IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 670) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.</b></p> <p><i>Note: See Power management (page 79) chapter for more information.</i></p> |  |                             |       |

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### Subgroup: Minimal Running Power

## #Min Run Power

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 65 000 [kW] |                             |       |
| <b>Default value</b>  | 210 kw           | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 kW             |                             |       |
| <b>Comm object</b>  | 9584             | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| <p>This setpoint is used to adjust certain minimum value of the sum of nominal power of all running gen-sets. If the function is active (by logical binary input <b>Min Run Power Active (page 673)</b>), then the gen-sets would not be stopped, although the reserve for stop is fulfilled, if the total remaining nominal power drops below this minimal value.</p> <p><b>Note: Logical binary input Min Run Power Active (page 673) needs to be activated on all gen-sets in the same time.</b></p> |                  |                             |       |

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## Subgroup: Start/Stop Timing

### #Next Engine Start Delay

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 0 .. 3 600 [s]   |                             |       |
| <b>Default value</b>   | 5 s              | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 1 s              |                             |       |
| <b>Comm object</b>   | 8492             | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Standard         |                             |       |
| <b>Setpoint visibility</b>   | Always           |                             |       |
| <b>Description</b>   |                  |                             |       |
| This setpoint adjusts the delay for starting the next gen-set after the reserve has dropped below the reserve for start. |                  |                             |       |

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### #Next Engine Stop Delay

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 0 .. 3 600 [s]   |                             |       |
| <b>Default value</b>   | 20 s             | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 1 s              |                             |       |
| <b>Comm object</b>   | 8494             | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Standard         |                             |       |
| <b>Setpoint visibility</b>   | Always           |                             |       |
| <b>Description</b>   |                  |                             |       |
| This setpoint adjusts the delay for stopping the gen-set after the reserve has risen above the reserve for stop. |                  |                             |       |

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### #Slow Stop Delay

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 0 .. 600 [s]     |                             |       |
| <b>Default value</b>   | 60 s             | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 1 s              |                             |       |
| <b>Comm object</b>   | 8495             | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Standard         |                             |       |
| <b>Setpoint visibility</b>   | Always           |                             |       |
| <b>Description</b>   |                  |                             |       |
| This setpoint is used to adjust how long the particular gen-set will suppress it's own Slow stop alarm to give chance to another gen-set to start and replace the defective one. |                  |                             |       |
| <b>Note:</b> <i>If there isn't any available gen-set to start, the alarm is not suppressed.</i>  |                  |                             |       |

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## Subgroup: Over Load Next Start Protection

### #Overload Next Start Protection

|  |                        |                             |       |
|--|------------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Power Management       | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | Enabled / Disabled [-] |                             |       |
| <b>Default value</b>   | Enabled                | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | [-]                    |                             |       |
| <b>Comm object</b>   | 14942                  | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Standard               |                             |       |
| <b>Setpoint visibility</b>   | Always                 |                             |       |
| <b>Description</b>   |                        |                             |       |
| This setpoint is intended for activation of the protection against the overloading of the system due to rapid change of the load. It makes the next gen-set (in priority order) to start when the load excises the value given by the setpoint <b>#Overload Next Start Level (page 341)</b> right after the delay <b>#Overload Next Start Delay (page 341)</b> . |                        |                             |       |

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### #Overload Next Start Level

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 100 [%]     |                             |       |
| <b>Default value</b>  | 80 %             | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 %              |                             |       |
| <b>Comm object</b>  | 14941            | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| Threshold level for <b>#Overload Next Start Protection (page 341)</b> . |                  |                             |       |

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### #Overload Next Start Delay

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 5 [s]       |                             |       |
| <b>Default value</b>  | 1 s              | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 s              |                             |       |
| <b>Comm object</b>  | 8493             | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>                                    | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| Delay for <b>#Overload Next Start Protection (page 341)</b> . |                  |                             |       |

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## Subgroup: Run Hours Equalization

### Run Hours Base

|   |                     |                             |       |
|---|---------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management    | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0,0 .. 200000,0 [h] |                             |       |
| <b>Default value</b>  | 0,0 h               | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 0,1 h               |                             |       |
| <b>Comm object</b>  | 10600               | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard            |                             |       |
| <b>Setpoint visibility</b>  | Always              |                             |       |
| <b>Description</b>  |                     |                             |       |
| Running hours base corrects actual Running hours differences between particular gen-sets.   |                     |                             |       |
| <p><b>Example:</b></p> <p>Gen-set 1 actual Running hours = 1000 h.</p> <p>Gen-set 2 actual Running hours = 2000 h.</p> <p>Adjust this setpoint for Gen-set 1 = 1000 h and for Gen-set 2 = 2000 h to be on the same base for Running Hours Equalization.</p> |                     |                             |       |

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### #Run Hours Max Difference

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 65 000 [h]  |                             |       |
| <b>Default value</b>  | 100 h            | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 h              |                             |       |
| <b>Comm object</b>  | 9919             | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| This setpoint adjusts the "dead-band" for the running hours equalization function ( <b>#Priority Auto Swap (page 334) = Run Hours Equal</b> ). The priorities are swapped when engine hours difference is higher than this dead-band. |                  |                             |       |
| <p><b>Note:</b> <i>The system calculates with whole hours.</i></p>  |                  |                             |       |
| <p><b>Example:</b> The difference in engine running hours has to be 11.0 hours, if #Run Hours Max Difference is set to 10. The priorities shuffling is not done with the difference just 10.1 hours.</p>                              |                  |                             |       |

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## Subgroup: Efficient Mode

### #Power Band Change Up Delay

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 3 600 [s]   |                             |       |
| <b>Default value</b>  | 10 s             | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | [s]              |                             |       |
| <b>Comm object</b>  | 8896             | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| This setpoint is used for adjusting the delay of changing the power band if the load demand rose above the upper limit of the current power band. Setpoint is taken into account only if <b>#Priority Auto Swap (page 334)</b> = Efficient. |                  |                             |       |

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### #Power Band Change Down Delay

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 0 .. 3 600 [s]   |                             |       |
| <b>Default value</b>   | 10 s             | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | [s]              |                             |       |
| <b>Comm object</b>   | 10795            | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Standard         |                             |       |
| <b>Setpoint visibility</b>   | Always           |                             |       |
| <b>Description</b>   |                  |                             |       |
| This setpoint is used for adjusting the delay of changing the power band if the load demand drops below the lower limit of the current power band. Setpoint is taken into account only if <b>#Priority Auto Swap (page 334)</b> = Efficient. |                  |                             |       |

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## Subgroup: Group Settings

### Control Group

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 1,2 .. 32 [-]    |                             |       |
| <b>Default value</b>  | 1 s              | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 s              |                             |       |
| <b>Comm object</b>  | 10589            | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| <p>This setpoint selects the control group (to get more information on this function please refer to the chapter <b>Control groups (page 98)</b> to which the particular gen-set belongs. If there aren't logical groups at the site, adjust the setpoint to 1.</p> |                  |                             |       |

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### Group Link L

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 1,2 .. 32 [-]    |                             |       |
| <b>Default value</b>  | 1 s              | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 s              |                             |       |
| <b>Comm object</b>  | 10590            | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard         |                             |       |
| <b>Setpoint visibility</b>  | Always           |                             |       |
| <b>Description</b>  |                  |                             |       |
| <p>If the input <b>GROUP LINK (PAGE 669)</b> of this particular controller is used to provide the "group link" information for two Control groups (to get more information refer to the chapter <b>Control groups (page 98)</b>), then this setpoint is used to select which group is located at the left side of the group link breaker (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1.</p> |                  |                             |       |

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## Group Link R

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 1,2 .. 32 [-]    |                             |       |
| <b>Default value</b>   | 1 s              | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 1 s              |                             |       |
| <b>Comm object</b>   | 10591            | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Standard         |                             |       |
| <b>Setpoint visibility</b>   | Always           |                             |       |
| <b>Description</b>   |                  |                             |       |
| <p>If the input <b>GROUP LINK (PAGE 669)</b> of this particular controller is used to provide the "group link" information for two Control groups (to get more information refer to the chapter <b>Control groups (page 98)</b>), then this setpoint is used to select which group is located at the right side of the group link breaker (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1.</p> |                  |                             |       |

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## Group: Speed/Load Control

### Subgroup: Speed Control

#### Speed Regulator Character

|  |                         |  |            |
|--|-------------------------|--|------------|
| <b>Setpoint group</b>  | Speed/Load Control      | <b>Related FW</b>  | 1.0.0      |
| <b>Range [units]</b>   | Positive / Negative [-] |  |            |
| <b>Default value</b>   | Positive                | <b>Alternative config</b>  | NO         |
| <b>Step</b>  | [-]                     |  |            |
| <b>Comm object</b>   | 9054                    | <b>Related applications</b>  | MINT, SPtM |
| <b>Config level</b>  | Standard                |  |            |
| <b>Setpoint visibility</b>   | Always                  |  |            |
| <b>Description</b>   |                         |  |            |
| <p>This setpoint selects the characteristic of the speed governor output of the controller. Adjust it according to the behavior of the remote speed input of the governor.</p> |                         |  |            |
|  | Positive                | Raising the voltage on the governor remote speed input causes engine speed to rise.    |            |
|  | Negative                | Raising the voltage on the governor remote speed input causes engine speed to go down. |            |

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## Speed Governor Bias

|   |                     |                             |            |
|---|---------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Speed/Load Control  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | -10,00 .. 10,00 [V] |                             |            |
| <b>Default value</b>  | 0,00 V              | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,01 V              |                             |            |
| <b>Comm object</b>  | 8656                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard            |                             |            |
| <b>Setpoint visibility</b>  | Always              |                             |            |
| <b>Description</b>  |                     |                             |            |
| This setpoint adjusts the initial voltage level for the speed governor output, which is present on the output, if no speed or power regulation loop is active.                          |                     |                             |            |
| <p><b>Note:</b> To make a fine adjustment, start the gen-set in MAN mode, leave it running unloaded and then make fine adjustment of this setpoint to achieve nominal engine speed.</p> |                     |                             |            |

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## Speed Governor Low Limit

|  |                     |                             |            |
|--|---------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Speed/Load Control  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | -10,00 .. 10,00 [V] |                             |            |
| <b>Default value</b>   | 0,00 V              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,01 V              |                             |            |
| <b>Comm object</b>   | 10115               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard            |                             |            |
| <b>Setpoint visibility</b>   | Always              |                             |            |
| <b>Description</b>   |                     |                             |            |
| Lower limit of the speed governor output. Use this setpoint to adjust the governor output range according to your governor type. |                     |                             |            |

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## Speed Governor High Limit

|  |                     |                             |            |
|--|---------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Speed/Load Control  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | -10,00 .. 10,00 [V] |                             |            |
| <b>Default value</b>   | 0,00 V              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,01 V              |                             |            |
| <b>Comm object</b>   | 10559               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard            |                             |            |
| <b>Setpoint visibility</b>   | Always              |                             |            |
| <b>Description</b>   |                     |                             |            |
| Upper limit of the speed governor output. Use this setpoint to adjust the governor output range according to your governor type. |                     |                             |            |

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## Speed Governor PWM Rate

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 500 .. 2 900 [Hz]  |                             |            |
| <b>Default value</b>  | 500 Hz             | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 Hz               |                             |            |
| <b>Comm object</b>  | 10911              | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard           |                             |            |
| <b>Setpoint visibility</b>  | Always             |                             |            |
| <b>Description</b>  |                    |                             |            |
| This setpoint adjusts the frequency of the speed governor PWM output. |                    |                             |            |

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## Tau Speed Governor Actuator

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1,0 .. 300,0 [s]   |                             |            |
| <b>Default value</b>  | 10,0 s             | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,1 s              |                             |            |
| <b>Comm object</b>  | 10784              | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard           |                             |            |
| <b>Setpoint visibility</b>  | Always             |                             |            |
| <b>Description</b>  |                    |                             |            |
| This setpoint is used to adjust the transformation ratio of the speed governor output to the pulses at the binary outputs <b>SPEED UP (PAGE 736)</b> and <b>SPEED DOWN (PAGE 736)</b> . Adjust the setpoint to the pulse duration which is needed for the speed control device to travel from minimal position to the maximal position. |                    |                             |            |

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## Subgroup: Regulation Loops

### Frequency Gain

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0,0 .. 200,0 [%]   |                             |            |
| <b>Default value</b>  | 10,0 %             | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,1 %              |                             |            |
| <b>Comm object</b>  | 8715               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard           |                             |            |
| <b>Setpoint visibility</b>  | Always             |                             |            |
| <b>Description</b>  |                    |                             |            |
| This setpoint adjusts the gain factor (P-factor) of the frequency control PI loop.    |                    |                             |            |
| <b>Note:</b> See the chapter <i>Regulation loops (page 102)</i> for more information. |                    |                             |            |

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## Frequency Int

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 100 [%]       |                             |            |
| <b>Default value</b>   | 50 %               | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 %                |                             |            |
| <b>Comm object</b>   | 8716               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard           |                             |            |
| <b>Setpoint visibility</b>   | Always             |                             |            |
| <b>Description</b>   |                    |                             |            |
| This setpoint adjusts the relative integration factor (I-factor) of the frequency control PI loop. |                    |                             |            |
| <i>Note: See the chapter Regulation loops (page 102) for more information.</i>                     |                    |                             |            |

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## Angle Gain

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 200,0 [%]   |                             |            |
| <b>Default value</b>   | 10,0 %             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 %              |                             |            |
| <b>Comm object</b>   | 8718               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard           |                             |            |
| <b>Setpoint visibility</b>   | Always             |                             |            |
| <b>Description</b>   |                    |                             |            |
| This setpoint is used for adjusting of the gain factor (P-factor) of the phase angle P-control loop.   |                    |                             |            |
| <i>Note: During synchronization, first the frequency loop is started to match the generator frequency with the mains or bus and after that the phase angle loop is started to match the phase angle.</i> |                    |                             |            |
| <i>Note: See the chapter Regulation loops (page 102) for more information.</i>   |                    |                             |            |

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## Load Gain

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 200,0 [%]   |                             |            |
| <b>Default value</b>   | 10,0 %             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 %              |                             |            |
| <b>Comm object</b>   | 8659               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard           |                             |            |
| <b>Setpoint visibility</b>   | Always             |                             |            |
| <b>Description</b>   |                    |                             |            |
| This setpoint adjusts the gain factor (P-factor) of the load control PI loop.  |                    |                             |            |
| <i>Note: See the chapter Regulation loops (page 102) for more information.</i> |                    |                             |            |

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## Load Int

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 100 [%]       |                             |            |
| <b>Default value</b>  | 50 %               | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 %                |                             |            |
| <b>Comm object</b>  | 8713               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard           |                             |            |
| <b>Setpoint visibility</b>  | Always             |                             |            |
| <b>Description</b>  |                    |                             |            |
| This setpoint adjusts the relative integration factor (I-factor) of the load control PI loop. |                    |                             |            |
| <i>Note: See the chapter Regulation loops (page 102) for more information.</i>                |                    |                             |            |

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## Load Sharing Gain

|   |                    |                             |       |
|---|--------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Speed/Load Control | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0,0 .. 200,0 [%]   |                             |       |
| <b>Default value</b>  | 10,0 %             | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 0,1 %              |                             |       |
| <b>Comm object</b>  | 8725               | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard           |                             |       |
| <b>Setpoint visibility</b>  | Always             |                             |       |
| <b>Description</b>  |                    |                             |       |
| This setpoint adjusts the gain factor (P-factor) of the load sharing control PI loop. |                    |                             |       |
| <i>Note: See the chapter Regulation loops (page 102) for more information.</i>        |                    |                             |       |

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## Load Sharing Int

|   |                    |                             |       |
|---|--------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Speed/Load Control | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 100 [%]       |                             |       |
| <b>Default value</b>  | 50 %               | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 %                |                             |       |
| <b>Comm object</b>  | 9035               | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard           |                             |       |
| <b>Setpoint visibility</b>  | Always             |                             |       |
| <b>Description</b>  |                    |                             |       |
| This setpoint adjusts the relative integration factor (I-factor) of the load sharing control PI loop. |                    |                             |       |
| <i>Note: See the chapter Regulation loops (page 102) for more information.</i>                        |                    |                             |       |

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## Subgroup: Load Transfer

### Close Transfer Max Duration

|   |                                 |                             |       |
|---|---------------------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Speed/Load Control              | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0,1 .. Load Ramp (page 353) [s] |                             |       |
| <b>Default value</b>  | 5,0 s                           | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 0,1 s                           |                             |       |
| <b>Comm object</b>  | 8661                            | <b>Related applications</b> | SPtM  |
| <b>Config level</b>   | Standard                        |                             |       |
| <b>Setpoint visibility</b>  | Always                          |                             |       |
| <b>Description</b>  |                                 |                             |       |
| The time of parallel work of gen-set and mains in close transition. |                                 |                             |       |

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### Open Transfer Min Break

|   |                    |                             |       |
|---|--------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Speed/Load Control | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0,1 .. 600,0 [s]   |                             |       |
| <b>Default value</b>  | 1,0 s              | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 0,1 s              |                             |       |
| <b>Comm object</b>  | 8303               | <b>Related applications</b> | SPtM  |
| <b>Config level</b>   | Standard           |                             |       |
| <b>Setpoint visibility</b>  | Always             |                             |       |
| <b>Description</b>  |                    |                             |       |
| Minimal duration of break in open transition when <b>Transfer BusGen To Mains (page 352)</b> or <b>Transfer Mains To Gen Bus (page 351)</b> is chosen as open transfer. |                    |                             |       |

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## Transfer Mains To Gen Bus

|                            |   |                             |       |
|----------------------------|---|-----------------------------|-------|
| <b>Setpoint group</b>      | Speed/Load Control                                      | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>       | Open / Close Only / Close Primarily / Soft Transfer [-] |                             |       |
| <b>Default value</b>       | Soft Transfer   | <b>Alternative config</b>   | NO    |
| <b>Step</b>                | [-]   |                             |       |
| <b>Comm object</b>         | 12969   | <b>Related applications</b> | SPtM  |
| <b>Config level</b>        | Standard  |                             |       |
| <b>Setpoint visibility</b> | Always  |                             |       |

### Description

This setpoint defines the type of transfer of load from mains to generator bus.

|                 |   |
|-----------------|---|
| Open            | Transfer of the load from mains to generator without parallel work and synchronization (one breaker opens and second is closed - checking feedbacks). The setpoint <b>Open Transfer Min Break (page 350)</b> sets the minimal duration of break.  |
| Close Only      | Transfer of the load from mains to generator with synchronization and parallel work. The time of parallel work is given by setpoint <b>Close Transfer Max Duration (page 350)</b> .<br>In case of synchronization fail, MCB stays close and gen-set is stopped.   |
| Close Primarily | Transfer of the load from mains to generator with synchronization and parallel work. The time of parallel work is given by setpoint <b>Close Transfer Max Duration (page 350)</b> .<br>In case of synchronization fail, open transfer is done.  |
| Soft Transfer   | Transfer of the load from mains to generator with parallel work and soft loading of the gen-set. This function is proceeded like the closed transfer, but there is time limitation of loading of the gen-set adjusted via setpoint <b>Load Ramp (page 353)</b> . The transfer is succeed only when the gen-set is fully loaded - mains is fully unloaded (level of load when mains is considered as unloaded is adjusted via setpoint <b>Mains Unload MCB Open Window (page 353)</b> ). |

**Note:** Close transfer of load is also affected by setpoint **Mains Import Measurement (page 239)**.

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## Transfer BusGen To Mains

|   |  |                             |       |
|---|--|-----------------------------|-------|
| <b>Setpoint group</b>   | Speed/Load Control   | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | Open / Close Only / Close Primarily / Soft Transfer [-]  |                             |       |
| <b>Default value</b>  | Soft Interchange   | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | [-]  |                             |       |
| <b>Comm object</b>  | 14688  | <b>Related applications</b> | SPtM  |
| <b>Config level</b>   | Standard   |                             |       |
| <b>Setpoint visibility</b>  | Always   |                             |       |
| <b>Description</b>  |  |                             |       |
| This setpoint defines the type of transfer of load from generator to mains. |  |                             |       |
| Open  | Transfer of the load from generator to mains without parallel work and synchronization (one breaker opens and second is closed - checking feedbacks). The setpoint <b>Open Transfer Min Break (page 350)</b> sets the minimal duration of break.   |                             |       |
| Close Only  | Transfer of the load from generator to mains with synchronization and parallel work. The time of parallel work is given by setpoint <b>Close Transfer Max Duration (page 350)</b> .<br>In case of synchronization fail, MCB stays close and gen-set is stopped.  |                             |       |
| Close Primarily   | Transfer of the load from generator to mains with synchronization and parallel work. The time of parallel work is given by setpoint <b>Close Transfer Max Duration (page 350)</b> .<br>In case of synchronization fail, open transfer is done.   |                             |       |
| Soft Transfer   | Transfer of the load from generator to mains with parallel work and soft unloading of the gen-set. This function is proceeded like the closed transfer, but there is time limitation of unloading of the gen-set adjusted via setpoint <b>Load Ramp (page 353)</b> . The transfer is succeed only when the gen-set is fully unloaded (level of load when gen-set is considered as unloaded is adjusted via setpoint <b>Unload MGCB Open LevelGenerator Unload GCB Open Level (page 352)</b> ). |                             |       |

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## Unload MGCB Open LevelGenerator Unload GCB Open Level

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Speed/Load Control                     | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 100 [%]                           |                             |            |
| <b>Default value</b>  | 10 %                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 % of <b>Nominal Power (page 242)</b> |                             |            |
| <b>Comm object</b>  | 8547                                   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                               |                             |            |
| <b>Setpoint visibility</b>  | Always                                 |                             |            |
| <b>Description</b>  |  |                             |            |
| This setpoint adjusts the value of the power when the GCB MGCB is opened during unloading of the gen-set. |  |                             |            |
| <b>Note:</b> It is set usually higher than 0 to prevent the engine to go to reverse power.                |  |                             |            |

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## Mains Unload MCB Open Window

|  |                                 |                             |            |
|--|---------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Speed/Load Control              | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 100 [%]                    |                             |            |
| <b>Default value</b>   | 10 %                            | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 % of Nominal Power (page 242) |                             |            |
| <b>Comm object</b>   | 14694                           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                        |                             |            |
| <b>Setpoint visibility</b>   | Always                          |                             |            |
| <b>Description</b>   |                                 |                             |            |
| This setpoint adjusts the value which defines the level where the mains is considered as unloaded.   |                                 |                             |            |
| <i>Note: This setpoint is window. It means that when you adjust this setpoint to 10%, there is window from -10% to +10%. The reason is import/export function.</i> |                                 |                             |            |

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## Load Ramp

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 600 [s]       |                             |            |
| <b>Default value</b>   | 5 s                | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 s                |                             |            |
| <b>Comm object</b>   | 8658               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard           |                             |            |
| <b>Setpoint visibility</b>   | Always             |                             |            |
| <b>Description</b>   |                    |                             |            |
| The max duration of soft transition(time for gen-set loading / unloading). |                    |                             |            |

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## Group: Voltage/PF Control

### Subgroup: Voltage Control

#### Voltage Regulator Character

|   |  |                             |            |          |   |          |  |
|---|--|-----------------------------|------------|----------|---|----------|--|
| <b>Setpoint group</b>   | Voltage/PF Control   | <b>Related FW</b>           | 1.0.0      |          |   |          |  |
| <b>Range [units]</b>  | Positive / Negative [-]  |                             |            |          |   |          |  |
| <b>Default value</b>  | Positive   | <b>Alternative config</b>   | NO         |          |   |          |  |
| <b>Step</b>   | [-]  |                             |            |          |   |          |  |
| <b>Comm object</b>  | 9055   | <b>Related applications</b> | MINT, SPtM |          |   |          |  |
| <b>Config level</b>   | Standard   |                             |            |          |   |          |  |
| <b>Setpoint visibility</b>  | Always   |                             |            |          |   |          |  |
| <b>Description</b>  |  |                             |            |          |   |          |  |
| This setpoint selects the characteristic of the voltage governor output of the controller. Adjust it according to the behavior of the remote voltage input of the governor. |  |                             |            |          |   |          |  |
|   | <table border="1"> <tr> <td>Positive</td> <td>Raising the voltage on the remote voltage adjustment input causes the generator voltage to raise.</td> </tr> <tr> <td>Negative</td> <td>Raising the voltage on the governor remote speed input causes engine speed to go down.</td> </tr> </table> |                             |            | Positive | Raising the voltage on the remote voltage adjustment input causes the generator voltage to raise. | Negative | Raising the voltage on the governor remote speed input causes engine speed to go down. |
| Positive  | Raising the voltage on the remote voltage adjustment input causes the generator voltage to raise.  |                             |            |          |   |          |  |
| Negative  | Raising the voltage on the governor remote speed input causes engine speed to go down.   |                             |            |          |   |          |  |

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#### Voltage Regulator Bias

|   |                     |                             |            |
|---|---------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Voltage/PF Control  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | -10,00 .. 10,00 [V] |                             |            |
| <b>Default value</b>  | 0,00 V              | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,01 V              |                             |            |
| <b>Comm object</b>  | 8500                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard            |                             |            |
| <b>Setpoint visibility</b>  | Always              |                             |            |
| <b>Description</b>  |                     |                             |            |
| This setpoint adjusts the initial level for the voltage governor output. This level is present on the output if no regulation loop is active. |                     |                             |            |

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### Voltage Regulator Low Limit

|  |                     |                             |            |
|--|---------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Voltage/PF Control  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | -10,00 .. 10,00 [V] |                             |            |
| <b>Default value</b>   | 0,00 V              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,01 V              |                             |            |
| <b>Comm object</b>   | 14792               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard            |                             |            |
| <b>Setpoint visibility</b>   | Always              |                             |            |
| <b>Description</b>   |                     |                             |            |
| Lower limit of the voltage governor output. Use this setpoint to adjust the governor output range according to your governor type. |                     |                             |            |

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### Voltage Regulator High Limit

|  |                     |                             |            |
|--|---------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Voltage/PF Control  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | -10,00 .. 10,00 [V] |                             |            |
| <b>Default value</b>   | 0,00 V              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,01 V              |                             |            |
| <b>Comm object</b>   | 14793               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard            |                             |            |
| <b>Setpoint visibility</b>   | Always              |                             |            |
| <b>Description</b>   |                     |                             |            |
| Upper limit of the voltage governor output. Use this setpoint to adjust the governor output range according to your governor type. |                     |                             |            |

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### Tau Voltage Governor Actuator

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Voltage/PF Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1,0 .. 300,0 [s]   |                             |            |
| <b>Default value</b>  | 10,0 s             | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,1 s              |                             |            |
| <b>Comm object</b>  | 10785              | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard           |                             |            |
| <b>Setpoint visibility</b>  | Always             |                             |            |
| <b>Description</b>  |                    |                             |            |
| This setpoint is used to adjust the transformation ratio of the voltage governor output to the pulses at the binary outputs <b>AVR UP (PAGE 706)</b> and <b>AVR DOWN (PAGE 706)</b> . Adjust the setpoint to the pulse duration which is needed for the voltage control device to travel from minimal position to the maximal position. |                    |                             |            |

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## Subgroup: Regulation Loops

### Voltage Gain

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Voltage/PF Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 200,0 [%]   |                             |            |
| <b>Default value</b>   | 10,0 %             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 %              |                             |            |
| <b>Comm object</b>   | 8501               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard           |                             |            |
| <b>Setpoint visibility</b>   | Always             |                             |            |
| <b>Description</b>   |                    |                             |            |
| This setpoint adjusts the gain factor (P-factor) of the voltage control PI loop. |                    |                             |            |
| <i>Note: See the chapter Regulation loops (page 102) for more information.</i>   |                    |                             |            |

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### Voltage Int

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Voltage/PF Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 100 [%]       |                             |            |
| <b>Default value</b>   | 50 %               | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 %                |                             |            |
| <b>Comm object</b>   | 8720               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard           |                             |            |
| <b>Setpoint visibility</b>   | Always             |                             |            |
| <b>Description</b>   |                    |                             |            |
| This setpoint adjusts the relative integration factor (I-factor) of the voltage control PI loop. |                    |                             |            |
| <i>Note: See the chapter Regulation loops (page 102) for more information.</i>                   |                    |                             |            |

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### PF Gain

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Voltage/PF Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 200,0 [%]   |                             |            |
| <b>Default value</b>   | 10,0 %             | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 %              |                             |            |
| <b>Comm object</b>   | 8503               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard           |                             |            |
| <b>Setpoint visibility</b>   | Always             |                             |            |
| <b>Description</b>   |                    |                             |            |
| This setpoint adjusts the gain factor (P-factor) of the PF control PI loop.    |                    |                             |            |
| <i>Note: See the chapter Regulation loops (page 102) for more information.</i> |                    |                             |            |

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## PF Int

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Voltage/PF Control | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 100 [%]       |                             |            |
| <b>Default value</b>  | 50 %               | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 %                |                             |            |
| <b>Comm object</b>  | 8721               | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard           |                             |            |
| <b>Setpoint visibility</b>  | Always             |                             |            |
| <b>Description</b>  |                    |                             |            |
| This setpoint adjusts the relative integration factor (I-factor) of the PF control PI loop. |                    |                             |            |
| <i>Note: See the chapter <b>Regulation loops</b> (page 102) for more information.</i>       |                    |                             |            |

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## VAr Sharing Gain

|   |                    |                             |       |
|---|--------------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Voltage/PF Control | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0,0 .. 200,0 [%]   |                             |       |
| <b>Default value</b>  | 10,0 %             | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 0,1 %              |                             |       |
| <b>Comm object</b>  | 8777               | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Standard           |                             |       |
| <b>Setpoint visibility</b>  | Always             |                             |       |
| <b>Description</b>  |                    |                             |       |
| This setpoint adjusts the gain factor (P-factor) of the VAr sharing control PI loop.  |                    |                             |       |
| <i>Note: See the chapter <b>Regulation loops</b> (page 102) for more information.</i> |                    |                             |       |

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## VAr Sharing Int

|  |                    |                             |       |
|--|--------------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Voltage/PF Control | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 0 .. 100 [%]       |                             |       |
| <b>Default value</b>   | 50 %               | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 1 %                |                             |       |
| <b>Comm object</b>   | 9036               | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Standard           |                             |       |
| <b>Setpoint visibility</b>   | Always             |                             |       |
| <b>Description</b>   |                    |                             |       |
| This setpoint adjusts the relative integration factor (I-factor) of the VAr sharing control PI loop. |                    |                             |       |
| <i>Note: See the chapter <b>Regulation loops</b> (page 102) for more information.</i>                |                    |                             |       |

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## Group: Synchronisation

### Synchronization Type

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                              | Synchronisation  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                               | Phase Match / Slip Synchro [-]   |                             |            |
| <b>Default value</b>                               | Phase Match  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>                                 | 14802  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                | Standard   |                             |            |
| <b>Setpoint visibility</b>                         | Always   |                             |            |
| <b>Description</b>                                 |  |                             |            |
| This setpoint adjusts the type of synchronization. |  |                             |            |
| Phase Match  | This type of synchronization is based on voltage and phase shift match. Limits are adjusted via setpoints <b>Voltage Window (page 359)</b> and <b>Phase Window (page 359)</b> . When voltage and phase shift are match, <b>Dwell Time (page 359)</b> starts countdown. After that the command for breaker closing is activated.  |                             |            |
| Slip Synchro                                       | This type of synchronization regulates the value of frequency to the value Mains/Bus frequency + <b>Slip Frequency (page 360)</b> (Mains frequency in SPtM, Bus frequency in MINT application). When this frequency is reached, <b>Dwell Time (page 359)</b> starts countdown. After that the command for breaker closing is activated. The closing breaker command is issued in advance due to latency of breakers (adjusted via setpoints <b>GCB MGCB Latency (page 360)</b> and <b>MCB Latency (page 361)</b> ).<br><br><b>Note: Condition of Voltage Window (page 359) has to be also fulfilled.</b> |                             |            |

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### Synchronization Timeout

|   |                     |                             |            |
|---|---------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Synchronisation     | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | OFF / 1 .. 1800 [s] |                             |            |
| <b>Default value</b>  | 60 s                | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s                 |                             |            |
| <b>Comm object</b>  | 8657                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard            |                             |            |
| <b>Setpoint visibility</b>  | Always              |                             |            |
| <b>Description</b>  |                     |                             |            |
| This setpoint adjusts the maximum duration of synchronizing.  |                     |                             |            |
| <b>Note: If this setpoint is adjusted to OFF then automatic restart of synchronization occurs every 180s. This method helps to synchronize successfully even in difficult conditions.</b> |                     |                             |            |

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## Voltage Window

|  |                  |                             |            |
|--|------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Synchronisation  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0,0 .. 100,0 [%] |                             |            |
| <b>Default value</b>   | 10,0 %           | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 0,1 %            |                             |            |
| <b>Comm object</b>   | 8650             | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard         |                             |            |
| <b>Setpoint visibility</b>   | Always           |                             |            |
| <b>Description</b>   |                  |                             |            |
| This setpoint adjusts maximum difference between generator and mains/bus voltage in respective phases for synchronization. |                  |                             |            |

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## Phase Window

|   |                 |                             |            |
|---|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Synchronisation | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 90 [°]     |                             |            |
| <b>Default value</b>  | 10 °            | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 °             |                             |            |
| <b>Comm object</b>  | 8652            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard        |                             |            |
| <b>Setpoint visibility</b>  | Always          |                             |            |
| <b>Description</b>  |                 |                             |            |
| This setpoint adjusts the maximum absolute value of difference between actual phase angle between the generator and mains/bus voltages for synchronization. |                 |                             |            |

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## Dwell Time

|   |                 |                             |            |
|---|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Synchronisation | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0,0 .. 25,0 [s] |                             |            |
| <b>Default value</b>  | 0,3 s           | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,1 s           |                             |            |
| <b>Comm object</b>  | 8653            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard        |                             |            |
| <b>Setpoint visibility</b>  | Always          |                             |            |
| <b>Description</b>  |                 |                             |            |
| The period of time that the phase angle difference must be within <b>Phase Window (page 359)</b> and voltage difference within <b>Voltage Window (page 359)</b> before the breaker is closed. |                 |                             |            |

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## Slip Frequency

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Synchronisation    | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | -0,50 .. 0,50 [Hz] |                             |            |
| <b>Default value</b>  | -0,25 Hz           | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,01 Hz            |                             |            |
| <b>Comm object</b>  | 14798              | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard           |                             |            |
| <b>Setpoint visibility</b>  | Always             |                             |            |
| <b>Description</b>  |                    |                             |            |
| Slip frequency for slip synchronization ( <b>Synchronization Type (page 358)</b> = Slip Synchro). |                    |                             |            |

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## Slip Frequency Window

|   |                   |                             |            |
|---|-------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Synchronisation   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0,01 .. 0,50 [Hz] |                             |            |
| <b>Default value</b>  | 0,15 Hz           | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,01 Hz           |                             |            |
| <b>Comm object</b>  | 14799             | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard          |                             |            |
| <b>Setpoint visibility</b>  | Always            |                             |            |
| <b>Description</b>  |                   |                             |            |
| Window of slip frequency for slip synchronization ( <b>Synchronization Type (page 358)</b> = Slip Synchro). |                   |                             |            |

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## GCB MGCB Latency

|  |                  |                             |            |
|--|------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Synchronisation  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 20 .. 1 000 [ms] |                             |            |
| <b>Default value</b>   | 80 ms            | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 ms             |                             |            |
| <b>Comm object</b>   | 14800            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard         |                             |            |
| <b>Setpoint visibility</b>   | Always           |                             |            |
| <b>Description</b>   |                  |                             |            |
| Latency of GCB MGCB.   |                  |                             |            |
| <div style="background-color: #f0f0f0; padding: 5px;"> <p><b>IMPORTANT: This setpoint is enable, when Synchronization Type (page 358) has Split Synchro value</b></p> </div> |                  |                             |            |

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## MCB Latency

|   |                  |                             |            |
|---|------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Synchronisation  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 20 .. 1 000 [ms] |                             |            |
| <b>Default value</b>  | 80 ms            | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 ms             |                             |            |
| <b>Comm object</b>  | 14801            | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard         |                             |            |
| <b>Setpoint visibility</b>  | Always           |                             |            |
| <b>Description</b>  |                  |                             |            |
| Latency of MCB.   |                  |                             |            |
| <div style="border: 1px solid black; padding: 5px;"> <b>IMPORTANT: This setpoint is enable, when Synchronization Type (page 358) has Split Synchro value</b> </div> |                  |                             |            |

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## Group: Droop Settings

### Subgroup: Droop Settings

#### Load/Var Sharing Regulation Type

|  |   |                             |   |       |   |            |  |  |  |
|--|---|-----------------------------|---|-------|---|------------|--|--|--|
| <b>Setpoint group</b>  | Droop Settings  | <b>Related FW</b>           | 1.0.0   |       |   |            |  |  |  |
| <b>Range [units]</b>   | Isochronous / Droop / Emergency Droop [-]   |                             |   |       |   |            |  |  |  |
| <b>Default value</b>   | Isonchronous  | <b>Alternative config</b>   | NO  |       |   |            |  |  |  |
| <b>Step</b>  | [-]   |                             |   |       |   |            |  |  |  |
| <b>Comm object</b>   | 13212   | <b>Related applications</b> | MINT  |       |   |            |  |  |  |
| <b>Config level</b>  | Advanced  |                             |   |       |   |            |  |  |  |
| <b>Setpoint visibility</b>   | Visible only if ECU is configured   |                             |   |       |   |            |  |  |  |
| <b>Description</b>   |   |                             |   |       |   |            |  |  |  |
| This setpoint adjusts how the active and reactive power is regulated. The droop is primarily intended for multiple parallel operation in island to ensure the load sharing and VAr sharing when intercontroller communication fails. |   |                             |   |       |   |            |  |  |  |
|  | <table border="1"> <tr> <td style="border: 1px solid black;">Isochronous</td> <td style="border: 1px solid black;">The active and reactive power is regulated based on data communicated between the controller units (intercontroller communication).</td> </tr> <tr> <td style="border: 1px solid black;">Droop</td> <td style="border: 1px solid black;">                     The active and reactive power is not regulated based on data communicated between the units but the speed request and voltage request is calculated from actual voltage and actual frequency of the system.<br/><br/>                     The speed request is correlative to active power and the voltage request is correlative to reactive power.                 </td> </tr> <tr> <td style="border: 1px solid black;">Emrg Droop</td> <td style="border: 1px solid black;">Regulation of active and reactive power is based on standard isochronous regulation based on intercontroller communication but it can be conditionally turned to droop</td> </tr> </table> | Isochronous                 | The active and reactive power is regulated based on data communicated between the controller units (intercontroller communication). | Droop | The active and reactive power is not regulated based on data communicated between the units but the speed request and voltage request is calculated from actual voltage and actual frequency of the system.<br><br>The speed request is correlative to active power and the voltage request is correlative to reactive power. | Emrg Droop | Regulation of active and reactive power is based on standard isochronous regulation based on intercontroller communication but it can be conditionally turned to droop |  |  |
| Isochronous  | The active and reactive power is regulated based on data communicated between the controller units (intercontroller communication).   |                             |   |       |   |            |  |  |  |
| Droop  | The active and reactive power is not regulated based on data communicated between the units but the speed request and voltage request is calculated from actual voltage and actual frequency of the system.<br><br>The speed request is correlative to active power and the voltage request is correlative to reactive power.   |                             |   |       |   |            |  |  |  |
| Emrg Droop   | Regulation of active and reactive power is based on standard isochronous regulation based on intercontroller communication but it can be conditionally turned to droop  |                             |   |       |   |            |  |  |  |

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## Dead Bus GCB Close Master

|  |  |                             |       |          |  |         |  |
|--|--|-----------------------------|-------|----------|--|---------|--|
| <b>Setpoint group</b>  | Droop Settings   | <b>Related FW</b>           | 1.0.0 |          |  |         |  |
| <b>Range [units]</b>   | Disabled / Enabled [-]   |                             |       |          |  |         |  |
| <b>Default value</b>   | Disabled   | <b>Alternative config</b>   | NO    |          |  |         |  |
| <b>Step</b>  | [-]  |                             |       |          |  |         |  |
| <b>Comm object</b>   | 13952  | <b>Related applications</b> | MINT  |          |  |         |  |
| <b>Config level</b>  | Advanced   |                             |       |          |  |         |  |
| <b>Setpoint visibility</b>   | Always   |                             |       |          |  |         |  |
| <b>Description</b>   |  |                             |       |          |  |         |  |
| This setpoint adjusts the behavior of GCB for droop regulation in AUTO mode. If the bus values are without the limits then the controller is prohibited to close it's GCB because of safety reasons.   |  |                             |       |          |  |         |  |
| <table border="1"> <tr> <td>Disabled</td> <td>If the bus values are without the limits then the controller is prohibited to close it's GCB because of safety reasons. Closing of GCB can be done manually in MAN mode.</td> </tr> <tr> <td>Enabled</td> <td>If the bus values are without the limits, controller is allowed to close it's GCB to the dead bus.</td> </tr> </table> |  |                             |       | Disabled | If the bus values are without the limits then the controller is prohibited to close it's GCB because of safety reasons. Closing of GCB can be done manually in MAN mode. | Enabled | If the bus values are without the limits, controller is allowed to close it's GCB to the dead bus. |
| Disabled   | If the bus values are without the limits then the controller is prohibited to close it's GCB because of safety reasons. Closing of GCB can be done manually in MAN mode. |                             |       |          |  |         |  |
| Enabled  | If the bus values are without the limits, controller is allowed to close it's GCB to the dead bus.   |                             |       |          |  |         |  |

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### Subgroup: Frequency Droop

## Frequency Droop Slope

|   |                 |                             |       |
|---|-----------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Droop Settings  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0,0 .. 20,0 [%] |                             |       |
| <b>Default value</b>  | 4,0 %           | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 0,1 %           |                             |       |
| <b>Comm object</b>  | 10032           | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Advanced        |                             |       |
| <b>Setpoint visibility</b>  | Always          |                             |       |
| <b>Description</b>  |                 |                             |       |
| This setpoint defines the slope of the load droop correlation. The slope is set as a droop of frequency in percentages of the requested system frequency (Basic settings: <b>Nominal Frequency (page 247)</b> ) on the range of the requested power from 0 to 100% of Basic settings: <b>Nominal Power (page 242)</b> . |                 |                             |       |

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## Frequency Droop Offset

|   |                |                             |       |
|---|----------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Droop Settings | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0 .. 100 [%]   |                             |       |
| <b>Default value</b>  | 100 %          | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1 %            |                             |       |
| <b>Comm object</b>  | 13213          | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Advanced       |                             |       |
| <b>Setpoint visibility</b>  | Always         |                             |       |
| <b>Description</b>  |                |                             |       |
| This setpoint defines the value of requested power on the requested system frequency (Basic settings: <b>Nominal Frequency (page 247)</b> ). Allows to shift the droop correlation line up or down. |                |                             |       |

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### Subgroup: Voltage Droop

## Voltage Droop Slope

|   |                 |                             |       |
|---|-----------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Droop Settings  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0,0 .. 20,0 [%] |                             |       |
| <b>Default value</b>  | 4,0 %           | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 0,1 %           |                             |       |
| <b>Comm object</b>  | 10033           | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Advanced        |                             |       |
| <b>Setpoint visibility</b>  | Always          |                             |       |
| <b>Description</b>  |                 |                             |       |
| This setpoint defines the slope of the VAr droop correlation. The slope is set as a droop of voltage in percentages of the generator nominal voltage (Basic settings: <b>Nominal Voltage Ph-N (page 246)</b> ) on the range of the requested reactive power from 0 to 100% of nominal reactive power (value of nominal reactive power is not given by setpoint but it is calculated from setpoint <b>Nominal Power (page 242)</b> whilst the PF=0,8). |                 |                             |       |

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## Voltage Droop Offset

|  |                |                             |       |
|--|----------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Droop Settings | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 0 .. 100 [%]   |                             |       |
| <b>Default value</b>   | 100 %          | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 1 %            |                             |       |
| <b>Comm object</b>   | 13214          | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Advanced       |                             |       |
| <b>Setpoint visibility</b>   | Always         |                             |       |
| <b>Description</b>   |                |                             |       |
| This setpoint defines the value of requested reactive power on the nominal voltage (Basic settings: <b>Nominal Voltage Ph-N (page 246)</b> ). Allows to shift the droop correlation line up or down. |                |                             |       |

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### Subgroup: Emergency Droop Settings

## #Number Of Controller On CAN

|   |                |                             |       |
|---|----------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Droop Settings | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 1 .. 32 [-]    |                             |       |
| <b>Default value</b>  | 1              | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 1              |                             |       |
| <b>Comm object</b>  | 13953          | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Advanced       |                             |       |
| <b>Setpoint visibility</b>  | Always         |                             |       |
| <b>Description</b>  |                |                             |       |
| This setpoint defines the minimum number of units supposed to be connected to CAN2. See values CAN16 and CAN32 for information about number of controllers on CAN2 bus. Controller counts itself as well, the number is always 1 or higher, it is never 0. If the number of controllers detected by the controller on CAN2 is lower than the number in this setpoint, the system falls in emergency droop, it means that regulations are switched to droop after delay defined by <b>#Emergency Droop On Delay (page 365)</b> . If the intercontroller communication recovers (the number of controllers detected on CAN2 gets equal or higher than value in this setpoint, then the system turns the regulations back to isochronous mode after delay defined by setpoint <b>#Emergency Droop Off Delay (page 365)</b> . |                |                             |       |
| <p><b>Note:</b> This function is available only when <b>Load/Var Sharing Regulation Type (page 361) = Emergency Droop</b>.</p>  |                |                             |       |

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## #Emergency Droop On Delay

|   |                 |                             |       |
|---|-----------------|-----------------------------|-------|
| <b>Setpoint group</b>   | Droop Settings  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>  | 0,0 .. 10,0 [s] |                             |       |
| <b>Default value</b>  | 10,0 s          | <b>Alternative config</b>   | NO    |
| <b>Step</b>   | 0,1 s           |                             |       |
| <b>Comm object</b>  | 13954           | <b>Related applications</b> | MINT  |
| <b>Config level</b>   | Advanced        |                             |       |
| <b>Setpoint visibility</b>  | Always          |                             |       |
| <b>Description</b>  |                 |                             |       |
| <p>This setpoint adjusts the delay for switching from isochronou regulation to droop regulation when number of controller detected by the controller on CAN2 is lower than the number in the setpoint <b>#Number Of Controller On CAN</b> (page 364).</p> <p><i>Note: This function is available only when Load/Var Sharing Regulation Type (page 361) = Emergency Droop.</i></p> |                 |                             |       |

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## #Emergency Droop Off Delay

|  |                 |                             |       |
|--|-----------------|-----------------------------|-------|
| <b>Setpoint group</b>  | Droop Settings  | <b>Related FW</b>           | 1.0.0 |
| <b>Range [units]</b>   | 0,0 .. 10,0 [s] |                             |       |
| <b>Default value</b>   | 10,0 s          | <b>Alternative config</b>   | NO    |
| <b>Step</b>  | 0,1 s           |                             |       |
| <b>Comm object</b>   | 13955           | <b>Related applications</b> | MINT  |
| <b>Config level</b>  | Advanced        |                             |       |
| <b>Setpoint visibility</b>   | Always          |                             |       |
| <b>Description</b>   |                 |                             |       |
| <p>This setpoint adjusts the delay for switching from droop regulation to isochronous regulation when number of controller detected by the controller on CAN2 is equal or higher than the number in the setpoint <b>#Number Of Controller On CAN</b> (page 364).</p> <p><i>Note: This function is available only when Load/Var Sharing Regulation Type (page 361) = Emergency Droop.</i></p> |                 |                             |       |

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## Group: General Analog Inputs

### General Analog Input 1

#### Analog Protection 1 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9259  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT01 (PAGE 744)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT01 (PAGE 744)</b> .   |   |                             |            |
| <i>Note: These setpoints are used only if LAI AIN PROT01 (PAGE 744) is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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#### Analog Protection 1 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9260  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT01 (PAGE 744)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT01 (PAGE 744)</b> .  |   |                             |            |
| <i>Note: These setpoints are used only if LAI AIN PROT01 (PAGE 744) is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 1 Delay

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>   | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 s   |                             |            |
| <b>Comm object</b>   | 9261  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical analog input <b>AIN PROT01 (PAGE 744)</b> is configured |                             |            |
| <b>Description</b>   |   |                             |            |
| Delay for <b>AIN PROT01 (PAGE 744)</b> .   |   |                             |            |
| <i>Note: These setpoints are used only if LAI <b>AIN PROT01 (PAGE 744)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 1 On

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 11407  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH01 (PAGE 696)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH01 (PAGE 696)</b> on. The value is measured from <b>AIN SWITCH 01 (PAGE 764)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.25 General analog input 1 switch  |  |                             |            |

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## Analog Switch 1 Off

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>   | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>   | 11410  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical binary output <b>AIN SWITCH01 (PAGE 696)</b> is configured |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH01 (PAGE 696)</b> off. The value is measured from <b>AIN SWITCH 01 (PAGE 764)</b> analog input. |  |                             |            |
|  |  |                             |            |
| Image 9.26 General analog input 1 switch   |  |                             |            |

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## General Analog Input 2

### Analog Protection 2 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9262  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT02 (PAGE 745)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT02 (PAGE 745)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT02 (PAGE 745)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 2 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9263  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT02 (PAGE 745)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT02 (PAGE 745)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT02 (PAGE 745)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 2 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9264  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT02 (PAGE 745)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT02 (PAGE 745)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT02 (PAGE 745)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 2 On

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>   | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>   | 11408  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical binary output <b>AIN SWITCH02 (PAGE 696)</b> is configured |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 02 (PAGE 764)</b> on. The value is measured from <b>AIN SWITCH 02 (PAGE 764)</b> analog input. |  |                             |            |
|  |  |                             |            |
| Image 9.27 General analog input 2 switch   |  |                             |            |

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## Analog Switch 2 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 11411  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH02 (PAGE 696)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 02 (PAGE 764)</b> off. The value is measured from <b>AIN SWITCH 02 (PAGE 764)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.28 General analog input 2 switch  |  |                             |            |

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## General Analog Input 3

### Analog Protection 3 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9265  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT03 (PAGE 746)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT03 (PAGE 746)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT03 (PAGE 746)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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### Analog Protection 3 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9266  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT03 (PAGE 746)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT03 (PAGE 746)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT03 (PAGE 746)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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### Analog Protection 3 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9267  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT03 (PAGE 746)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT03 (PAGE 746)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT03 (PAGE 746)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 3 On

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>   | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>   | 11409  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical binary output <b>AIN SWITCH03 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 03 (PAGE 764)</b> on. The value is measured from <b>AIN SWITCH 03 (PAGE 764)</b> analog input. |  |                             |            |
|  |  |                             |            |
| Image 9.29 General analog input 3 switch   |  |                             |            |

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## Analog Switch 3 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 11412  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH03 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 03 (PAGE 764)</b> off. The value is measured from <b>AIN SWITCH 03 (PAGE 764)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.30 General analog input 3 switch  |  |                             |            |

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## General Analog Input 4

### Analog Protection 4 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9268  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT04 (PAGE 747)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT04 (PAGE 747)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT04 (PAGE 747)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 4 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9269  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT04</b> (PAGE 747) is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT04</b> (PAGE 747).   |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT04</b> (PAGE 747) is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 4 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9270  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT04</b> (PAGE 747) is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT04</b> (PAGE 747).   |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT04</b> (PAGE 747) is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 4 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14385  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 04 (PAGE 765)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

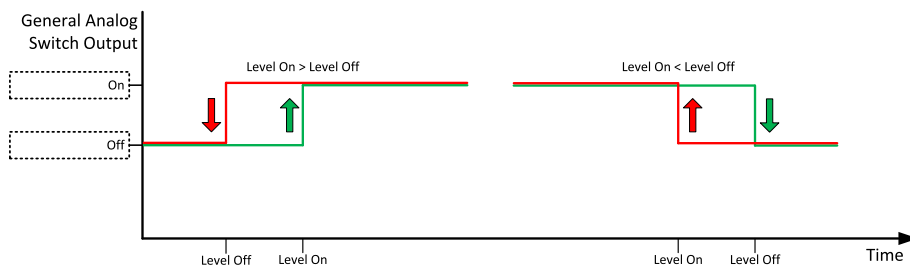


Image 9.31 General analog input 4 switch

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## Analog Switch 4 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14386  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 04 (PAGE 765)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.32 General analog input 4 switch  |  |                             |            |

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## General Analog Input 5

### Analog Protection 5 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9271  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT05 (PAGE 748)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT05 (PAGE 748)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT05 (PAGE 748)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 5 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9272  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT05 (PAGE 748)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT05 (PAGE 748)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT05 (PAGE 748)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 5 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9273  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT05 (PAGE 748)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT05 (PAGE 748)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT05 (PAGE 748)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 5 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14963  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 05 (PAGE 765)** on. The value is measured from **AIN SWITCH 05 (PAGE 765)** analog input.

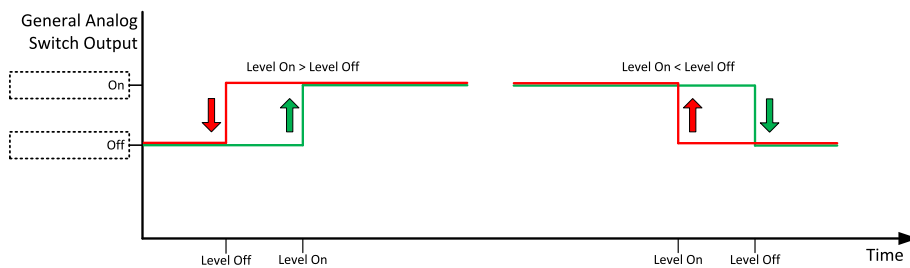


Image 9.33 General analog input 4 switch

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## Analog Switch 5 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14979  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 05 (PAGE 765)</b> off. The value is measured from <b>AIN SWITCH 05 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.34 General analog input 4 switch  |  |                             |            |

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## General Analog Input 6

### Analog Protection 6 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9274  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT06 (PAGE 749)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT06 (PAGE 749)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT06 (PAGE 749)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 6 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9275  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT06 (PAGE 749)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT06 (PAGE 749)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT06 (PAGE 749)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 6 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9276  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT06 (PAGE 749)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT06 (PAGE 749)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT06 (PAGE 749)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 6 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14964  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 06 (PAGE 765)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

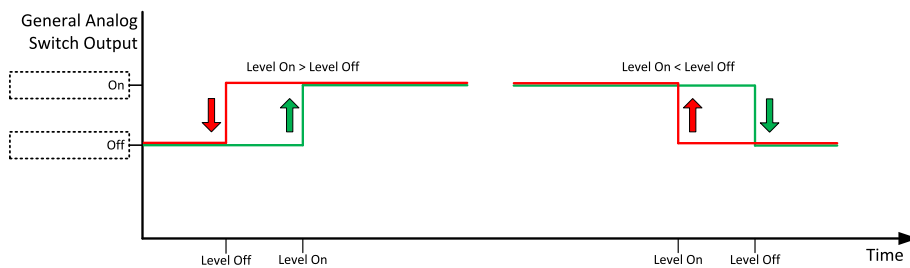


Image 9.35 General analog input 4 switch

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## Analog Switch 6 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14980  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 06 (PAGE 765)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.36 General analog input 4 switch  |  |                             |            |

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## General Analog Input 7

### Analog Protection 7 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9277  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT07 (PAGE 750)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT07 (PAGE 750)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT07 (PAGE 750)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 7 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9278  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT07 (PAGE 750)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT07 (PAGE 750)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT07 (PAGE 750)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 7 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9279  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT07 (PAGE 750)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT07 (PAGE 750)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT07 (PAGE 750)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 7 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14965  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 07 (PAGE 766)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

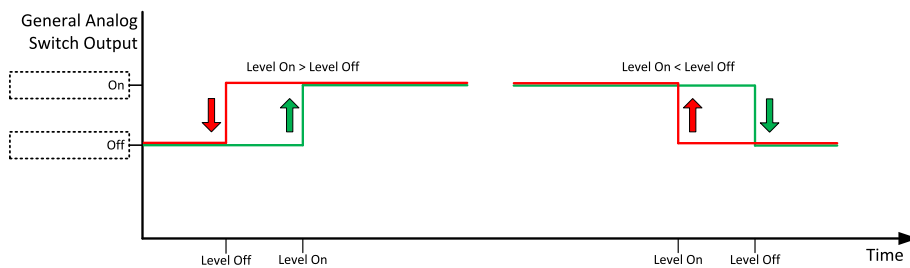


Image 9.37 General analog input 4 switch

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## Analog Switch 7 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14981  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 07 (PAGE 766)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.38 General analog input 4 switch  |  |                             |            |

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## General Analog Input 8

### Analog Protection 8 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9280  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT08 (PAGE 751)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT08 (PAGE 751)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT08 (PAGE 751)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 8 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9281  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT08 (PAGE 751)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT08 (PAGE 751)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT08 (PAGE 751)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 8 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9282  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT08 (PAGE 751)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT08 (PAGE 751)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT08 (PAGE 751)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 8 On

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>   | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>   | 14966  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 08 (PAGE 766)</b> on. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|  |  |                             |            |
| Image 9.39 General analog input 4 switch   |  |                             |            |

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## Analog Switch 8 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14982  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 08 (PAGE 766)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |

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## General Analog Input 9

### Analog Protection 9 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9283  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT09 (PAGE 752)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT09 (PAGE 752)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT09 (PAGE 752)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 9 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9284  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT09</b> (PAGE 752) is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT09</b> (PAGE 752).   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT09</b> (PAGE 752) is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 9 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9285  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT09</b> (PAGE 752) is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT09</b> (PAGE 752).   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT09</b> (PAGE 752) is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Switch 9 On

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>   | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>   | 14967  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 09 (PAGE 766)</b> on. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|  |  |                             |            |
| Image 9.41 General analog input 4 switch   |  |                             |            |

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## Analog Switch 9 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14983  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 09 (PAGE 766)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.42 General analog input 4 switch  |  |                             |            |

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## General Analog Input 10

### Analog Protection 10 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9286  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT10 (PAGE 753)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT10 (PAGE 753)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT10 (PAGE 753)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 10 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9287  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT10 (PAGE 753)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT10 (PAGE 753)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT10 (PAGE 753)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 10 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9288  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT10 (PAGE 753)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT10 (PAGE 753)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT10 (PAGE 753)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 10 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14968  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 10 (PAGE 767)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

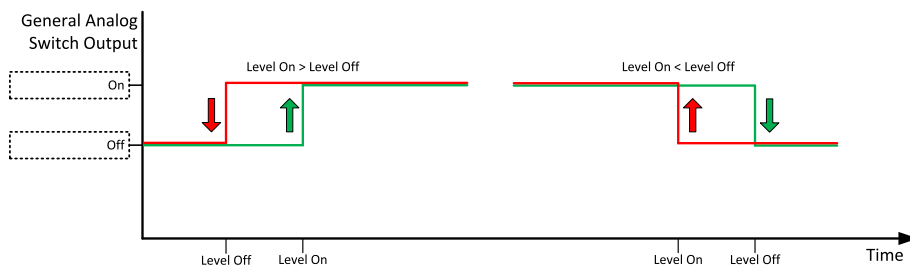


Image 9.43 General analog input 4 switch

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## Analog Switch 10 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14984  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 10 (PAGE 767)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.44 General analog input 4 switch  |  |                             |            |

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## General Analog Input 11

### Analog Protection 11 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9289  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT11 (PAGE 754)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT11 (PAGE 754)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT11 (PAGE 754)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 11 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9290  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT11 (PAGE 754)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT11 (PAGE 754)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT11 (PAGE 754)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 11 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9291  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT11 (PAGE 754)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT11 (PAGE 754)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT11 (PAGE 754)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 11 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14969  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 11 (PAGE 767)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

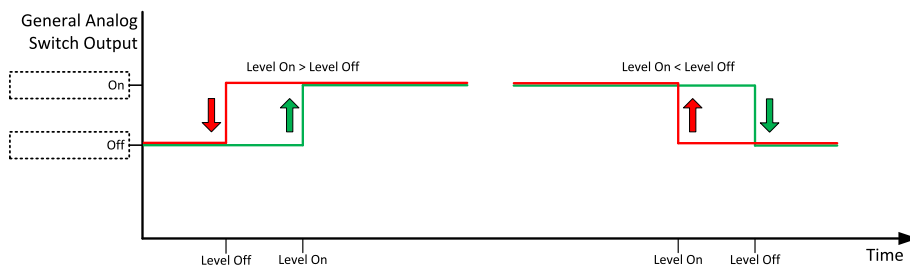


Image 9.45 General analog input 4 switch

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## Analog Switch 11 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14985  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 11 (PAGE 767)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.46 General analog input 4 switch  |  |                             |            |

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## General Analog Input 12

### Analog Protection 12 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9292  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT12 (PAGE 755)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT12 (PAGE 755)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT12 (PAGE 755)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 12 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9293  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT12 (PAGE 755)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT12 (PAGE 755)</b> .  |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT12 (PAGE 755)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 12 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9294  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT12 (PAGE 755)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT12 (PAGE 755)</b> .  |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT12 (PAGE 755)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Switch 12 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14970  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 12 (PAGE 767)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

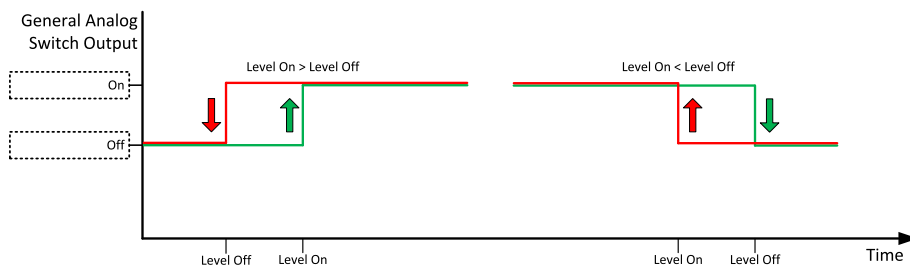


Image 9.47 General analog input 4 switch

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## Analog Switch 12 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14986  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 12 (PAGE 767)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.48 General analog input 4 switch  |  |                             |            |

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## General Analog Input 13

### Analog Protection 13 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9295  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT13 (PAGE 756)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT13 (PAGE 756)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT13 (PAGE 756)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 13 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9296  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT13 (PAGE 756)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT13 (PAGE 756)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT13 (PAGE 756)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 13 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9297  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT13 (PAGE 756)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT13 (PAGE 756)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT13 (PAGE 756)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 13 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14971  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 13 (PAGE 768)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

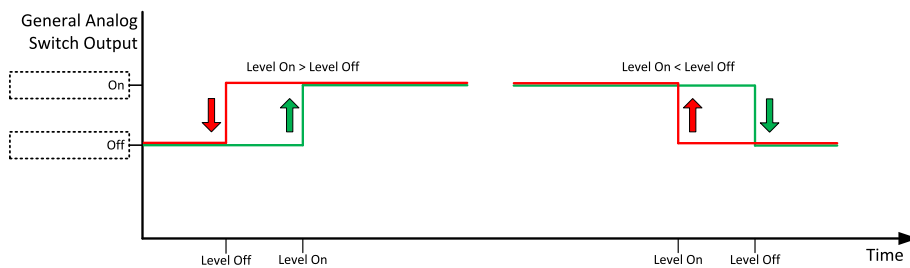


Image 9.49 General analog input 4 switch

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## Analog Switch 13 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14987  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 13 (PAGE 768)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.50 General analog input 4 switch  |  |                             |            |

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## General Analog Input 14

### Analog Protection 14 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9298  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT14 (PAGE 757)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT14 (PAGE 757)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT14 (PAGE 757)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 14 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9299  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT14 (PAGE 757)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT14 (PAGE 757)</b> .  |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT14 (PAGE 757)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 14 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9300  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT14 (PAGE 757)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT14 (PAGE 757)</b> .  |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT14 (PAGE 757)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Switch 14 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14972  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 14 (PAGE 768)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

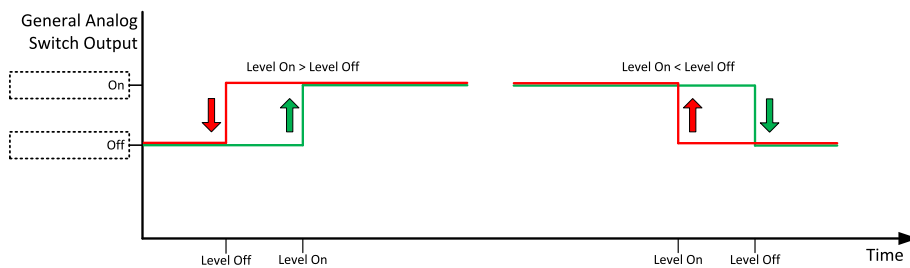


Image 9.51 General analog input 4 switch

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## Analog Switch 14 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14988  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 14 (PAGE 768)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.52 General analog input 4 switch  |  |                             |            |

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## General Analog Input 15

### Analog Protection 15 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9301  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT15 (PAGE 758)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT15 (PAGE 758)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT15 (PAGE 758)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 15 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9302  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT15 (PAGE 758)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT15 (PAGE 758)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT15 (PAGE 758)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 15 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9303  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT15 (PAGE 758)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT15 (PAGE 758)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT15 (PAGE 758)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 15 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14973  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 15 (PAGE 768)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

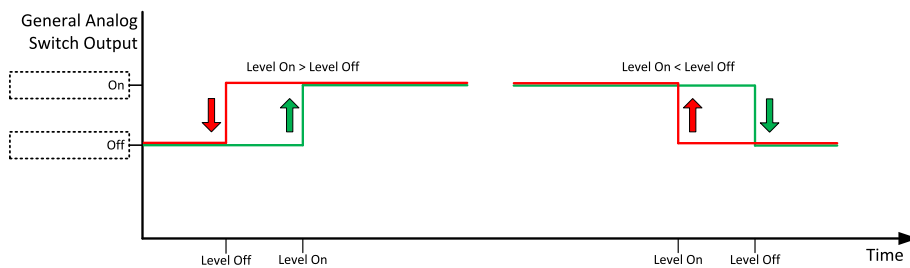


Image 9.53 General analog input 4 switch

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## Analog Switch 15 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14989  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 15 (PAGE 768)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.54 General analog input 4 switch  |  |                             |            |

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## General Analog Input 16

### Analog Protection 16 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9304  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT16 (PAGE 759)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT16 (PAGE 759)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT16 (PAGE 759)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 16 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9305  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT16 (PAGE 759)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT16 (PAGE 759)</b> .  |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT16 (PAGE 759)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 16 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9306  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT16 (PAGE 759)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT16 (PAGE 759)</b> .  |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT16 (PAGE 759)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Switch 16 On

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>   | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>   | 14974  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>   |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 16 (PAGE 769)</b> on. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|  |  |                             |            |
| Image 9.55 General analog input 4 switch   |  |                             |            |

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## Analog Switch 16 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14990  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 16 (PAGE 769)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.56 General analog input 4 switch  |  |                             |            |

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## General Analog Input 17

### Analog Protection 17 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9307  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT17 (PAGE 760)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT17 (PAGE 760)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT17 (PAGE 760)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 17 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9308  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT17 (PAGE 760)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT17 (PAGE 760)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT17 (PAGE 760)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 17 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9309  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT17 (PAGE 760)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT17 (PAGE 760)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT17 (PAGE 760)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 17 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14975  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 17 (PAGE 769)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

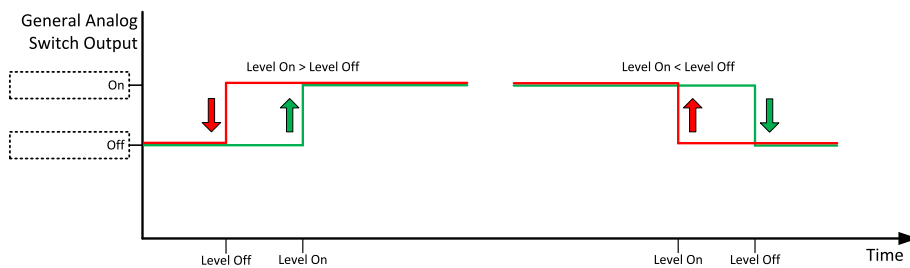


Image 9.57 General analog input 4 switch

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## Analog Switch 17 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14991  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 17 (PAGE 769)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.58 General analog input 4 switch  |  |                             |            |

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## General Analog Input 18

### Analog Protection 18 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9310  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT18 (PAGE 761)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT18 (PAGE 761)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT18 (PAGE 761)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 18 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9311  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT18 (PAGE 761)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT18 (PAGE 761)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT18 (PAGE 761)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 18 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9312  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT18 (PAGE 761)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT18 (PAGE 761)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT18 (PAGE 761)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 18 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14976  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 18 (PAGE 769)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

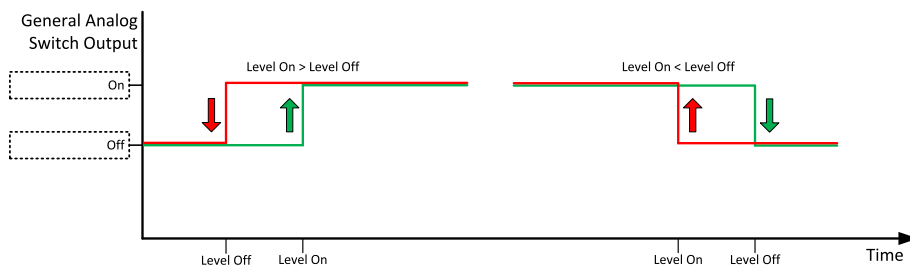


Image 9.59 General analog input 4 switch

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## Analog Switch 18 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14992  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 18 (PAGE 769)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.60 General analog input 4 switch  |  |                             |            |

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## General Analog Input 19

### Analog Protection 19 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9313  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT19 (PAGE 762)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT19 (PAGE 762)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT19 (PAGE 762)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 19 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9314  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT19</b> (PAGE 762) is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT19</b> (PAGE 762).   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT19</b> (PAGE 762) is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 19 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9315  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT19</b> (PAGE 762) is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT19</b> (PAGE 762).   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT19</b> (PAGE 762) is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Switch 19 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14977  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 19 (PAGE 770)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

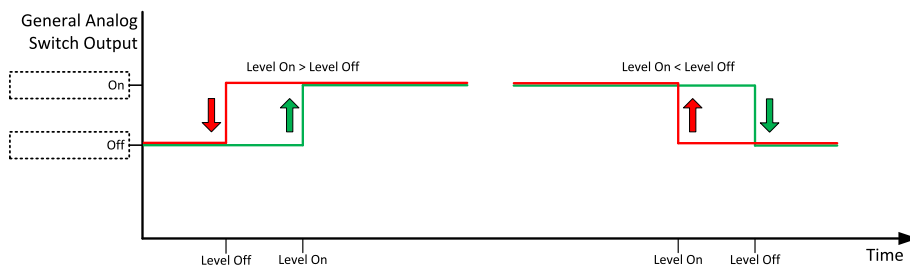


Image 9.61 General analog input 4 switch

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## Analog Switch 19 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14993  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 19 (PAGE 770)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.62 General analog input 4 switch  |  |                             |            |

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## General Analog Input 20

### Analog Protection 20 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9316  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT20 (PAGE 763)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Warning or history threshold level for <b>AIN PROT20 (PAGE 763)</b> .   |   |                             |            |
| <p><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT20 (PAGE 763)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</p> |   |                             |            |

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## Analog Protection 20 Sd

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve   |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve  |                             |            |
| <b>Comm object</b>  | 9317  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT20 (PAGE 763)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Shutdown or BOC threshold level for <b>AIN PROT20 (PAGE 763)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT20 (PAGE 763)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Protection 20 Delay

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0 .. 900 [s]  |                             |            |
| <b>Default value</b>  | 0 s   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 s   |                             |            |
| <b>Comm object</b>  | 9318  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical analog input <b>AIN PROT20 (PAGE 763)</b> is configured |                             |            |
| <b>Description</b>  |   |                             |            |
| Delay for <b>AIN PROT20 (PAGE 763)</b> .  |   |                             |            |
| <i><b>Note:</b> These setpoints are used only if LAI <b>AIN PROT20 (PAGE 763)</b> is adjusted to required protection type. Otherwise these setpoints are useless.</i> |   |                             |            |

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## Analog Switch 20 On

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>       | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>         | 14978  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |

### Description

Threshold level for switching the binary output **AIN SWITCH 20 (PAGE 770)** on. The value is measured from **AIN SWITCH 04 (PAGE 765)** analog input.

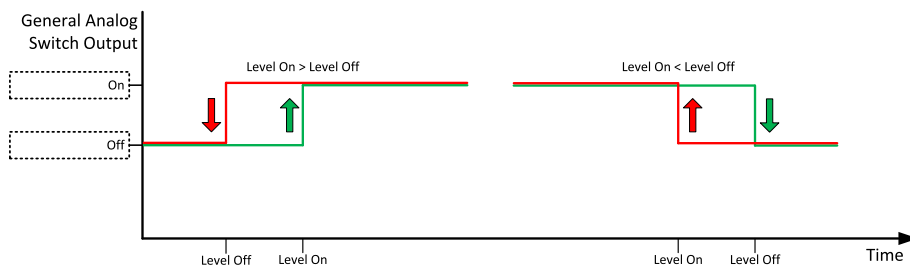


Image 9.63 General analog input 4 switch

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## Analog Switch 20 Off

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | General Analog Inputs  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve  |                             |            |
| <b>Default value</b>  | the value is defined by analog sensor curve  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve   |                             |            |
| <b>Comm object</b>  | 14994  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Visible only if the logical binary output <b>AIN SWITCH04 (PAGE 697)</b> is configured |                             |            |
| <b>Description</b>  |  |                             |            |
| Threshold level for switching the binary output <b>AIN SWITCH 20 (PAGE 770)</b> off. The value is measured from <b>AIN SWITCH 04 (PAGE 765)</b> analog input. |  |                             |            |
|   |  |                             |            |
| Image 9.64 General analog input 4 switch  |  |                             |            |

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## Group: Scheduler

### Subgroup: Time & Date

#### Time

|                             |              |                             |            |
|-----------------------------|--------------|-----------------------------|------------|
| <b>Setpoint group</b>       | Scheduler    | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>        | HH:MM:SS [-] |                             |            |
| <b>Default value</b>        | 0:0:0        | <b>Alternative config</b>   | NO         |
| <b>Step</b>                 | [-]          |                             |            |
| <b>Comm object</b>          | 24554        | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>         | Standard     |                             |            |
| <b>Setpoint visibility</b>  | Always       |                             |            |
| <b>Description</b>          |              |                             |            |
| Real time clock adjustment. |              |                             |            |

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## Date

|                            |                |                             |            |
|----------------------------|----------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Scheduler      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | DD/MM/YYYY [-] |                             |            |
| <b>Default value</b>       | 1.1.2015       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | [-]            |                             |            |
| <b>Comm object</b>         | 24553          | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard       |                             |            |
| <b>Setpoint visibility</b> | Always         |                             |            |
| <b>Description</b>         |                |                             |            |
| Actual date adjustment.    |                |                             |            |

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## Time Stamp Period

|  |                |                             |            |
|--|----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 240 [min] |                             |            |
| <b>Default value</b>   | 60 min         | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 min          |                             |            |
| <b>Comm object</b>   | 8979           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard       |                             |            |
| <b>Setpoint visibility</b>                                       | Always         |                             |            |
| <b>Description</b>   |                |                             |            |
| Time interval for periodic history records.                      |                |                             |            |
| <i>Note: History record is made only when engine is running.</i> |                |                             |            |

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## #Summer Time Mode

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                                 | Scheduler   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                  | Disabled / Winter / Summer / Winter - S / Summer - S [-]  |                             |            |
| <b>Default value</b>                                  | Disabled  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>                                    | 8727  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                   | Advanced  |                             |            |
| <b>Setpoint visibility</b>                            | Always  |                             |            |
| <b>Description</b>                                    |   |                             |            |
| Behavior of switching between winter and summer time. |   |                             |            |
| Disable   | Automatic switching between summer and wintertime is disabled.  |                             |            |
| Winter (Summer)                                       | Automatic switching between summer and wintertime is enabled and it is set to winter (summer) season. |                             |            |
| Winter - S (Summer - S)                               | Modification for southern hemisphere.   |                             |            |

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## Subgroup: Timer 1

### Timer 1 Setup

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Setpoint group</b>   | Scheduler | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | [-]       |                             |            |
| <b>Default value</b>  | [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]       |                             |            |
| <b>Comm object</b>  | 10969     | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Always    |                             |            |
| <b>Description</b>  |           |                             |            |
| <p>Related setpoints for timer 1 are:</p> <ul style="list-style-type: none"> <li>▶ <a href="#">Timer 1 Function (page 428)</a></li> <li>▶ <a href="#">Timer 1 Day (page 432)</a></li> <li>▶ <a href="#">Timer 1 Repetition (page 429)</a></li> <li>▶ <a href="#">Timer 1 Repeated Day In Week (page 433)</a></li> <li>▶ <a href="#">Timer 1 First Occur. Date (page 429)</a></li> <li>▶ <a href="#">Timer 1 Repeat Day In Month (page 433)</a></li> <li>▶ <a href="#">Timer 1 First Occur. Time (page 429)</a></li> <li>▶ <a href="#">Timer 1 Repeat Week In Month (page 434)</a></li> <li>▶ <a href="#">Timer 1 Duration (page 430)</a></li> <li>▶ <a href="#">Timer 1 Refresh Period (page 431)</a></li> <li>▶ <a href="#">Timer 1 Repeated (page 430)</a></li> <li>▶ <a href="#">Timer 1 Weekends (page 432)</a></li> <li>▶ <a href="#">Timer 1 Repeat Day (page 433)</a></li> </ul> |           |                             |            |

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## Timer 1 Function

|   |   |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
|---|---|-----------------------------|------------|---------|------------------------|---------|---|----------|---|------|---|-----------|---|-----------|--|----------|--|
| <b>Setpoint group</b>   | Scheduler   | <b>Related FW</b>           | 1.0.0      |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Range [units]</b>  | Disable / No Func / TEST / Test OnLd / MFail Blk / Mode OFF [-]   |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Default value</b>  | Disable   | <b>Alternative config</b>   | NO         |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Step</b>   | [-]   |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Comm object</b>  | 15358   | <b>Related applications</b> | MINT, SPtM |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Config level</b>   | Standard  |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Setpoint visibility</b>  | Always  |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Description</b>  |   |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <p>It is possible to choose from following timer functions. Binary output <b>EXERCISE TIMER 1 (PAGE 713)</b> is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.</p> <p><b>IMPORTANT: Binary output is activated always when timer should be activated e.g. even when controller is in different mode than AUTO.</b></p> <p>Timer 1 has the highest priority. Timer 8 has the lowest priority. So if Timer 1 is configured for OFF mode and Timer 8 is over the same time configured for AUTO mode, controller will work in OFF mode.</p> <p>Controller activates timer whenever it is powered up even in period, where timer should be already running.</p> <table> <tr> <td>Disable</td> <td>The Timer is disabled.</td> </tr> <tr> <td>No Func</td> <td>There is no any other function, only binary output of timer is activated.</td> </tr> <tr> <td>Auto Run</td> <td>When this option is chosen then the binary output of timer is internally connected to the <b>REMOTE START/STOP (PAGE 677)</b> binary input.</td> </tr> <tr> <td>TEST</td> <td>When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST.</td> </tr> <tr> <td>TEST OnLd</td> <td>When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input.</td> </tr> <tr> <td>MFail Blk</td> <td>When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input.</td> </tr> <tr> <td>Mode OFF</td> <td>When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input.</td> </tr> </table> |   |                             |            | Disable | The Timer is disabled. | No Func | There is no any other function, only binary output of timer is activated. | Auto Run | When this option is chosen then the binary output of timer is internally connected to the <b>REMOTE START/STOP (PAGE 677)</b> binary input. | TEST | When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST. | TEST OnLd | When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input. | MFail Blk | When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input. | Mode OFF | When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input. |
| Disable   | The Timer is disabled.  |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| No Func   | There is no any other function, only binary output of timer is activated.   |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| Auto Run  | When this option is chosen then the binary output of timer is internally connected to the <b>REMOTE START/STOP (PAGE 677)</b> binary input. |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| TEST  | When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST.                         |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| TEST OnLd   | When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input.                 |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| MFail Blk   | When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input.                    |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| Mode OFF  | When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input.                          |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |

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## Timer 1 Repetition

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>                                      | Scheduler   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                       | Off / Once / Repeated [-]   |                             |            |
| <b>Default value</b>                                       | Off   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]   |                             |            |
| <b>Comm object</b>   | 0   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>                                 | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b>      |                             |            |
| <b>Description</b>   |   |                             |            |
| Defines repetition of <b>Timer 1 Function (page 428)</b> . |   |                             |            |
| Off  | <b>Timer 1 Function (page 428)</b> will not be activated.           |                             |            |
| Once   | <b>Timer 1 Function (page 428)</b> will be activated only one time. |                             |            |
| Repeated   | <b>Timer 1 Function (page 428)</b> will be repeatedly activated.    |                             |            |

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## Timer 1 First Occur. Date

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | [DD/MM/YYYY]   |                             |            |
| <b>Default value</b>   | 01/01/2000   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>                                       | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| Date of first occurrence of <b>Timer 1 Function (page 428)</b> . |  |                             |            |

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## Timer 1 First Occur. Time

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | [HH:MM]  |                             |            |
| <b>Default value</b>   | 00:00  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>                                       | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| Time of first occurrence of <b>Timer 1 Function (page 428)</b> . |  |                             |            |

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## Timer 1 Duration

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                      | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                       | [HH:MM]  |                             |            |
| <b>Default value</b>                       | 00:00  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                | [-]  |                             |            |
| <b>Comm object</b>                         | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                        | Standard   |                             |            |
| <b>Setpoint visibility</b>                 | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b> |                             |            |
| <b>Description</b>                         |  |                             |            |
| Timer 1 Function (page 428) duration time. |  |                             |            |

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## Timer 1 Repeated

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>                                     | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                      | Daily / Weekly / Monthly / Short Period [-]  |                             |            |
| <b>Default value</b>                                      | Daily  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]  |                             |            |
| <b>Comm object</b>  | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                       | Standard   |                             |            |
| <b>Setpoint visibility</b>                                | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b>   |                             |            |
| <b>Description</b>  |  |                             |            |
| Repeated interval of <b>Timer 1 Function (page 428)</b> . |  |                             |            |
| Daily   | <b>Timer 1 Function (page 428)</b> is repeated every day.  |                             |            |
| Weekly  | <b>Timer 1 Function (page 428)</b> is repeated every week in chosen days.  |                             |            |
| Monthly   | <b>Timer 1 Function (page 428)</b> is repeated in chosen day every month or in chosen days of chosen week of month |                             |            |
| Short Period  | <b>Timer 1 Function (page 428)</b> is repeated in adjusted period.   |                             |            |

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## Timer 1 Refresh Period

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | [-]   |                             |            |
| <b>Default value</b>   | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]   |                             |            |
| <b>Comm object</b>   | 0   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b>  |                             |            |
| <b>Description</b>   |   |                             |            |
| Refresh period of <b>Timer 1 Function (page 428)</b> . Meaning of this setpoint depends on type of repetition adjusted in <b>Timer 1 Repeated (page 430)</b> . |   |                             |            |
| Daily  | <p>Range [units]: 1 .. 1000 [day]. This setpoint adjust that every X day the timer will be activated.</p> <p><b>Example:</b> If you have daily repetition and you set this setpoint to 2, then every second day from first occurrence of <b>Timer 1 Function (page 428)</b>, the <b>Timer 1 Function (page 428)</b> will be activated.</p>  |                             |            |
| Weekly   | <p>Range [units]: 1 .. 60 [week]. This setpoint adjust that every X week the timer will be activated.</p> <p><b>Example:</b> If you have weekly repetition and you set this setpoint to 2, then every second week from first occurrence of <b>Timer 1 Function (page 428)</b>, the <b>Timer 1 Function (page 428)</b> will be activated in selected days adjusted by <b>Timer 1 Day (page 432)</b>.</p>   |                             |            |
| Monthly  | <p>Range [units]: 1 .. 12 [month]. This setpoint adjust that every X month the timer will be activated.</p> <p><b>Example:</b> If you have monthly repetition and you set this setpoint to 2, then every second month from first occurrence of <b>Timer 1 Function (page 428)</b>, the <b>Timer 1 Function (page 428)</b> will be activated in selected day of month adjusted by <b>Timer 1 Repeat Day In Month (page 433)</b> or in selected days of week of month adjusted by <b>Timer 1 Day (page 432)</b> and <b>Timer 1 Repeat Week In Month (page 434)</b>.</p> |                             |            |
| Short Period   | <p>Range [units]: [HH:MM]. This setpoint adjust that every X short period the timer will be activated.</p> <p><b>Example:</b> If you have short period repetition and you set this setpoint to 2, then every second minute from first occurrence of <b>Timer 1 Function (page 428)</b>, the <b>Timer 1 Function (page 428)</b> will be activated.</p>   |                             |            |

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## Timer 1 Weekends

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                                       | Scheduler   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Including / Skip / Postpone [-]   |                             |            |
| <b>Default value</b>  | Including   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 0   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>                                  | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b>  |                             |            |
| <b>Description</b>  |   |                             |            |
| Behavior of <b>Timer 1 Function (page 428)</b> on weekends. |   |                             |            |
| Including   | <b>Timer 1 Function (page 428)</b> counter is running on the weekends and <b>Timer 1 Function (page 428)</b> can be active.   |                             |            |
| Skip  | <b>Timer 1 Function (page 428)</b> counter is running on the weekends but <b>Timer 1 Function (page 428)</b> isn't active.  |                             |            |
| Postpone  | <b>Timer 1 Function (page 428)</b> counter isn't running on the weekends and <b>Timer 1 Function (page 428)</b> isn't active. If the activation of timer is counted on the weekend, than timer will be activated after weekend. Another activation of timer is counted from original date of first occurrence date. |                             |            |

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## Timer 1 Day

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-] |                             |            |
| <b>Default value</b>   | All OFF  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b>         |                             |            |
| <b>Description</b>   |  |                             |            |
| Use this setpoint to include or exclude individual days of week. To select the day use Up and Down buttons. To change the value of day use Enter button. |  |                             |            |

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## Timer 1 Repeat Day

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Repeated Day / Repeated Day In Week [-]                        |                             |            |
| <b>Default value</b>  | Repeated Day   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]  |                             |            |
| <b>Comm object</b>  | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b> |                             |            |
| <b>Description</b>  |  |                             |            |
| Use this setpoint to adjust behavior of monthly repetition of the <b>Timer 1 Function (page 428)</b> .              |  |                             |            |
| Repeated Day                      Chose one day in month when <b>Timer 1 Function (page 428)</b> will be activated. |  |                             |            |
| Repeated Day In Week      Chose days in one week when <b>Timer 1 Function (page 428)</b> will be activated.         |  |                             |            |

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## Timer 1 Repeated Day In Week

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-] |                             |            |
| <b>Default value</b>   | All OFF  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b>         |                             |            |
| <b>Description</b>   |  |                             |            |
| Use this setpoint to select the day of week when timer will be activated.                                |  |                             |            |
| <i>Note: More day can be selected. Timer will be activated on the day which happened like the first.</i> |  |                             |            |

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## Timer 1 Repeat Day In Month

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 1..31 [day]  |                             |            |
| <b>Default value</b>   | 0  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| Use this setpoint to chose the day in month when the <b>Timer 1 Function (page 428)</b> will be activated. |  |                             |            |

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## Timer 1 Repeat Week In Month

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 5 [week]  |                             |            |
| <b>Default value</b>  | 1 week   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 week   |                             |            |
| <b>Comm object</b>  | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Timer 1 Function (page 428)</b> |                             |            |
| <b>Description</b>  |  |                             |            |
| This setpoint adjust the week of month in which the <b>Timer 1 Function (page 428)</b> will be activated. |  |                             |            |

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## Subgroup: Timer 2

### Timer 2 Setup

|   |           |  |            |
|---|-----------|--|------------|
| <b>Setpoint group</b>                         | Scheduler | <b>Related FW</b>                                | 1.0.0      |
| <b>Range [units]</b>                          | [-]       |  |            |
| <b>Default value</b>                          | [-]       | <b>Alternative config</b>                        | NO         |
| <b>Step</b>                                   | [-]       |  |            |
| <b>Comm object</b>                            | 10970     | <b>Related applications</b>                      | MINT, SPtM |
| <b>Config level</b>                           | Standard  |  |            |
| <b>Setpoint visibility</b>                    | Always    |  |            |
| <b>Description</b>                            |           |  |            |
| Related setpoints for timer 2 are:            |           |  |            |
| ▶ <b>Timer 2 Function (page 435)</b>          |           | ▶ <b>Timer 2 Day (page 439)</b>                  |            |
| ▶ <b>Timer 2 Repetition (page 436)</b>        |           | ▶ <b>Timer 2 Repeated Day In Week (page 440)</b> |            |
| ▶ <b>Timer 2 First Occur. Date (page 436)</b> |           | ▶ <b>Timer 2 Repeat Day In Month (page 440)</b>  |            |
| ▶ <b>Timer 2 First Occur. Time (page 436)</b> |           | ▶ <b>Timer 2 Repeat Week In Month (page 441)</b> |            |
| ▶ <b>Timer 2 Duration (page 437)</b>          |           | ▶ <b>Timer 2 Refresh Period (page 438)</b>       |            |
| ▶ <b>Timer 2 Repeated (page 437)</b>          |           | ▶ <b>Timer 2 Weekends (page 439)</b>             |            |
| ▶ <b>Timer 2 Repeat Day (page 440)</b>        |           |  |            |

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## Timer 2 Function

|   |   |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
|---|---|-----------------------------|------------|---------|------------------------|---------|---|----------|---|------|---|-----------|---|-----------|--|----------|--|
| <b>Setpoint group</b>   | Scheduler   | <b>Related FW</b>           | 1.0.0      |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Range [units]</b>  | Disable / No Func / TEST / Test OnLd / MFail Blk / Mode OFF [-]   |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Default value</b>  | No Func   | <b>Alternative config</b>   | NO         |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Step</b>   | [-]   |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Comm object</b>  | 15359   | <b>Related applications</b> | MINT, SPtM |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Config level</b>   | Standard  |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Setpoint visibility</b>  | Always  |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <b>Description</b>  |   |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| <p>It is possible to choose from following Timer functions. Binary output <b>EXERCISE TIMER 2 (PAGE 714)</b> is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.</p> <p><b>IMPORTANT: Binary output is activated always when timer should be activated e.g. even when controller is in different mode than AUTO.</b></p> <p>Timer 1 has the highest priority. Timer 8 has the lowest priority. So if Timer 1 is configured for OFF mode and Timer 8 is over the same time configured for AUTO mode, controller will work in OFF mode.</p> <p>Controller activates timer whenever it is powered up even in period, where timer should be already running.</p> <table> <tr> <td>Disable</td> <td>The Timer is disabled.</td> </tr> <tr> <td>No Func</td> <td>There is no any other function, only binary output of timer is activated.</td> </tr> <tr> <td>Auto Run</td> <td>When this option is chosen then the binary output of timer is internally connected to the <b>REMOTE START/STOP (PAGE 677)</b> binary input.</td> </tr> <tr> <td>TEST</td> <td>When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST.</td> </tr> <tr> <td>TEST OnLd</td> <td>When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input.</td> </tr> <tr> <td>MFail Blk</td> <td>When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input.</td> </tr> <tr> <td>Mode OFF</td> <td>When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input.</td> </tr> </table> |   |                             |            | Disable | The Timer is disabled. | No Func | There is no any other function, only binary output of timer is activated. | Auto Run | When this option is chosen then the binary output of timer is internally connected to the <b>REMOTE START/STOP (PAGE 677)</b> binary input. | TEST | When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST. | TEST OnLd | When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input. | MFail Blk | When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input. | Mode OFF | When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input. |
| Disable   | The Timer is disabled.  |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| No Func   | There is no any other function, only binary output of timer is activated.   |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| Auto Run  | When this option is chosen then the binary output of timer is internally connected to the <b>REMOTE START/STOP (PAGE 677)</b> binary input. |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| TEST  | When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST.                         |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| TEST OnLd   | When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input.                 |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| MFail Blk   | When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input.                    |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |
| Mode OFF  | When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input.                          |                             |            |         |                        |         |   |          |   |      |   |           |   |           |  |          |  |

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## Timer 2 Repetition

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>                                      | Scheduler   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                       | Off / Once / Repeated [-]   |                             |            |
| <b>Default value</b>                                       | Off   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]   |                             |            |
| <b>Comm object</b>   | 0   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>                                 | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b>      |                             |            |
| <b>Description</b>   |   |                             |            |
| Defines repetition of <b>Timer 2 Function (page 435)</b> . |   |                             |            |
| Off  | <b>Timer 2 Function (page 435)</b> will not be activated.           |                             |            |
| Once   | <b>Timer 2 Function (page 435)</b> will be activated only one time. |                             |            |
| Repeated   | <b>Timer 2 Function (page 435)</b> will be repeatedly activated.    |                             |            |

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## Timer 2 First Occur. Date

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | [DD/MM/YYYY]   |                             |            |
| <b>Default value</b>   | 01/01/2000   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>                                       | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| Date of first occurrence of <b>Timer 2 Function (page 435)</b> . |  |                             |            |

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## Timer 2 First Occur. Time

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | [HH:MM]  |                             |            |
| <b>Default value</b>   | 00:00  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>                                       | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| Time of first occurrence of <b>Timer 2 Function (page 435)</b> . |  |                             |            |

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## Timer 2 Duration

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>                      | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                       | [HH:MM]  |                             |            |
| <b>Default value</b>                       | 00:00  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                | [-]  |                             |            |
| <b>Comm object</b>                         | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                        | Standard   |                             |            |
| <b>Setpoint visibility</b>                 | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b> |                             |            |
| <b>Description</b>                         |  |                             |            |
| Timer 2 Function (page 435) duration time. |  |                             |            |

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## Timer 2 Repeated

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>                                     | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                      | Daily / Weekly / Monthly / Short Period [-]  |                             |            |
| <b>Default value</b>                                      | Daily  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]  |                             |            |
| <b>Comm object</b>  | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                       | Standard   |                             |            |
| <b>Setpoint visibility</b>                                | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b>   |                             |            |
| <b>Description</b>  |  |                             |            |
| Repeated interval of <b>Timer 2 Function (page 435)</b> . |  |                             |            |
| Daily   | <b>Timer 2 Function (page 435)</b> is repeated every day.  |                             |            |
| Weekly  | <b>Timer 2 Function (page 435)</b> is repeated every week in chosen days.  |                             |            |
| Monthly   | <b>Timer 2 Function (page 435)</b> is repeated in chosen day every month or in chosen days of chosen week of month |                             |            |
| Short Period  | <b>Timer 2 Function (page 435)</b> is repeated in adjusted period.   |                             |            |

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## Timer 2 Refresh Period

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | [-]   |                             |            |
| <b>Default value</b>   | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]   |                             |            |
| <b>Comm object</b>   | 0   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b>  |                             |            |
| <b>Description</b>   |   |                             |            |
| Refresh period of <b>Timer 2 Function (page 435)</b> . Meaning of this setpoint depends on type of repetition adjusted in <b>Timer 2 Repeated (page 437)</b> . |   |                             |            |
| Daily  | <p>Range [units]: 1 .. 1000 [day]. This setpoint adjust that every X day the timer will be activated.</p> <p><b>Example:</b> If you have daily repetition and you set this setpoint to 2, then every second day from first occurrence of <b>Timer 2 Function (page 435)</b>, the <b>Timer 2 Function (page 435)</b> will be activated.</p>  |                             |            |
| Weekly   | <p>Range [units]: 1 .. 60 [week]. This setpoint adjust that every X week the timer will be activated.</p> <p><b>Example:</b> If you have weekly repetition and you set this setpoint to 2, then every second week from first occurrence of <b>Timer 2 Function (page 435)</b>, the <b>Timer 2 Function (page 435)</b> will be activated in selected days adjusted by <b>Timer 2 Day (page 439)</b>.</p>   |                             |            |
| Monthly  | <p>Range [units]: 1 .. 12 [month]. This setpoint adjust that every X month the timer will be activated.</p> <p><b>Example:</b> If you have monthly repetition and you set this setpoint to 2, then every second month from first occurrence of <b>Timer 2 Function (page 435)</b>, the <b>Timer 2 Function (page 435)</b> will be activated in selected day of month adjusted by <b>Timer 2 Repeat Day In Month (page 440)</b> or in selected days of week of month adjusted by <b>Timer 2 Day (page 439)</b> and <b>Timer 2 Repeat Week In Month (page 441)</b>.</p> |                             |            |
| Short Period   | <p>Range [units]: [HH:MM]. This setpoint adjust that every X short period the timer will be activated.</p> <p><b>Example:</b> If you have short period repetition and you set this setpoint to 2, then every second minute from first occurrence of <b>Timer 2 Function (page 435)</b>, the <b>Timer 2 Function (page 435)</b> will be activated.</p>   |                             |            |

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## Timer 2 Weekends

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                                       | Scheduler   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Including / Skip / Postpone [-]   |                             |            |
| <b>Default value</b>  | Including   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 0   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>                                  | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b>  |                             |            |
| <b>Description</b>  |   |                             |            |
| Behavior of <b>Timer 2 Function (page 435)</b> on weekends. |   |                             |            |
| Including   | <b>Timer 2 Function (page 435)</b> counter is running on the weekends and <b>Timer 2 Function (page 435)</b> can be active.   |                             |            |
| Skip  | <b>Timer 2 Function (page 435)</b> counter is running on the weekends but <b>Timer 2 Function (page 435)</b> isn't active.  |                             |            |
| Postpone  | <b>Timer 2 Function (page 435)</b> counter isn't running on the weekends and <b>Timer 2 Function (page 435)</b> isn't active. If the activation of timer is counted on the weekend, than timer will be activated after weekend. Another activation of timer is counted from original date of first occurrence date. |                             |            |

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## Timer 2 Day

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-] |                             |            |
| <b>Default value</b>   | All OFF  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b>         |                             |            |
| <b>Description</b>   |  |                             |            |
| Use this setpoint to include or exclude individual days of week. To select the day use Up and Down buttons. To change the value of day use Enter button. |  |                             |            |

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## Timer 2 Repeat Day

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Repeated Day / Repeated Day In Week [-]                        |                             |            |
| <b>Default value</b>  | Repeated Day   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]  |                             |            |
| <b>Comm object</b>  | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b> |                             |            |
| <b>Description</b>  |  |                             |            |
| Use this setpoint to adjust behavior of monthly repetition of the <b>Timer 2 Function (page 435)</b> .              |  |                             |            |
| Repeated Day                      Chose one day in month when <b>Timer 2 Function (page 435)</b> will be activated. |  |                             |            |
| Repeated Day In Week      Chose days in one week when <b>Timer 2 Function (page 435)</b> will be activated.         |  |                             |            |

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## Timer 2 Repeated Day In Week

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-] |                             |            |
| <b>Default value</b>   | All OFF  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b>         |                             |            |
| <b>Description</b>   |  |                             |            |
| Use this setpoint to select the day of week when timer will be activated.                                |  |                             |            |
| <i>Note: More day can be selected. Timer will be activated on the day which happened like the first.</i> |  |                             |            |

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## Timer 2 Repeat Day In Month

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 1..31 [day]  |                             |            |
| <b>Default value</b>   | 0  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| Use this setpoint to chose the day in month when the <b>Timer 2 Function (page 435)</b> will be activated. |  |                             |            |

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## Timer 2 Repeat Week In Month

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 5 [week]  |                             |            |
| <b>Default value</b>  | 1 week   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 week   |                             |            |
| <b>Comm object</b>  | 0  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard   |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Timer 2 Function (page 435)</b> |                             |            |
| <b>Description</b>  |  |                             |            |
| This setpoint adjust the week of month in which the <b>Timer 2 Function (page 435)</b> will be activated. |  |                             |            |

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### Subgroup: Rental Timers

#### Rental Timer 1

|  |                           |                             |            |
|--|---------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler                 | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Disabled / 1 .. 8 760 [h] |                             |            |
| <b>Default value</b>   | Disabled                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 h                       |                             |            |
| <b>Comm object</b>   | 14326                     | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced                  |                             |            |
| <b>Setpoint visibility</b>   | Always                    |                             |            |
| <b>Description</b>   |                           |                             |            |
| Another engine start is not allowed when this timer elapsed. This timer is based on engine running hours. The alarm <b>Rental Timer 1 Elapsed (page 798)</b> will be recorded in alarm list and the binary output <b>AL RENTAL TIMER 1 (PAGE 694)</b> will close.  |                           |                             |            |
| <p><b>IMPORTANT: To reset Rental Timer 1 (page 441) we have to set up Rental Timer 1 (page 441) again. It means go to setpoint group Scheduler and to the setpoint Rental Timer 1 (page 441). Then press enter button , change the value if it is necessary and press enter button  again.</b></p> |                           |                             |            |
| When the <b>Rental Timer 1 (page 441)</b> elapsed during engine run the gen-set will not stop immediately. The adjustable <b>Rental Timer BOC (page 445)</b> timer will start in this moment. The engine will be cooled and stopped when the <b>Rental Timer BOC (page 445)</b> time elapsed.  |                           |                             |            |

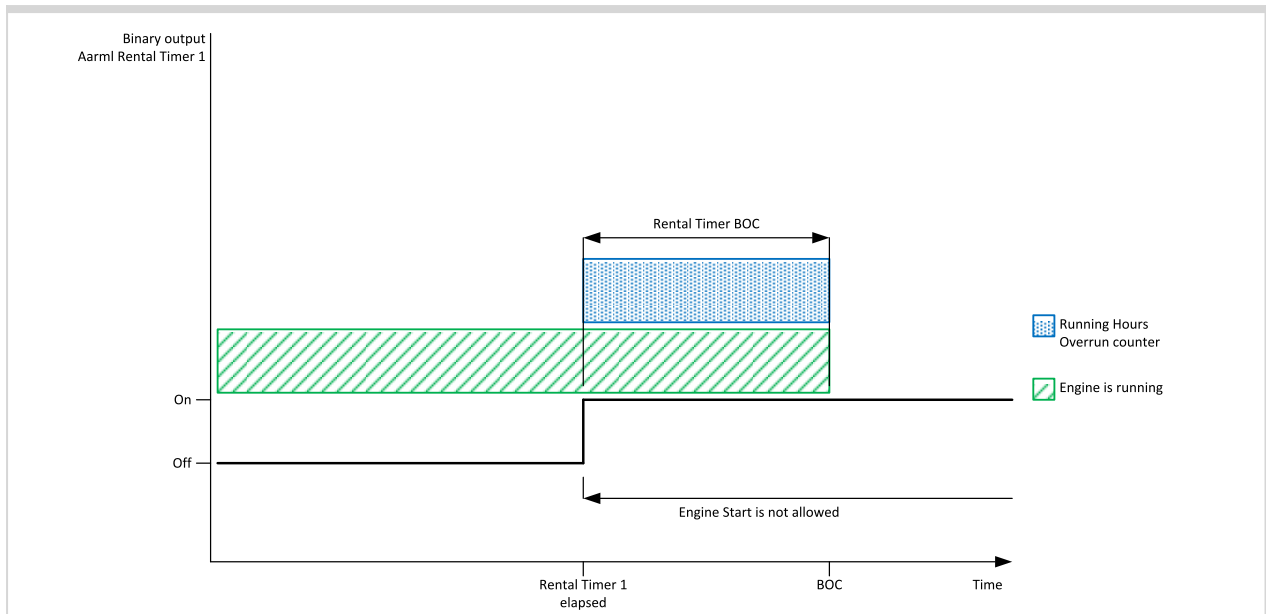


Image 9.65 Rental Timer 1

The Running Hours Overrun counter will start increment when the engine is continue running after the **Rental Timer 1** (page 441) elapsed.

**Note:** There is no priority between Rental Timer 1 and Rental Timer 2. The sooner timer will activated the Rental Timer BOC (page 445) protection.

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## Rental Timer 1 Wrn

|                            |   |                             |            |
|----------------------------|---|-----------------------------|------------|
| <b>Setpoint group</b>      | Scheduler   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Disabled / 1.. Rental Timer 1 (page 441) [h]          |                             |            |
| <b>Default value</b>       | Disabled  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 h   |                             |            |
| <b>Comm object</b>         | 14332   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced  |                             |            |
| <b>Setpoint visibility</b> | Conditioned by the setpoint Rental Timer 1 (page 441) |                             |            |

### Description

Alarm **Wrn Rental Timer 1 (page 810)** comes up after xx running hours from adjusting the **Rental Timer 1 (page 441)**. Hours are adjusted by this setpoint.

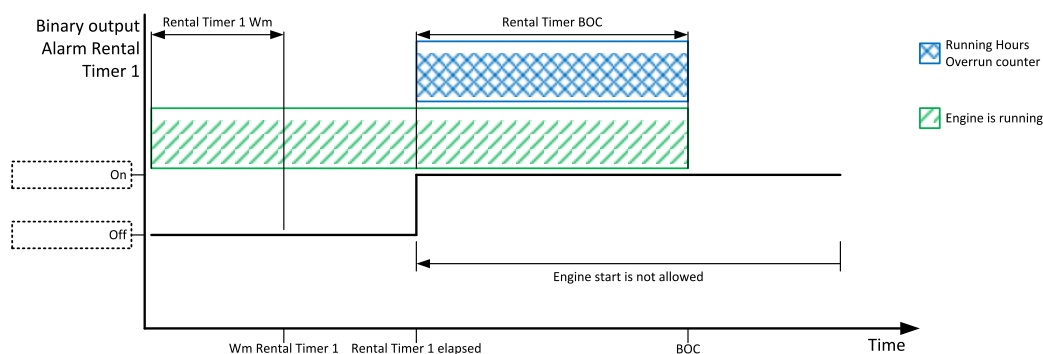


Image 9.66 Rental Timer 1 Wrn

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## Rental Timer 2

|                            |              |                             |            |
|----------------------------|--------------|-----------------------------|------------|
| <b>Setpoint group</b>      | Scheduler    | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | [DD/MM/YYYY] |                             |            |
| <b>Default value</b>       | 01/01/2015   | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | 1 day        |                             |            |
| <b>Comm object</b>         | 14367        | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Advanced     |                             |            |
| <b>Setpoint visibility</b> | Always       |                             |            |

### Description

Another engine start is not allowed when this timer elapsed. This timer is based on date. At the midnight of the last day the alarm **Rental Timer 2 Elapsed (page 799)** will be recorded in alarm list and the binary output **AL RENTAL TIMER 2 (PAGE 694)** will close.

**IMPORTANT:** To reset Rental Timer 2 (page 443) we have to set up Rental Timer 2 (page 443) again. It means go to setpoint group Scheduler and to the setpoint Rental Timer 2 (page 443). Then press enter button , change the value if it is necessary and press enter button again.

**IMPORTANT:** To disable Rental Timer 2 (page 443) set date to 01/01/2015.

When the **Rental Timer 2** (page 443) elapsed during engine run the gen-set will not stop immediately. The adjustable **Rental Timer BOC** (page 445) timer will start in this moment. The engine will be cooled and stopped when the **Rental Timer BOC** (page 445) time elapsed.

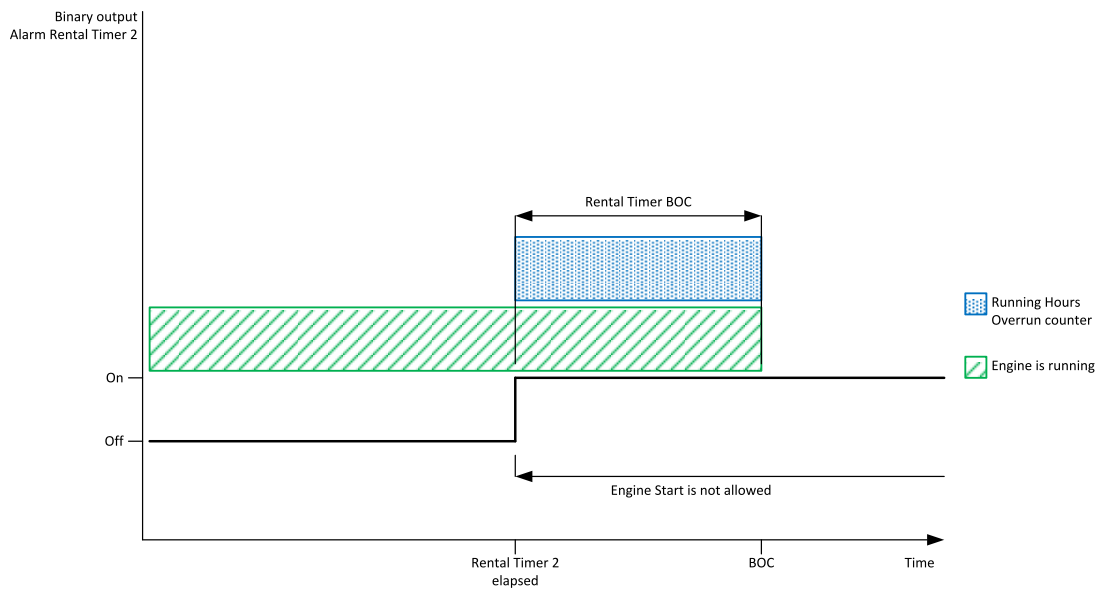


Image 9.67 Rental Timer 2

The Running Hours Overrun counter will start increment when the engine is continue running after the **Rental Timer 2** (page 443) elapsed.

**Note:** *There is no priority between Rental Timer 1 and Rental Timer 2. The sooner timer will activated the Rental Timer BOC (page 445) protection.*

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## Rental Timer 2 Wrn

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Scheduler   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | Disabled / 01/01/2015 .. Rental Timer 2 (page 443) [DD/MM/YYYY] |                             |            |
| <b>Default value</b>  | 01/01/2015  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 1 day   |                             |            |
| <b>Comm object</b>  | 14368   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint Rental Timer 2 (page 443)           |                             |            |
| <b>Description</b>  |   |                             |            |
| Alarm <b>Wrn Rental Timer 2 (page 810)</b> comes up xx days before the <b>Rental Timer 2 (page 443)</b> . Days are adjusted by this setpoint. |   |                             |            |
|   |   |                             |            |
| Image 9.68 Rental Timer 2 Wrn   |   |                             |            |

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## Rental Timer BOC

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Scheduler  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Disabled / 1 .. 210 [h]  |                             |            |
| <b>Default value</b>   | 24 h   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | 1 h  |                             |            |
| <b>Comm object</b>   | 14334  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced   |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoints <b>Rental Timer 1 (page 441)</b> and <b>Rental Timer 2 (page 443)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| This timer will start after <b>Rental Timer 1 (page 441)</b> or <b>Rental Timer 2 (page 443)</b> elapsed in case that the engine is still running. When this timer elapsed the engine is cooled and stopped. |  |                             |            |

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## Group: Geo-Fencing

### Home Latitude

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Geo-Fencing                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | -90,0000..90,0000 [°]                |                             |            |
| <b>Default value</b>  | 0,0000 °                             | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,0001 °                             |                             |            |
| <b>Comm object</b>  | 14606                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| <p>This setpoint adjust latitude of "home" position. Home is position where gen-set should runs. Positions on north hemisphere have positive value, position on south hemisphere have negative value.</p> <p><b>Note:</b> This value with <b>Home Longitude (page 446)</b> are used for counting <b>Fence Radius 1 (page 447)</b> and <b>Fence Radius 2 (page 447)</b>.</p> <p><b>Note:</b> This value can be also obtained automatically via logical binary input <b>GEO HOME POSITION (PAGE 668)</b>. In case of activation of this binary input for at least 2 seconds, setpoint will be adjusted automatically from actual coordinates from GPS signal.</p> |                                      |                             |            |

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### Home Longitude

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Geo-Fencing                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | -180,0000..180,0000 [°]              |                             |            |
| <b>Default value</b>  | 0,0000 °                             | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,0001 °                             |                             |            |
| <b>Comm object</b>  | 14607                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| <p>This setpoint adjust longitude of "home" position. Home is position where gen-set should runs. Positions on east hemisphere have positive value, position on west hemisphere have negative value.</p> <p><b>Note:</b> This value with <b>Home Latitude (page 446)</b> are used for counting <b>Fence Radius 1 (page 447)</b> and <b>Fence Radius 2 (page 447)</b>.</p> <p><b>Note:</b> This value can be also obtained automatically via logical binary input <b>GEO HOME POSITION (PAGE 668)</b>. In case of activation of this binary input for at least 2 seconds, setpoint will be adjusted automatically from actual coordinates from GPS signal.</p> |                                      |                             |            |

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## Fence Radius 1

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Geo-Fencing                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0,0..99,9 [km]                       |                             |            |
| <b>Default value</b>  | 0,0 km                               | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,1 km                               |                             |            |
| <b>Comm object</b>  | 11677                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Radius for circle area 1. When the gen-set leaves this area, <b>Fence 1 Protection (page 449)</b> is activated after <b>Fence 1 Delay (page 447)</b> .      |                                      |                             |            |
| <i>Note: The center of this circle area is defined by "Home" position - setpoints <b>Home Longitude (page 446)</b> and <b>Home Latitude (page 446)</b>.</i> |                                      |                             |            |

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## Fence Radius 2

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Geo-Fencing                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0,0..99,9 [km]                       |                             |            |
| <b>Default value</b>  | 0,0 km                               | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | 0,1 km                               |                             |            |
| <b>Comm object</b>  | 14608                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Radius for circle area 2. When the gen-set leaves this area, <b>Fence 2 Protection (page 450)</b> is activated after <b>Fence 2 Delay (page 448)</b> .      |                                      |                             |            |
| <i>Note: The center of this circle area is defined by "Home" position - setpoints <b>Home Longitude (page 446)</b> and <b>Home Latitude (page 446)</b>.</i> |                                      |                             |            |

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## Fence 1 Delay

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>                            | Geo-Fencing                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                             | 0..3600 [s]                          |                             |            |
| <b>Default value</b>                             | 0 s                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                      | 1 s                                  |                             |            |
| <b>Comm object</b>                               | 11682                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                              | Standard                             |                             |            |
| <b>Setpoint visibility</b>                       | Only if relevant module is installed |                             |            |
| <b>Description</b>                               |                                      |                             |            |
| Delay for <b>Fence 1 Protection (page 449)</b> . |                                      |                             |            |

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## Fence 2 Delay

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>                    | Geo-Fencing                          | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                     | 0..3600 [s]                          |                             |            |
| <b>Default value</b>                     | 0 s                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>                              | 1 s                                  |                             |            |
| <b>Comm object</b>                       | 14609                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                      | Standard                             |                             |            |
| <b>Setpoint visibility</b>               | Only if relevant module is installed |                             |            |
| <b>Description</b>                       |                                      |                             |            |
| Delay for Fence 2 Protection (page 450). |                                      |                             |            |

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## Geo-Fencing

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                                   | Geo-Fencing   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                    | Disabled / Enabled / LBI Enable [-]   |                             |            |
| <b>Default value</b>                                    | Disabled  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>                                      | 11681   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                     | Standard  |                             |            |
| <b>Setpoint visibility</b>                              | Only if relevant module is installed  |                             |            |
| <b>Description</b>                                      |   |                             |            |
| This setpoint enables or disables geo-fencing function. |   |                             |            |
| Disabled  | Fence 1 Protection (page 449) and Fence 2 Protection (page 450) are disabled.   |                             |            |
| Enabled   | Fence 1 Protection (page 449) and Fence 2 Protection (page 450) are enabled.  |                             |            |
| LBI Enable  | Fence 1 Protection (page 449) and Fence 2 Protection (page 450) are enabled only when logical binary input .GEO-FENCING ENABLED (PAGE 669) is active. |                             |            |

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## Fence 1 Protection

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Geo-Fencing  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | HistRecOnl / Wrm / Sd / BOC[-]   |                             |            |
| <b>Default value</b>   | HistRecOnl   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 14610  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed   |                             |            |
| <b>Description</b>   |  |                             |            |
| Protection type for geo-fencing 1 protection. Fence of circle area is adjusted by setpoint <b>Fence Radius 1</b> (page 447). Delay for protection is adjusted by setpoint <b>Fence 1 Delay</b> (page 447). |  |                             |            |
| <b>Protection types</b>  |  |                             |            |
| HistRecOnl   | Position of gen-set is only measured and displayed on the LCD screen but not used for protection. History record is made if position is out of <b>Fence Radius 1</b> (page 447). |                             |            |
| Wrm  | Position of gen-set is used for warning protection only. Protection is activated when position of the gen-set is out of <b>Fence Radius 1</b> (page 447).                        |                             |            |
| Sd   | Position of gen-set is used for shutdown protection. Protection is activated when position of the gen-set is out of <b>Fence Radius 1</b> (page 447).                            |                             |            |
| BOC  | Position of gen-set is used for BOC (Breaker Open and Cooling) protection. Protection is activated when position of the gen-set is out of <b>Fence Radius 1</b> (page 447).      |                             |            |
| <b>Note:</b> Protection is activated also when GPS signal is lost for <b>Fence 1 Delay</b> (page 447).   |  |                             |            |

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## Fence 2 Protection

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | Geo-Fencing  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | HistRecOnl / Wrm / Sd / BOC[-]   |                             |            |
| <b>Default value</b>   | HistRecOnl   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 14611  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed   |                             |            |
| <b>Description</b>   |  |                             |            |
| Protection type for geo-fencing 2 protection. Fence of circle area is adjusted by setpoint <b>Fence Radius 2</b> (page 447). Delay for protection is adjusted by setpoint <b>Fence 2 Delay</b> (page 448). |  |                             |            |
| <b>Protection types</b>  |  |                             |            |
| HistRecOnl   | Position of gen-set is only measured and displayed on the LCD screen but not used for protection. History record is made if position is out of <b>Fence Radius 2</b> (page 447). |                             |            |
| Wrm  | Position of gen-set is used for warning protection only. Protection is activated when position of the gen-set is out of <b>Fence Radius 2</b> (page 447).                        |                             |            |
| Sd   | Position of gen-set is used for shutdown protection. Protection is activated when position of the gen-set is out of <b>Fence Radius 2</b> (page 447).                            |                             |            |
| BOC  | Position of gen-set is used for BOC (Breaker Open and Cooling) protection. Protection is activated when position of the gen-set is out of <b>Fence Radius 2</b> (page 447).      |                             |            |
| <b>Note:</b> Protection is activated also when GPS signal is lost for <b>Fence 2 Delay</b> (page 448).   |  |                             |            |

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## Group: Plug-In Modules

### Slot A

|   |                        |                             |            |
|---|------------------------|-----------------------------|------------|
| <b>Setpoint group</b>                             | Plug-In Modules        | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                              | ENABLED / DISABLED [-] |                             |            |
| <b>Default value</b>                              | ENABLED                | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                       | [-]                    |                             |            |
| <b>Comm object</b>                                | 24280                  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                               | Standard               |                             |            |
| <b>Setpoint visibility</b>                        | Always                 |                             |            |
| <b>Description</b>                                |                        |                             |            |
| This setpoint enable or disable module in slot A. |                        |                             |            |

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## Slot B

|   |                        |                             |            |
|---|------------------------|-----------------------------|------------|
| <b>Setpoint group</b>                             | Plug-In Modules        | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                              | ENABLED / DISABLED [-] |                             |            |
| <b>Default value</b>                              | ENABLED                | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                       | [-]                    |                             |            |
| <b>Comm object</b>                                | 24279                  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                               | Standard               |                             |            |
| <b>Setpoint visibility</b>                        | Always                 |                             |            |
| <b>Description</b>                                |                        |                             |            |
| This setpoint enable or disable module in slot B. |                        |                             |            |

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## Group: CU AIN Calibration

### Subgroup: Analog Input 1

#### CU AIN1 Calibration

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | CU AIN Calibration                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve    |                             |            |
| <b>Default value</b>  | 0 (number of decimal is given by sensor curve) | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve     |                             |            |
| <b>Comm object</b>  | 8431   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                                       |                             |            |
| <b>Setpoint visibility</b>  | Always   |                             |            |
| <b>Description</b>  |  |                             |            |
| Calibrating constant to adjust the measured value of controller analog inputs. Physical dimension of calibrating constant is corresponding to Analog input. |  |                             |            |
| <b>Note:</b> Unit is adjusted via IntelliConfig in configuration of analog input 1.   |  |                             |            |

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## Subgroup: Analog Input 2

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | CU AIN Calibration                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve    |                             |            |
| <b>Default value</b>  | 0 (number of decimal is given by sensor curve) | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve     |                             |            |
| <b>Comm object</b>  | 8407   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                                       |                             |            |
| <b>Setpoint visibility</b>  | Always   |                             |            |
| <b>Description</b>  |  |                             |            |
| Calibrating constant to adjust the measured value of controller analog inputs. Physical dimension of calibrating constant is corresponding to Analog input. |  |                             |            |
| <i>Note: Unit is adjusted via IntelliConfig in configuration of analog input 2.</i>   |  |                             |            |

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## Subgroup: Analog Input 3

### CU AIN3 Calibration

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | CU AIN Calibration                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve    |                             |            |
| <b>Default value</b>  | 0 (number of decimal is given by sensor curve) | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve     |                             |            |
| <b>Comm object</b>  | 8467   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                                       |                             |            |
| <b>Setpoint visibility</b>  | Always   |                             |            |
| <b>Description</b>  |  |                             |            |
| Calibrating constant to adjust the measured value of controller analog inputs. Physical dimension of calibrating constant is corresponding to Analog input. |  |                             |            |
| <i>Note: Unit is adjusted via IntelliConfig in configuration of analog input 3.</i>   |  |                             |            |

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## Subgroup: Analog Input 4

### CU AIN4 Calibration

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Setpoint group</b>   | CU AIN Calibration                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | the range is defined by analog sensor curve    |                             |            |
| <b>Default value</b>  | 0 (number of decimal is given by sensor curve) | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | the step is defined by analog sensor curve     |                             |            |
| <b>Comm object</b>  | 8793   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                                       |                             |            |
| <b>Setpoint visibility</b>  | Always   |                             |            |
| <b>Description</b>  |  |                             |            |
| Calibrating constant to adjust the measured value of controller analog inputs. Physical dimension of calibrating constant is corresponding to Analog input. |  |                             |            |
| <i>Note: Unit is adjusted via IntelliConfig in configuration of analog input 4.</i>   |  |                             |            |

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### Group: Alternate Config

## Subgroup: Basic settingsConfiguration 1

### Connection Type 1

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | Basic settings   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Monophase / Splitphase / 3Ph3Wire / High Leg D / 3Ph4Wire / Autodetect [-]   |                             |            |
| <b>Default value</b>       | 3Ph4Wire   | <b>Alternative config</b>   | YES        |
| <b>Step</b>                | [-]  |                             |            |
| <b>Comm object</b>         | 12058  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard   |                             |            |
| <b>Setpoint visibility</b> | Always   |                             |            |
| <b>Description</b>         |  |                             |            |
| Connection type:           |  |                             |            |
| Mono Phase                 | Single phase voltage measurement L1-N<br>1x CT (Current Transformer)   |                             |            |
| Split Phase                | Double Delta connection<br>Split Phase<br>Two phase voltage measurement L1,L2 with 180° phase shift<br>2x CT (Current Transformer) |                             |            |
| 3Ph3Wire                   | Ungrounded Delta connection<br>Open Delta<br>Ungrounded Wye<br>Corner-Grounded Delta   |                             |            |

|            |  |
|------------|--|
|            | <p>Split Phase Delta</p> <p>Three phase voltage measurement L1,L2,L3 with 120° phase shift</p> <p>No neutral is available 3x CT (Current Transformer)</p>  |
| High Leg D | <p>High Leg Delta connection</p> <p>Three phase voltage measurement L1,L2,L3</p> <p>3x CT (Current Transformer)</p>  |
| 3Ph4Wire   | <p>Grounded Star (Grounded Wye) connection – 3PY</p> <p>Three phase voltage measurement L1,L2,L3 with 120° phase shift</p> <p>3x CT (Current Transformer)</p>  |
| Autodetect | <p>High Leg Delta <span style="float: right;">L1 &gt;=100V; L1 &lt;=140V</span></p> <p>or <span style="float: right;">L2 &gt;=140V</span></p> <p><span style="float: right;">L3 &gt;=100V; L3 &lt;=140V</span></p> <p>3PH3Wire or 3Ph4Wire <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &gt;=100V</span></p> <p><span style="float: right;">L3 &gt;=100V</span></p> <p>Split Phase <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &lt;= 20V</span></p> <p><span style="float: right;">L3 &gt;=100V</span></p> <p>Mono Phase <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &lt;= 20V</span></p> <p><span style="float: right;">L3 &lt;= 20V</span></p> <p><b>Voltage Autodetect</b> shutdown</p> |

**Note:** This value is used when binary input **ALTERNATE CONFIG 2 (PAGE 615)** is active.

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## Nominal Power 1

|   |                 |                             |            |
|---|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 5 000 [kW] |                             |            |
| <b>Default value</b>  | 200 kW          | <b>Alternative config</b>   | Yes        |
| <b>Step</b>   | 1 kW            |                             |            |
| <b>Comm object</b>  | 12046           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard        |                             |            |
| <b>Setpoint visibility</b>  | Always          |                             |            |
| <b>Description</b>  |                 |                             |            |
| Nominal power of the gen-set. Generator <b>Overload BOC (page 304)</b> protection is based on this setpoint.  |                 |                             |            |
| <p><b>Note:</b> This setpoint is used when setpoint <b>Connection type (page 244)</b> is adjusted to <i>Monophase or Splitphase or 3Ph3Wire or High Leg D or 3Ph4Wire</i> or when <b>Autodetect</b> detects connection type as <i>3Ph3Wire or High Leg D or 3Ph4Wire</i>.</p> |                 |                             |            |
| <p><b>Note:</b> This value is used when any other alternate configuration is not active.</p>  |                 |                             |            |

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## Nominal Power Split Phase 1

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 5 000 [kW]   |                             |            |
| <b>Default value</b>  | 200 kW  | <b>Alternative config</b>   | Yes        |
| <b>Step</b>   | 1 kW  |                             |            |
| <b>Comm object</b>  | 15771   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Connection type (page 244)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| Nominal power of the gen-set for detected split-phase or mono phase connection. Generator <b>Overload BOC (page 304)</b> protection is based on this setpoint.  |   |                             |            |
| <p><b>Note:</b> This setpoint is used when setpoint <b>Connection type (page 244)</b> is adjusted to <i>Autodetect</i> and <b>Autodetect</b> detects connection type as <i>Monophase or Splitphase</i>.</p> |   |                             |            |
| <p><b>Note:</b> This value is used when any other alternate configuration is not active.</p>  |   |                             |            |

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## Nominal Current 1

|  |                 |                             |            |
|--|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 1 .. 10 000 [A] |                             |            |
| <b>Default value</b>   | 350 A           | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 A             |                             |            |
| <b>Comm object</b>   | 12049           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard        |                             |            |
| <b>Setpoint visibility</b>   | Always          |                             |            |
| <b>Description</b>   |                 |                             |            |
| It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value. |                 |                             |            |
| <i>Note: This value is used when any other alternate configuration is not active.</i>  |                 |                             |            |

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## Nominal Frequency 1

|   |                |                             |            |
|---|----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 45 .. 65 [Hz]  |                             |            |
| <b>Default value</b>  | 50 Hz          | <b>Alternative config</b>   | YES        |
| <b>Step</b>   | 1 Hz           |                             |            |
| <b>Comm object</b>  | 9913           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard       |                             |            |
| <b>Setpoint visibility</b>  | Always         |                             |            |
| <b>Description</b>  |                |                             |            |
| Nominal system frequency (usually 50 or 60 Hz).                                       |                |                             |            |
| <i>Note: This value is used when any other alternate configuration is not active.</i> |                |                             |            |

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## Nominal RPM 1

|   |                   |                             |            |
|---|-------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings    | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 100 .. 4000 [RPM] |                             |            |
| <b>Default value</b>  | 1 500 RPM         | <b>Alternative config</b>   | YES        |
| <b>Step</b>   | 1 RPM             |                             |            |
| <b>Comm object</b>  | 9915              | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Advanced          |                             |            |
| <b>Setpoint visibility</b>  | Always            |                             |            |
| <b>Description</b>  |                   |                             |            |
| Nominal engine speed (RPM - revolutions per minute).                                  |                   |                             |            |
| <i>Note: This value is used when any other alternate configuration is not active.</i> |                   |                             |            |

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## Nominal Voltage Ph-N 1

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 80 .. 20000 [V]   |                             |            |
| <b>Default value</b>  | 231 V   | <b>Alternative config</b>   | YES        |
| <b>Step</b>   | 1 V   |                             |            |
| <b>Comm object</b>  | 12052   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Connection Type 1 (page 453)</b> . |                             |            |
| <b>Description</b>  |   |                             |            |
| Nominal system voltage (phase to neutral).  |   |                             |            |
| <i>Note: This value is used when any other alternate configuration is not active.</i> |   |                             |            |

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## Nominal Voltage Ph-Ph 1

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 80 .. 40000 [V]   |                             |            |
| <b>Default value</b>  | 400 V   | <b>Alternative config</b>   | YES        |
| <b>Step</b>   | 1 V   |                             |            |
| <b>Comm object</b>  | 12055   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Connection Type 1 (page 453)</b> . |                             |            |
| <b>Description</b>  |   |                             |            |
| Nominal system voltage (phase to phase).  |   |                             |            |
| <i>Note: This value is used when any other alternate configuration is not active.</i> |   |                             |            |

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## Connection type 2

|  |  |                             |            |            |  |             |                         |
|--|--|-----------------------------|------------|------------|--|-------------|-------------------------|
| <b>Setpoint group</b>  | Basic settings   | <b>Related FW</b>           | 1.0.0      |            |  |             |                         |
| <b>Range [units]</b>   | Monophase / Splitphase / 3Ph3Wire / High Leg D / 3Ph4Wire / Autodetect [-] |                             |            |            |  |             |                         |
| <b>Default value</b>   | 3Ph4Wire   | <b>Alternative config</b>   | YES        |            |  |             |                         |
| <b>Step</b>  | [-]  |                             |            |            |  |             |                         |
| <b>Comm object</b>   | 12059  | <b>Related applications</b> | MINT, SPtM |            |  |             |                         |
| <b>Config level</b>  | Standard   |                             |            |            |  |             |                         |
| <b>Setpoint visibility</b>   | Always   |                             |            |            |  |             |                         |
| <b>Description</b>   |  |                             |            |            |  |             |                         |
| Connection type:   |  |                             |            |            |  |             |                         |
| <table border="1"> <tr> <td>Mono Phase</td> <td>Single phase voltage measurement L1-N<br/>1x CT (Current Transformer)</td> </tr> <tr> <td>Split Phase</td> <td>Double Delta connection</td> </tr> </table> |  |                             |            | Mono Phase | Single phase voltage measurement L1-N<br>1x CT (Current Transformer) | Split Phase | Double Delta connection |
| Mono Phase   | Single phase voltage measurement L1-N<br>1x CT (Current Transformer)       |                             |            |            |  |             |                         |
| Split Phase  | Double Delta connection  |                             |            |            |  |             |                         |

|            |  |
|------------|--|
|            | <p>Split Phase</p> <p>Two phase voltage measurement L1,L2 with 180° phase shift</p> <p>2x CT (Current Transformer)</p>   |
| 3Ph3Wire   | <p>Ungrounded Delta connection</p> <p>Open Delta</p> <p>Ungrounded Wye</p> <p>Corner-Grounded Delta</p> <p>Split Phase Delta</p> <p>Three phase voltage measurement L1,L2,L3 with 120° phase shift</p> <p>No neutral is available 3x CT (Current Transformer)</p>  |
| High Leg D | <p>High Leg Delta connection</p> <p>Three phase voltage measurement L1,L2,L3</p> <p>3x CT (Current Transformer)</p>  |
| 3Ph4Wire   | <p>Grounded Star (Grounded Wye) connection – 3PY</p> <p>Three phase voltage measurement L1,L2,L3 with 120° phase shift</p> <p>3x CT (Current Transformer)</p>  |
| Autodetect | <p>High Leg Delta <span style="float: right;">L1 &gt;=100V; L1 &lt;=140V</span></p> <p>or <span style="float: right;">L2 &gt;=140V</span></p> <p><span style="float: right;">L3 &gt;=100V; L3 &lt;=140V</span></p> <p>3PH3Wire or 3Ph4Wire <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &gt;=100V</span></p> <p><span style="float: right;">L3 &gt;=100V</span></p> <p>Split Phase <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &lt;= 20V</span></p> <p><span style="float: right;">L3 &gt;=100V</span></p> <p>Mono Phase <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &lt;= 20V</span></p> <p><span style="float: right;">L3 &lt;= 20V</span></p> <p><b>Voltage Autodetect</b> shutdown</p> |

**Note:** This value is used when binary input **ALTERNATE CONFIG 2 (PAGE 615)** is active.

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## Nominal Power 2

|   |                 |                             |            |
|---|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 5 000 [kW] |                             |            |
| <b>Default value</b>  | 200 kW          | <b>Alternative config</b>   | Yes        |
| <b>Step</b>   | 1 kW            |                             |            |
| <b>Comm object</b>  | 12047           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard        |                             |            |
| <b>Setpoint visibility</b>  | Always          |                             |            |
| <b>Description</b>  |                 |                             |            |
| Nominal power of the gen-set. Generator <b>Overload BOC (page 304)</b> protection is based on this setpoint.  |                 |                             |            |
| <i>Note: This setpoint is used when setpoint <b>Connection type (page 244)</b> is adjusted to Monophase or Splitphase or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.</i> |                 |                             |            |
| <i>Note: This value is used when binary input <b>ALTERNATE CONFIG 2 (PAGE 615)</b> is active.</i>   |                 |                             |            |

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## Nominal Power Split Phase 2

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 5 000 [kW]   |                             |            |
| <b>Default value</b>  | 200 kW  | <b>Alternative config</b>   | Yes        |
| <b>Step</b>   | 1 kW  |                             |            |
| <b>Comm object</b>  | 15772   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Connection type (page 244)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| Nominal power of the gen-set for detected split-phase or mono phase connection. Generator <b>Overload BOC (page 304)</b> protection is based on this setpoint.                  |   |                             |            |
| <i>Note: This setpoint is used when setpoint <b>Connection type (page 244)</b> is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.</i> |   |                             |            |
| <i>Note: This value is used when binary input <b>ALTERNATE CONFIG 2 (PAGE 615)</b> is active.</i>   |   |                             |            |

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## Nominal Current 2

|  |                |                             |            |
|--|----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 1 .. 10000 [A] |                             |            |
| <b>Default value</b>   | 350 A          | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 A            |                             |            |
| <b>Comm object</b>   | 12050          | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard       |                             |            |
| <b>Setpoint visibility</b>   | Always         |                             |            |
| <b>Description</b>   |                |                             |            |
| It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value. |                |                             |            |
| <i>Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 615) is active.</i>   |                |                             |            |

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## Nominal Frequency 2

|  |                |                             |            |
|--|----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 45 .. 65 [Hz]  |                             |            |
| <b>Default value</b>   | 50 Hz          | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 Hz           |                             |            |
| <b>Comm object</b>   | 9914           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard       |                             |            |
| <b>Setpoint visibility</b>   | Always         |                             |            |
| <b>Description</b>   |                |                             |            |
| Nominal system frequency (usually 50 or 60 Hz).  |                |                             |            |
| <i>Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 615) is active.</i> |                |                             |            |

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## Nominal RPM 2

|  |                   |                             |            |
|--|-------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings    | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 100 .. 4000 [RPM] |                             |            |
| <b>Default value</b>   | 1 500 RPM         | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 RPM             |                             |            |
| <b>Comm object</b>   | 9916              | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced          |                             |            |
| <b>Setpoint visibility</b>   | Always            |                             |            |
| <b>Description</b>   |                   |                             |            |
| Nominal engine speed (RPM - revolutions per minute).                                       |                   |                             |            |
| <i>Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 615) is active.</i> |                   |                             |            |

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## Nominal Voltage Ph-N 2

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 80 .. 20000 [V]   |                             |            |
| <b>Default value</b>   | 231 V   | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 V   |                             |            |
| <b>Comm object</b>   | 12053   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Connection type 2 (page 457)</b> . |                             |            |
| <b>Description</b>   |   |                             |            |
| Nominal system voltage (phase to neutral).   |   |                             |            |
| <i>Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 615) is active.</i> |   |                             |            |

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## Nominal Voltage Ph-Ph 2

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 80 .. 40000 [V]   |                             |            |
| <b>Default value</b>   | 400 V   | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 V   |                             |            |
| <b>Comm object</b>   | 12056   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Connection type 2 (page 457)</b> . |                             |            |
| <b>Description</b>   |   |                             |            |
| Nominal system voltage (phase to phase).   |   |                             |            |
| <i>Note: This value is used when binary input ALTERNATE CONFIG 2 (PAGE 615) is active.</i> |   |                             |            |

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## Connection type 3

|  |  |                             |            |            |  |             |                         |
|--|--|-----------------------------|------------|------------|--|-------------|-------------------------|
| <b>Setpoint group</b>  | Basic settings   | <b>Related FW</b>           | 1.0.0      |            |  |             |                         |
| <b>Range [units]</b>   | Monophase / Splitphase / 3Ph3Wire / High Leg D / 3Ph4Wire / Autodetect [-] |                             |            |            |  |             |                         |
| <b>Default value</b>   | 3Ph4Wire   | <b>Alternative config</b>   | YES        |            |  |             |                         |
| <b>Step</b>  | [-]  |                             |            |            |  |             |                         |
| <b>Comm object</b>   | 12060  | <b>Related applications</b> | MINT, SPtM |            |  |             |                         |
| <b>Config level</b>  | Standard   |                             |            |            |  |             |                         |
| <b>Setpoint visibility</b>   | Always   |                             |            |            |  |             |                         |
| <b>Description</b>   |  |                             |            |            |  |             |                         |
| Connection type:   |  |                             |            |            |  |             |                         |
| <table border="1"> <tr> <td>Mono Phase</td> <td>Single phase voltage measurement L1-N<br/>1x CT (Current Transformer)</td> </tr> <tr> <td>Split Phase</td> <td>Double Delta connection</td> </tr> </table> |  |                             |            | Mono Phase | Single phase voltage measurement L1-N<br>1x CT (Current Transformer) | Split Phase | Double Delta connection |
| Mono Phase   | Single phase voltage measurement L1-N<br>1x CT (Current Transformer)       |                             |            |            |  |             |                         |
| Split Phase  | Double Delta connection  |                             |            |            |  |             |                         |

|            |  |
|------------|--|
|            | <p>Split Phase</p> <p>Two phase voltage measurement L1,L2 with 180° phase shift</p> <p>2x CT (Current Transformer)</p>   |
| 3Ph3Wire   | <p>Ungrounded Delta connection</p> <p>Open Delta</p> <p>Ungrounded Wye</p> <p>Corner-Grounded Delta</p> <p>Split Phase Delta</p> <p>Three phase voltage measurement L1,L2,L3 with 120° phase shift</p> <p>No neutral is available 3x CT (Current Transformer)</p>  |
| High Leg D | <p>High Leg Delta connection</p> <p>Three phase voltage measurement L1,L2,L3</p> <p>3x CT (Current Transformer)</p>  |
| 3Ph4Wire   | <p>Grounded Star (Grounded Wye) connection – 3PY</p> <p>Three phase voltage measurement L1,L2,L3 with 120° phase shift</p> <p>3x CT (Current Transformer)</p>  |
| Autodetect | <p>High Leg Delta <span style="float: right;">L1 &gt;=100V; L1 &lt;=140V</span></p> <p>or <span style="float: right;">L2 &gt;=140V</span></p> <p><span style="float: right;">L3 &gt;=100V; L3 &lt;=140V</span></p> <p>3PH3Wire or 3Ph4Wire <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &gt;=100V</span></p> <p><span style="float: right;">L3 &gt;=100V</span></p> <p>Split Phase <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &lt;= 20V</span></p> <p><span style="float: right;">L3 &gt;=100V</span></p> <p>Mono Phase <span style="float: right;">L1 &gt;=100V</span></p> <p>or <span style="float: right;">L2 &lt;= 20V</span></p> <p><span style="float: right;">L3 &lt;= 20V</span></p> <p><b>Voltage Autodetect</b> shutdown</p> |

**Note:** This value is used when binary input **ALTERNATE CONFIG 2 (PAGE 615)** is active.

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### Nominal Power 3

|   |                 |                             |            |
|---|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 5 000 [kW] |                             |            |
| <b>Default value</b>  | 200 kW          | <b>Alternative config</b>   | Yes        |
| <b>Step</b>   | 1 kW            |                             |            |
| <b>Comm object</b>  | 12048           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard        |                             |            |
| <b>Setpoint visibility</b>  | Always          |                             |            |
| <b>Description</b>  |                 |                             |            |
| Nominal power of the gen-set. Generator <b>Overload BOC</b> (page 304) protection is based on this setpoint.  |                 |                             |            |
| <i>Note: This setpoint is used when setpoint <b>Connection type</b> (page 244) is adjusted to Monophase or Splitphase or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.</i> |                 |                             |            |
| <i>Note: This value is used when binary input <b>ALTERNATE CONFIG 3</b> (PAGE 615) is active.</i>   |                 |                             |            |

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### Nominal Power Split Phase 3

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 1 .. 5 000 [kW]   |                             |            |
| <b>Default value</b>  | 200 kW  | <b>Alternative config</b>   | Yes        |
| <b>Step</b>   | 1 kW  |                             |            |
| <b>Comm object</b>  | 15773   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Conditioned by the setpoint <b>Connection type</b> (page 244) |                             |            |
| <b>Description</b>  |   |                             |            |
| Nominal power of the gen-set for detected split-phase or mono phase connection. Generator <b>Overload BOC</b> (page 304) protection is based on this setpoint.                  |   |                             |            |
| <i>Note: This setpoint is used when setpoint <b>Connection type</b> (page 244) is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.</i> |   |                             |            |
| <i>Note: This value is used when binary input <b>ALTERNATE CONFIG 3</b> (PAGE 615) is active.</i>   |   |                             |            |

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### Nominal Current 3

|  |                 |                             |            |
|--|-----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 1 .. 10 000 [A] |                             |            |
| <b>Default value</b>   | 350 A           | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 A             |                             |            |
| <b>Comm object</b>   | 12051           | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard        |                             |            |
| <b>Setpoint visibility</b>   | Always          |                             |            |
| <b>Description</b>   |                 |                             |            |
| It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value. |                 |                             |            |
| <i>Note: This value is used when binary input ALTERNATE CONFIG 3 (PAGE 615) is active.</i>   |                 |                             |            |

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### Nominal Frequency 3

|  |                |                             |            |
|--|----------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 45 .. 65 [Hz]  |                             |            |
| <b>Default value</b>   | 50 Hz          | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 Hz           |                             |            |
| <b>Comm object</b>   | 15197          | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard       |                             |            |
| <b>Setpoint visibility</b>   | Always         |                             |            |
| <b>Description</b>   |                |                             |            |
| Nominal system frequency (usually 50 or 60 Hz).  |                |                             |            |
| <i>Note: This value is used when binary input ALTERNATE CONFIG 3 (PAGE 615) is active.</i> |                |                             |            |

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### Nominal RPM 3

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings     | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 100 .. 4 000 [RPM] |                             |            |
| <b>Default value</b>   | 1 500 RPM          | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 RPM              |                             |            |
| <b>Comm object</b>   | 15196              | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Advanced           |                             |            |
| <b>Setpoint visibility</b>   | Always             |                             |            |
| <b>Description</b>   |                    |                             |            |
| Nominal engine speed (RPM - revolutions per minute).                                       |                    |                             |            |
| <i>Note: This value is used when binary input ALTERNATE CONFIG 3 (PAGE 615) is active.</i> |                    |                             |            |

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### Nominal Voltage Ph-N 3

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 80 .. 20 000 [V]  |                             |            |
| <b>Default value</b>   | 231 V   | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 V   |                             |            |
| <b>Comm object</b>   | 12054   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Connection type 3 (page 461)</b> . |                             |            |
| <b>Description</b>   |   |                             |            |
| Nominal system voltage (phase to neutral).   |   |                             |            |
| <i>Note: This value is used when binary input ALTERNATE CONFIG 3 (PAGE 615) is active.</i> |   |                             |            |

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### Nominal Voltage Ph-Ph 3

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | Basic settings  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 80 .. 40 000 [V]  |                             |            |
| <b>Default value</b>   | 400 V   | <b>Alternative config</b>   | YES        |
| <b>Step</b>  | 1 V   |                             |            |
| <b>Comm object</b>   | 12057   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Conditioned by the setpoint <b>Connection type 3 (page 461)</b> . |                             |            |
| <b>Description</b>   |   |                             |            |
| Nominal system voltage (phase to phase).   |   |                             |            |
| <i>Note: This value is used when binary input ALTERNATE CONFIG 3 (PAGE 615) is active.</i> |   |                             |            |

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## Group: CM-RS232-485

### COM1 Mode

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                               | CM-RS232-485  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                | Direct / MODBUS / DualSlave / Dual Master [-]         |                             |            |
| <b>Default value</b>                                | Direct  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>                                  | 24522   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                 | Standard  |                             |            |
| <b>Setpoint visibility</b>                          | Only if relevant module is installed                  |                             |            |
| <b>Description</b>                                  |   |                             |            |
| Communication protocol switch for the COM1 channel. |   |                             |            |
| Direct  | InteliConfig communication protocol via serial cable. |                             |            |
| MODBUS  | MODBUS protocol.                                      |                             |            |

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### COM1 Communication Speed

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-RS232-485   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 9600 / 19200 / 38400 / 57600 / 115200[bps]   |                             |            |
| <b>Default value</b>   | 57600 bps  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24341  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>COM1 Mode (page 466)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| If the direct mode is selected on COM1 channel, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value. |  |                             |            |
| <i>Note: Winscope supports only 19200, 38400, 57600 speeds.</i>  |  |                             |            |

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## COM1 MODBUS Communication Speed

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-RS232-485   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 9600 / 19200 / 38400 / 57600 / 115200 [bps]  |                             |            |
| <b>Default value</b>   | 9600 bps   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24477  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>COM1 Mode (page 466)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here. |  |                             |            |

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## COM2 Mode

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>                               | CM-RS232-485  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                                | Direct / MODBUS / DualSlave / Dual Master [-]         |                             |            |
| <b>Default value</b>                                | Direct  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>                                  | 24451   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                                 | Standard  |                             |            |
| <b>Setpoint visibility</b>                          | Only if relevant module is installed                  |                             |            |
| <b>Description</b>                                  |   |                             |            |
| Communication protocol switch for the COM2 channel. |   |                             |            |
| Direct  | InteliConfig communication protocol via serial cable. |                             |            |
| MODBUS  | MODBUS protocol.                                      |                             |            |

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## COM2 Communication Speed

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-RS232-485   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 9600 / 19200 / 38400 / 57600 / 115200[bps]   |                             |            |
| <b>Default value</b>   | 57600 bps  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24340  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>COM2 Mode (page 467)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| If the direct mode is selected on COM2 channel, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value. |  |                             |            |
| <b>Note:</b> Winscope supports only 19200, 38400, 57600 speeds.  |  |                             |            |

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## COM2 MODBUS Communication Speed

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-RS232-485   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 9600 / 19200 / 38400 / 57600 / 115200 [bps]  |                             |            |
| <b>Default value</b>   | 9600 bps   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24420  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>COM2 Mode (page 467)</b> |                             |            |
| <b>Description</b>   |  |                             |            |
| If the MODBUS mode is selected on COM2 channel, the MODBUS communication speed can be adjusted here. |  |                             |            |

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## Group: CM-GPRS

### Mode

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Email+SMS / SMS Only [-]   |                             |            |
| <b>Default value</b>   | Email+SMS  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24315  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed   |                             |            |
| <b>Description</b>   |  |                             |            |
| This setpoint adjust the communication mode of module.   |  |                             |            |
| Email+SMS  | Controller is connected to the Internet and is able to send e-mails as well as SMS. The controller is also accessible via AirGate. Internet-enabled SIM card must be used. Also <b>APN Name (page 480)</b> has to be adjusted. |                             |            |
| SMS Only   | Only SMS are sent. Internet-enabled SIM card is not required.  |                             |            |
| <b>IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.</b> |  |                             |            |

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## APN Name

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]  |                             |            |
| <b>Default value</b>  | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24363   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| APN (Access Point Name) of the GPRS/4G network, provided by GSM operator. |   |                             |            |

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## APN User Name

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..15 characters [-]  |                             |            |
| <b>Default value</b>  | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24361   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| User name for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank. |   |                             |            |

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## APN User Password

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..15 characters [-]  |                             |            |
| <b>Default value</b>  | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24360   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| User password for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank. |   |                             |            |

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### Email Address 1

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24298                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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### Email Address 2

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24297                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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### Email Address 3

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24145                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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## Email Address 4

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24144                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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## E-mail/SMS Language

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | [-]                                  |                             |            |
| <b>Default value</b>   | English                              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24299                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Use this setpoint to set the language of SMS and e-mail.             |                                      |                             |            |
| <i>Note: Numbers correspond with languages in language list.</i>     |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## SMTP User Name

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]  |                             |            |
| <b>Default value</b>  | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24313   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication. |   |                             |            |

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## SMTP User Password

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..15 characters [-]  |                             |            |
| <b>Default value</b>  | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24312   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication. |   |                             |            |

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## SMTP Server Address

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]  |                             |            |
| <b>Default value</b>  | airgate.comap.cz:9925   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24311   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information.  |   |                             |            |
| <p><b>Note:</b> You may use also any public SMTP server which does not require connection over SSL/TLS channels. If the device is connected to AirGate the AirGate SMTP server at "airgate.comap.cz" may be used. Ports 25 and 9925 are supported. After controller connects to AirGate for the first time (or with new public IP address), it may not be able to send emails for first 5-10 minutes.</p> |   |                             |            |

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## SMTP Sender Address

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..31 characters [-]   |                             |            |
| <b>Default value</b>   | [-]  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24310  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> (CM-GPRS module) |                             |            |
| <b>Description</b>   |  |                             |            |
| Enter an existing email address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller. |  |                             |            |
| <p><b>Note:</b> <i>It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.</i></p>                    |  |                             |            |
| <p><b>IMPORTANT:</b> This item is obligatory when emails are configured.</p>   |  |                             |            |

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## Time Zone

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | GMT-12:00 .. GMT+13:00 [hours]       |                             |            |
| <b>Default value</b>   | GMT+1:00 hour                        | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24366                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint is used to select the time zone where the controller is located. See your computer time zone setting (click on the time indicator located in the rightmost position of the Windows task bar) if you are not sure about your time zone. |                                      |                             |            |
| <p><b>Note:</b> <i>If the time zone is not selected properly the active e-mails may contain incorrect information about sending time, which may result in confusion when the respective problem actually occurred.</i></p>                           |                                      |                             |            |
| <p><b>Note:</b> <i>This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i></p>  |                                      |                             |            |

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## Event Message

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 10926                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables Event Messages.                    |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## Wrn Message

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 8482                                 | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables Wrn Messages.                      |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## BOC Message

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 10566                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables BOC Messages.                      |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## Sd Messages

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 8484                                 | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables Sd Messages.                       |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## Telephone Number 1

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>  | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24296                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix. |                                      |                             |            |
| <b>IMPORTANT: Telephone number has to be entered without spaces.</b>  |                                      |                             |            |

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## Telephone Number 2

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>  | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24295                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix. |                                      |                             |            |
| <div style="background-color: #f0f0f0; padding: 5px;"><b>IMPORTANT: Telephone number has to be entered without spaces.</b></div>  |                                      |                             |            |

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## Telephone Number 3

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>  | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24143                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix. |                                      |                             |            |
| <div style="background-color: #f0f0f0; padding: 5px;"><b>IMPORTANT: Telephone number has to be entered without spaces.</b></div>  |                                      |                             |            |

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## Telephone Number 4

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24142                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| <p>Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix.</p> <p><b>IMPORTANT: Telephone number has to be entered without spaces.</b></p> |                                      |                             |            |

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## DNS IP Address

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Valid IP address [-]  |                             |            |
| <b>Default value</b>   | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]   |                             |            |
| <b>Comm object</b>   | 24314   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>   |   |                             |            |
| <p>The setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.</p> |   |                             |            |

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## AirGate Connection

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | DISABLED / ENABLED [-]  |                             |            |
| <b>Default value</b>   | ENABLED   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]   |                             |            |
| <b>Comm object</b>   | 24273   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>   |   |                             |            |
| <p>This setpoint enable or disable AirGate connection via CM-GPRS or via CM-4G-GPS.</p> <p>DISABLED: Only SMS are sent. Internet-enabled SIM card is not required. AirGate is not used.</p> <p>ENABLED This mode uses the “AirGate” service. Internet-enabled SIM card must be used. The AirGate server address is adjusted by the setpoint <b>AirGate Address (page 260)</b>.</p> |   |                             |            |
| <p><b>IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.</b></p>  |   |                             |            |

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## ComAp TCP Port

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 65 535[-]   |                             |            |
| <b>Default value</b>   | 23   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24374  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> (CM-GPRS module) |                             |            |
| <b>Description</b>   |  |                             |            |
| <p>This setpoint is used to adjust the port number, which is used for Ethernet connection to a PC with any of ComAp PC program (i.e. IntelliConfig). This setpoint should be adjusted to 23, which is the default port used by all ComAp PC programs. A different value should be used only in special situations as e.g. sharing one public IP address among many controllers or to overcome a firewall restrictions.</p> |  |                             |            |
| <p><b>IMPORTANT: If AirGate is used, this setpoint has to be adjusted to 23.</b></p>   |  |                             |            |
| <p><i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i></p>   |  |                             |            |

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## Group: CM-4G-GPS

### Mode

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | Email+SMS / SMS Only [-]   |                             |            |
| <b>Default value</b>   | Email+SMS  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24315  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed   |                             |            |
| <b>Description</b>   |  |                             |            |
| This setpoint adjust the communication mode of module.   |  |                             |            |
| Email+SMS  | Controller is connected to the Internet and is able to send e-mails as well as SMS. The controller is also accessible via AirGate. Internet-enabled SIM card must be used. Also <b>APN Name (page 480)</b> has to be adjusted. |                             |            |
| SMS Only   | Only SMS are sent. Internet-enabled SIM card is not required.  |                             |            |
| <b>IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.</b> |  |                             |            |

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### Required Connection Type

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-4G-GPS                            | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 2G/3G/4G/Automatic [-]               |                             |            |
| <b>Default value</b>   | Automatic                            | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24132                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint adjusts preferred connection type of CM-4G-GPS module. |                                      |                             |            |

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## APN Name

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]  |                             |            |
| <b>Default value</b>  | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24363   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| APN (Access Point Name) of the GPRS/4G network, provided by GSM operator. |   |                             |            |

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## APN User Name

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..15 characters [-]  |                             |            |
| <b>Default value</b>  | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24361   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| User name for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank. |   |                             |            |

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## APN User Password

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..15 characters [-]  |                             |            |
| <b>Default value</b>  | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24360   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| User password for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank. |   |                             |            |

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### Email Address 1

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24298                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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### Email Address 2

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24297                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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### Email Address 3

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24145                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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## Email Address 4

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | Ethernet                             | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..63 characters [-]                 |                             |            |
| <b>Default value</b>   | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24144                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. |                                      |                             |            |
| <i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i>              |                                      |                             |            |

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## E-mail/SMS Language

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | [-]                                  |                             |            |
| <b>Default value</b>   | English                              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24299                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| Use this setpoint to set the language of SMS and e-mail.             |                                      |                             |            |
| <i>Note: Numbers correspond with languages in language list.</i>     |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## SMTP User Name

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]  |                             |            |
| <b>Default value</b>  | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24313   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication. |   |                             |            |

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## SMTP User Password

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..15 characters [-]  |                             |            |
| <b>Default value</b>  | [-]   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24312   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication. |   |                             |            |

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## SMTP Server Address

|   |   |                             |            |
|---|---|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]  |                             |            |
| <b>Default value</b>  | airgate.comap.cz:9925   | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]   |                             |            |
| <b>Comm object</b>  | 24311   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard  |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>  |   |                             |            |
| This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information.  |   |                             |            |
| <p><b>Note:</b> You may use also any public SMTP server which does not require connection over SSL/TLS channels. If the device is connected to AirGate the AirGate SMTP server at "airgate.comap.cz" may be used. Ports 25 and 9925 are supported. After controller connects to AirGate for the first time (or with new public IP address), it may not be able to send emails for first 5-10 minutes.</p> |   |                             |            |

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## SMTP Sender Address

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0..31 characters [-]   |                             |            |
| <b>Default value</b>   | [-]  | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24310  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> (CM-GPRS module) |                             |            |
| <b>Description</b>   |  |                             |            |
| Enter an existing email address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller. |  |                             |            |
| <p><b>Note:</b> <i>It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.</i></p>                    |  |                             |            |
| <p><b>IMPORTANT:</b> This item is obligatory when emails are configured.</p>   |  |                             |            |

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## Time Zone

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | GMT-12:00 .. GMT+13:00 [hours]       |                             |            |
| <b>Default value</b>   | GMT+1:00 hour                        | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 24366                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint is used to select the time zone where the controller is located. See your computer time zone setting (click on the time indicator located in the rightmost position of the Windows task bar) if you are not sure about your time zone. |                                      |                             |            |
| <p><b>Note:</b> <i>If the time zone is not selected properly the active e-mails may contain incorrect information about sending time, which may result in confusion when the respective problem actually occurred.</i></p>                           |                                      |                             |            |
| <p><b>Note:</b> <i>This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i></p>  |                                      |                             |            |

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## Event Message

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 10926                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables Event Messages.                    |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## Wrn Message

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 8482                                 | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables Wrn Messages.                      |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## BOC Message

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 10566                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables BOC Messages.                      |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## Sd Messages

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | ON / OFF [-]                         |                             |            |
| <b>Default value</b>   | ON                                   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 8484                                 | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| This setpoint enables or disables Sd Messages.                       |                                      |                             |            |
| This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules. |                                      |                             |            |

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## Telephone Number 1

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>  | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24296                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a "+" character followed by the country prefix. |                                      |                             |            |
| <b>IMPORTANT: Telephone number has to be entered without spaces.</b>  |                                      |                             |            |

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## Telephone Number 2

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>  | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24295                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix. |                                      |                             |            |
| <div style="background-color: #f0f0f0; padding: 5px;"><b>IMPORTANT: Telephone number has to be entered without spaces.</b></div>  |                                      |                             |            |

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## Telephone Number 3

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>  | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24143                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix. |                                      |                             |            |
| <div style="background-color: #f0f0f0; padding: 5px;"><b>IMPORTANT: Telephone number has to be entered without spaces.</b></div>  |                                      |                             |            |

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## Telephone Number 4

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>   | CM-GPRS; CM-4G-GPS                   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>  | 0..31 characters [-]                 |                             |            |
| <b>Default value</b>  | [-]                                  | <b>Alternative config</b>   | NO         |
| <b>Step</b>   | [-]                                  |                             |            |
| <b>Comm object</b>  | 24142                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>   | Standard                             |                             |            |
| <b>Setpoint visibility</b>  | Only if relevant module is installed |                             |            |
| <b>Description</b>  |                                      |                             |            |
| Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix. |                                      |                             |            |
| <div style="background-color: #f0f0f0; padding: 5px;"><b>IMPORTANT: Telephone number has to be entered without spaces.</b></div>  |                                      |                             |            |

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## AirGate Connection

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS  | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | DISABLED / ENABLED [-]  |                             |            |
| <b>Default value</b>   | ENABLED   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]   |                             |            |
| <b>Comm object</b>   | 24273   | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard  |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> |                             |            |
| <b>Description</b>   |   |                             |            |
| This setpoint enable or disable AirGate connection via CM-GPRS or via CM-4G-GPS.   |   |                             |            |
| DISABLED: Only SMS are sent. Internet-enabled SIM card is not required. AirGate is not used.   |   |                             |            |
| ENABLED This mode uses the “AirGate” service. Internet-enabled SIM card must be used. The AirGate server address is adjusted by the setpoint <b>AirGate Address (page 260)</b> . |   |                             |            |
| <div style="background-color: #f0f0f0; padding: 5px;"><b>IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.</b></div>                 |   |                             |            |

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## ComAp TCP Port

|  |  |                             |            |
|--|--|-----------------------------|------------|
| <b>Setpoint group</b>  | CM-GPRS; CM-4G-GPS; Ethernet   | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | 0 .. 65 535[-]   |                             |            |
| <b>Default value</b>   | 23   | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]  |                             |            |
| <b>Comm object</b>   | 24374  | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard   |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed + conditioned by the setpoint <b>Mode (page 479)</b> (CM-GPRS module) |                             |            |
| <b>Description</b>   |  |                             |            |
| <p>This setpoint is used to adjust the port number, which is used for Ethernet connection to a PC with any of ComAp PC program (i.e. IntelliConfig). This setpoint should be adjusted to 23, which is the default port used by all ComAp PC programs. A different value should be used only in special situations as e.g. sharing one public IP address among many controllers or to overcome a firewall restrictions.</p> <p><b>IMPORTANT: If AirGate is used, this setpoint has to be adjusted to 23.</b></p> <p><i>Note: This setpoint is common for Ethernet, CM-GPRS and CM-4G-GPS modules.</i></p> |  |                             |            |

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## Group: EM-BIO8-EFCP

### Earth Fault Current Protection

|  |                                      |                             |            |
|--|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>  | EM-BIO8-EFCP                         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>   | DISABLED / ENABLED [-]               |                             |            |
| <b>Default value</b>   | ENABLED                              | <b>Alternative config</b>   | NO         |
| <b>Step</b>  | [-]                                  |                             |            |
| <b>Comm object</b>   | 11631                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>  | Standard                             |                             |            |
| <b>Setpoint visibility</b>   | Only if relevant module is installed |                             |            |
| <b>Description</b>   |                                      |                             |            |
| <p>This setpoint can block or allow Earth fault Current protection.</p> <p>DISABLED      Earth fault current protection is blocked.</p> <p>ENABLED      Earth fault current protection is allowed. Behavior of Earth fault current protection is set by these setpoints: <b>Earth Fault CT Input Range (page 490)</b>, <b>Earth Fault CT Ratio (page 490)</b>, <b>Earth Fault Delay (page 490)</b> and <b>Earth Fault Sd (page 491)</b>.</p> |                                      |                             |            |

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## Earth Fault Delay

|   |                                      |                      |            |
|---|--------------------------------------|----------------------|------------|
| Setpoint group                            | EM-BIO8-EFCP                         | Related FW           | 1.0.0      |
| Range [units]                             | 0,03 .. 5,00 [s]                     |                      |            |
| Default value                             | 0,10 s                               | Alternative config   | NO         |
| Step                                      | 0,01 s                               |                      |            |
| Comm object                               | 11633                                | Related applications | MINT, SPtM |
| Config level                              | Standard                             |                      |            |
| Setpoint visibility                       | Only if relevant module is installed |                      |            |
| <b>Description</b>                        |                                      |                      |            |
| Delay for Earth Fault Current protection. |                                      |                      |            |

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## Earth Fault CT Input Range

|   |                                      |                      |            |
|---|--------------------------------------|----------------------|------------|
| Setpoint group  | EM-BIO8-EFCP                         | Related FW           | 1.0.0      |
| Range [units]   | 1 [A] / 5 [A]                        |                      |            |
| Default value   | 5 A                                  | Alternative config   | NO         |
| Step  | [-]                                  |                      |            |
| Comm object   | 14340                                | Related applications | MINT, SPtM |
| Config level  | Standard                             |                      |            |
| Setpoint visibility   | Only if relevant module is installed |                      |            |
| <b>Description</b>  |                                      |                      |            |
| There are 2 physical inputs for <b>Earth Fault Current Protection (page 489)</b> . Value of this setpoint has to be set on value of physical input which is presently in use. |                                      |                      |            |

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## Earth Fault CT Ratio

|   |                                      |                      |            |
|---|--------------------------------------|----------------------|------------|
| Setpoint group  | EM-BIO8-EFCP                         | Related FW           | 1.0.0      |
| Range [units]   | 1 .. 2000 [1/(1or5)A]                |                      |            |
| Default value   | 500 1/(1or5)A                        | Alternative config   | NO         |
| Step  | 1A/1A; 1A/5A                         |                      |            |
| Comm object   | 14339                                | Related applications | MINT, SPtM |
| Config level  | Standard                             |                      |            |
| Setpoint visibility   | Only if relevant module is installed |                      |            |
| <b>Description</b>  |                                      |                      |            |
| Earth Fault current transformer ratio.  |                                      |                      |            |
| <p><b>Note:</b> Type of units depends on setpoint <b>Earth Fault CT Input Range (page 490)</b> which have to be set before this setpoint.</p> |                                      |                      |            |

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## Earth Fault Sd

|   |                                      |                             |            |
|---|--------------------------------------|-----------------------------|------------|
| <b>Setpoint group</b>                           | EM-BIO8-EFCP                         | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>                            | 0,03 .. 5,00 [A]                     |                             |            |
| <b>Default value</b>                            | 0,30 A                               | <b>Alternative config</b>   | NO         |
| <b>Step</b>                                     | 0,01 [A]                             |                             |            |
| <b>Comm object</b>                              | 11632                                | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>                             | Standard                             |                             |            |
| <b>Setpoint visibility</b>                      | Only if relevant module is installed |                             |            |
| <b>Description</b>                              |                                      |                             |            |
| Limit value for Earth Fault Current protection. |                                      |                             |            |

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## Group: PLC

### PLC Setpoint 1

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10440                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

#### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig



Image 9.69 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 2

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10441                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

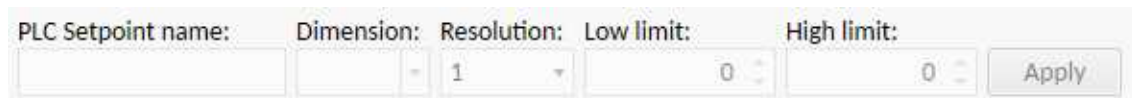


Image 9.70 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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### PLC Setpoint 3

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10442                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

#### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

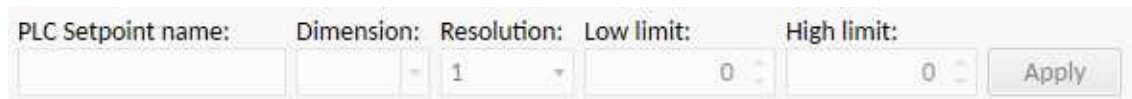


Image 9.71 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 4

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10443                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

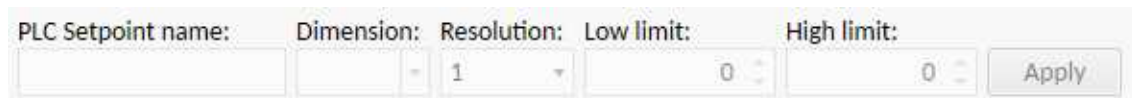


Image 9.72 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 5

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10444                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

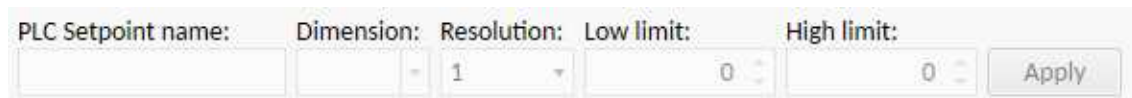


Image 9.73 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 6

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10445                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

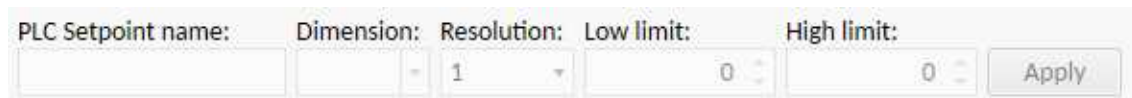


Image 9.74 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 7

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10446                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

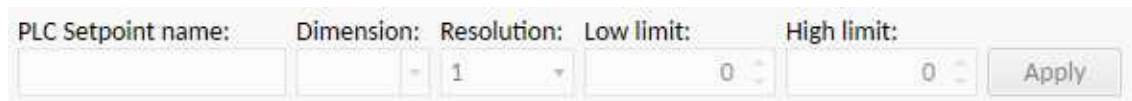


Image 9.75 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 8

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10447                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

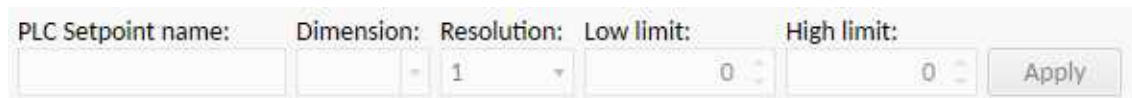


Image 9.76 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 9

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10448                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

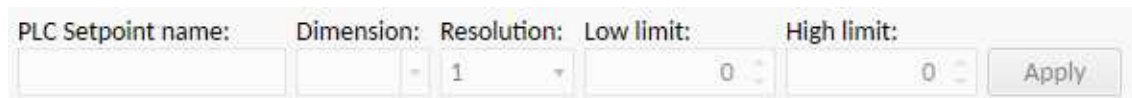


Image 9.77 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 10

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10449                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

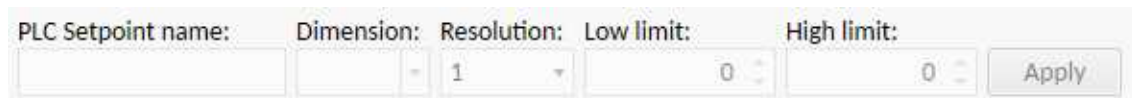


Image 9.78 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 11

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10450                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

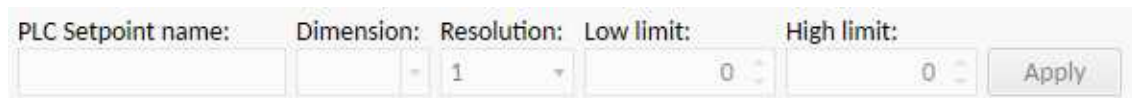


Image 9.79 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 12

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10451                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

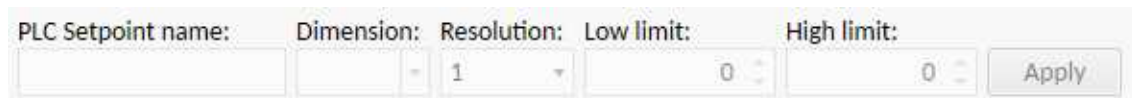


Image 9.80 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 13

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10452                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

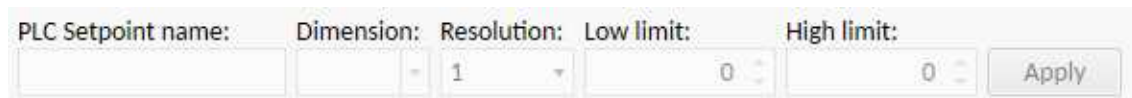


Image 9.81 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 14

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10453                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

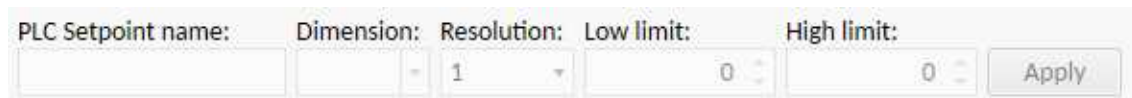


Image 9.82 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 15

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10454                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

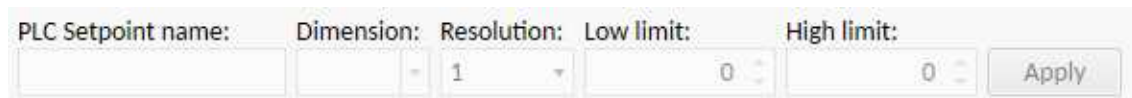


Image 9.83 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 16

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10455                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

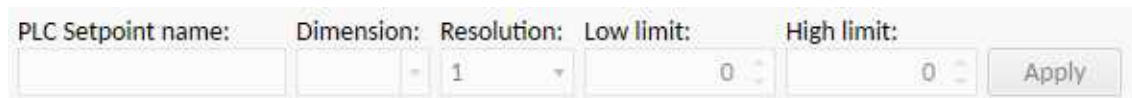


Image 9.84 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 17

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10456                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

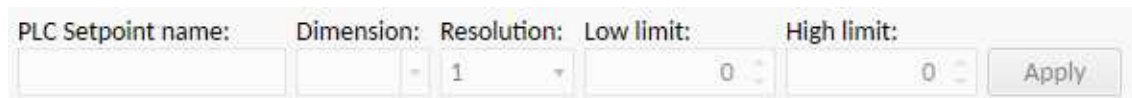


Image 9.85 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 18

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10457                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

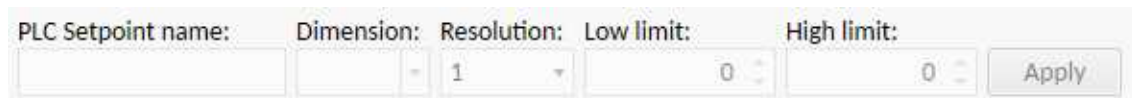


Image 9.86 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 19

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10458                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

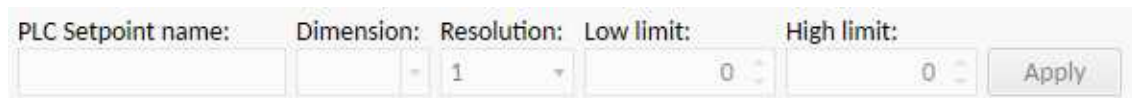


Image 9.87 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 20

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10459                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

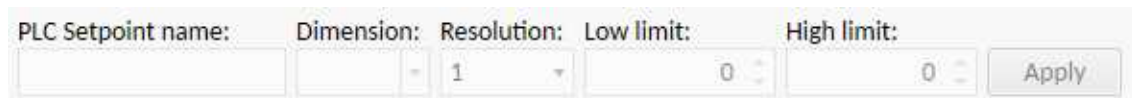


Image 9.88 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 21

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10460                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

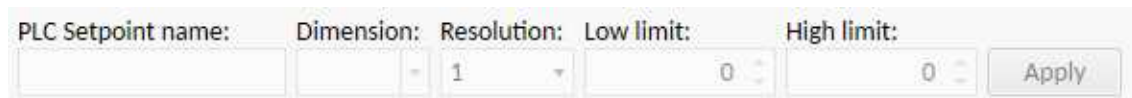


Image 9.89 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 22

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10461                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

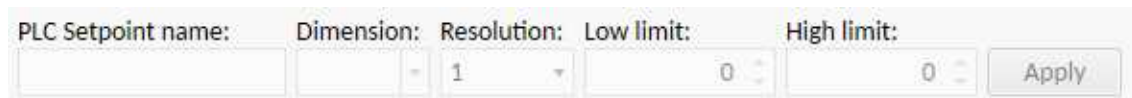


Image 9.90 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 23

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10462                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

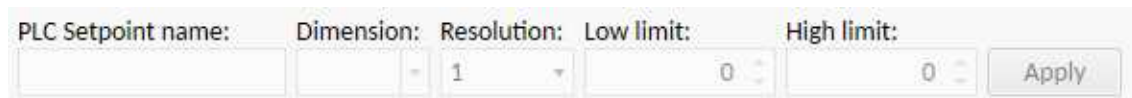


Image 9.91 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 24

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10463                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

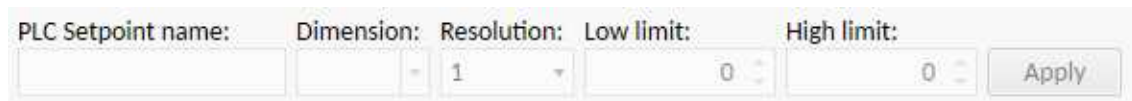


Image 9.92 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 25

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10464                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

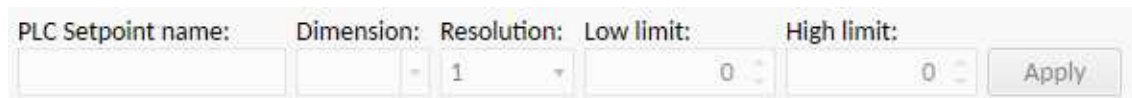


Image 9.93 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 26

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10465                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

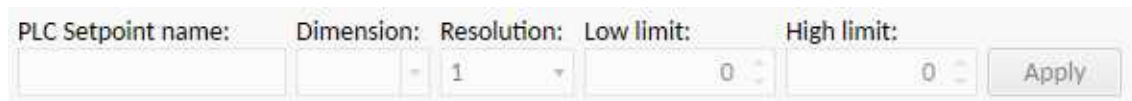


Image 9.94 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 27

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10466                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

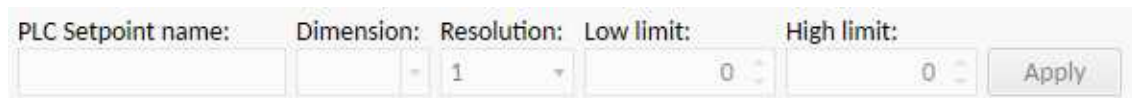


Image 9.95 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 28

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10467                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

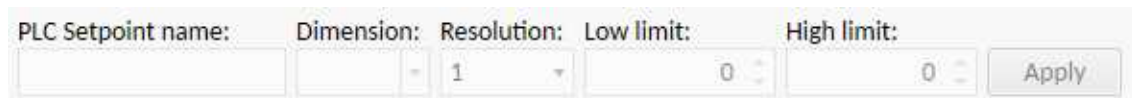


Image 9.96 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 29

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10468                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

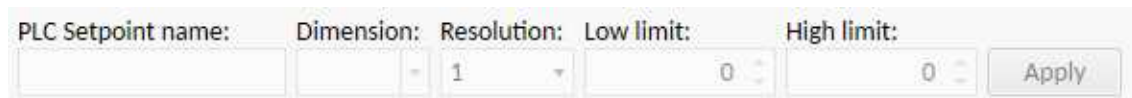


Image 9.97 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 30

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10469                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

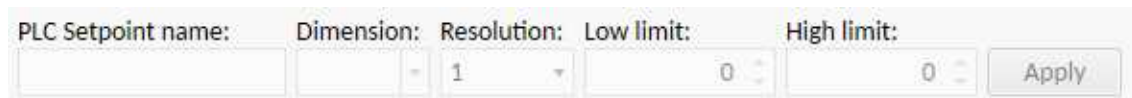


Image 9.98 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 31

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10470                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

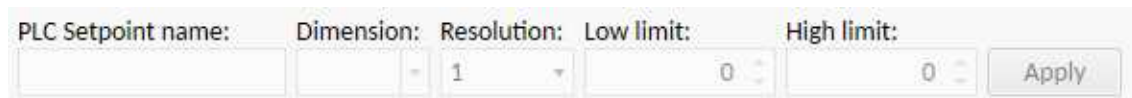


Image 9.99 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 32

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10471                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

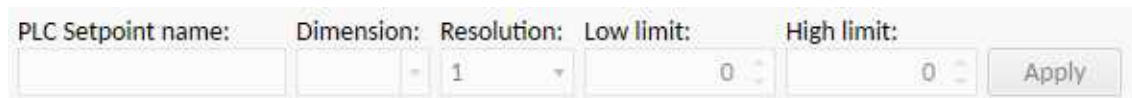


Image 9.100 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 33

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10472                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

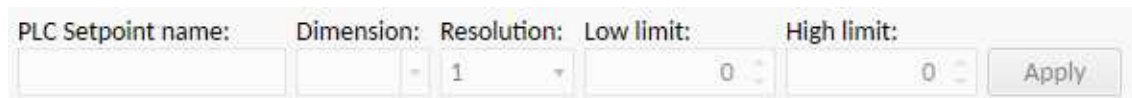


Image 9.101 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 34

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10473                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

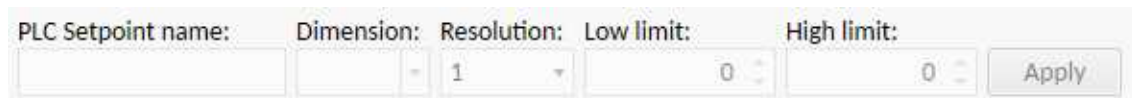


Image 9.102 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 35

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10474                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

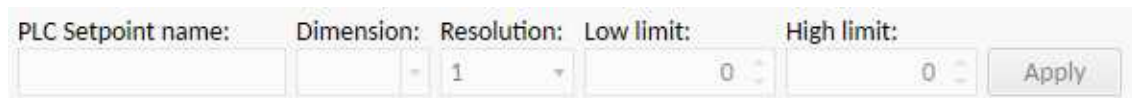


Image 9.103 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 36

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10475                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

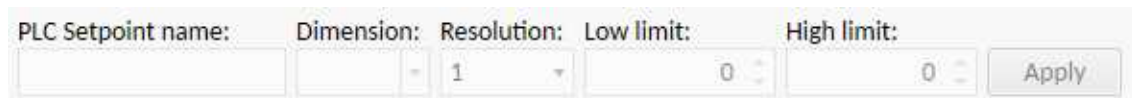


Image 9.104 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 37

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10476                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

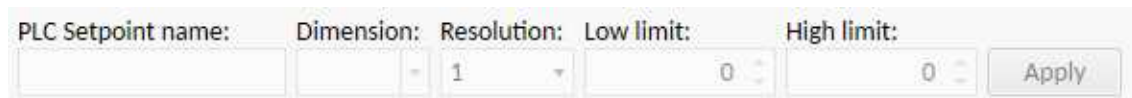


Image 9.105 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 38

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10477                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

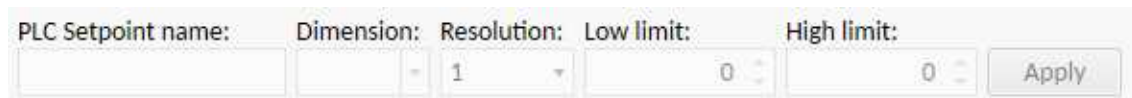


Image 9.106 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 39

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10478                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

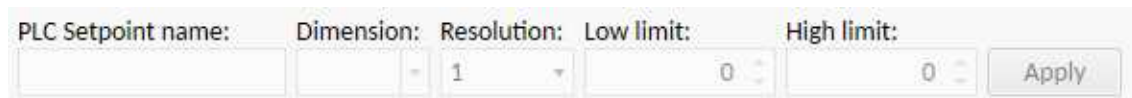


Image 9.107 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 40

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10479                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

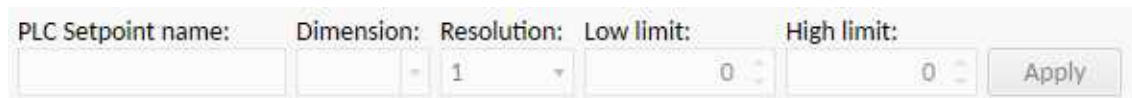


Image 9.108 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 41

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10480                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

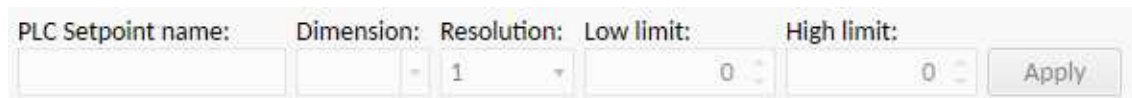


Image 9.109 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 42

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10481                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

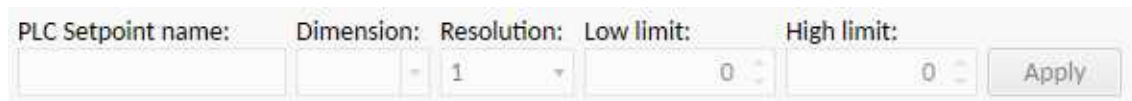


Image 9.110 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 43

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10482                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

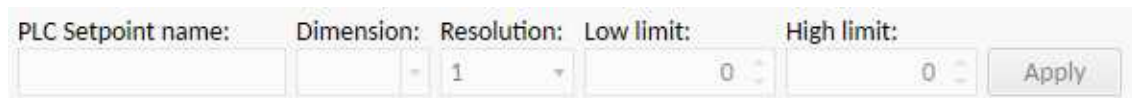


Image 9.111 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 44

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10483                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

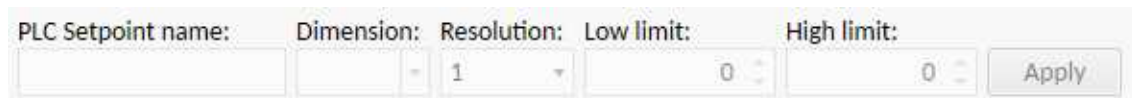


Image 9.112 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 45

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10484                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

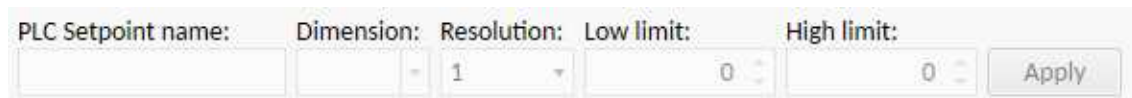


Image 9.113 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 46

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10485                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

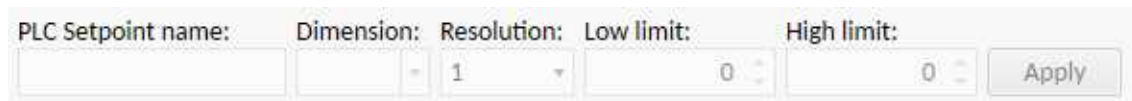


Image 9.114 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 47

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10486                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

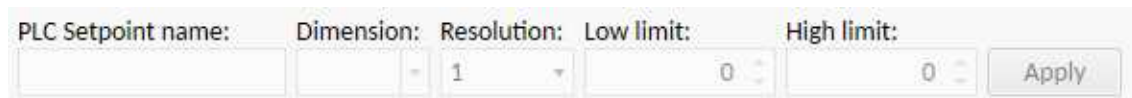


Image 9.115 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 48

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10487                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

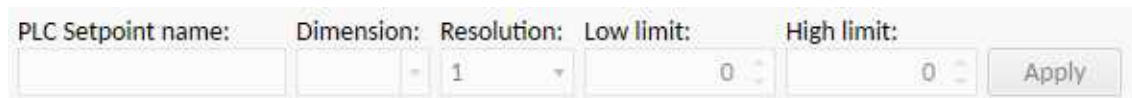


Image 9.116 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 49

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10488                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

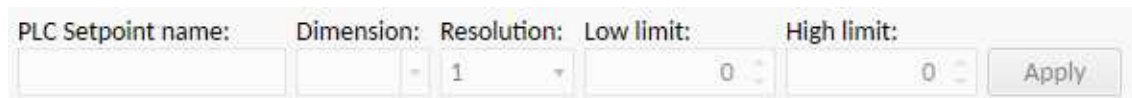


Image 9.117 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 50

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10489                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

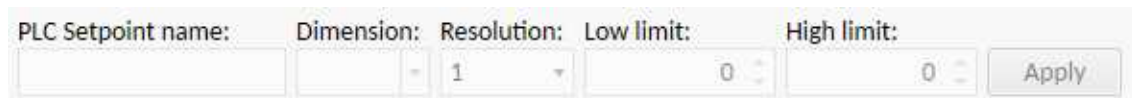


Image 9.118 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 51

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10490                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

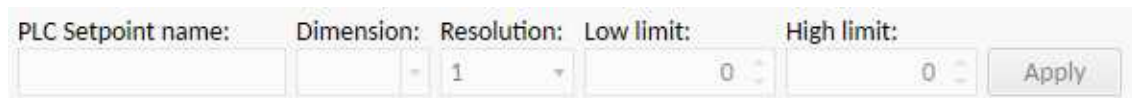


Image 9.119 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 52

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10491                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

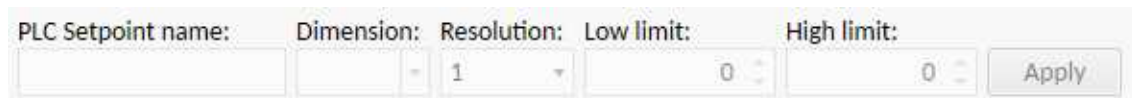


Image 9.120 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 53

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10492                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

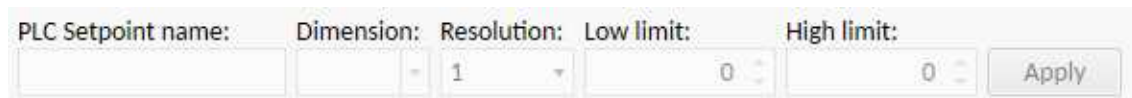


Image 9.121 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 54

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10493                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

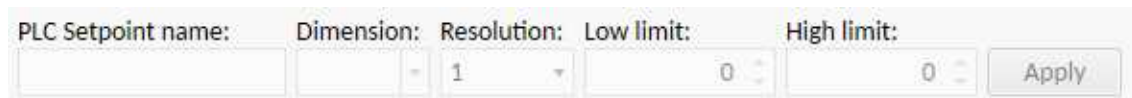


Image 9.122 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 55

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10494                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

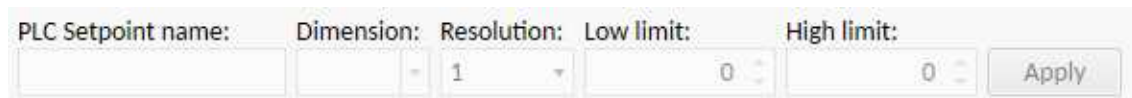


Image 9.123 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 56

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10495                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

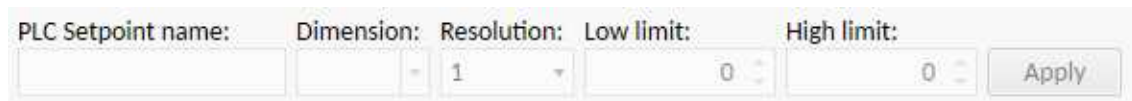


Image 9.124 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 57

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10496                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

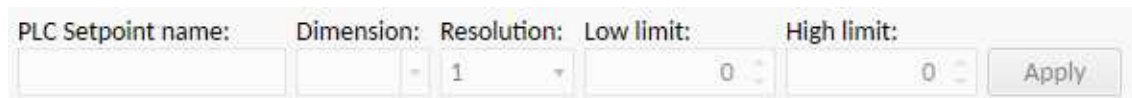


Image 9.125 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 58

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10497                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

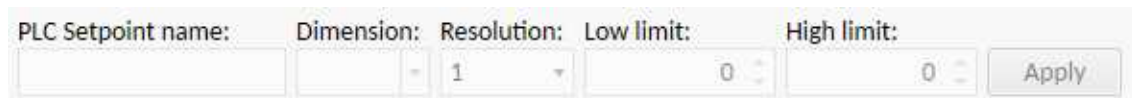


Image 9.126 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 59

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10498                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

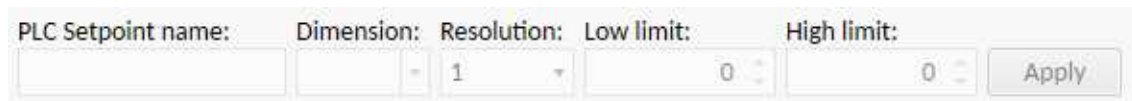


Image 9.127 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 60

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10499                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

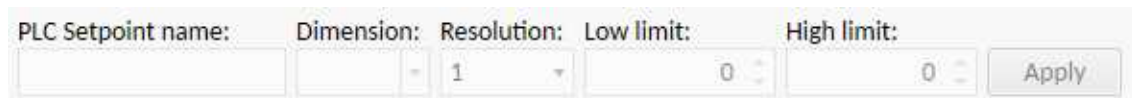


Image 9.128 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 61

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10500                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

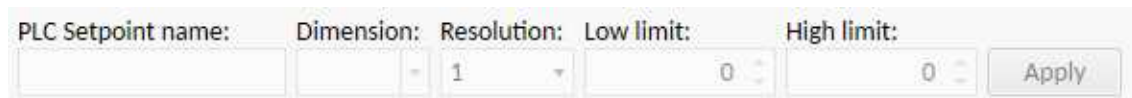


Image 9.129 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 62

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10501                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

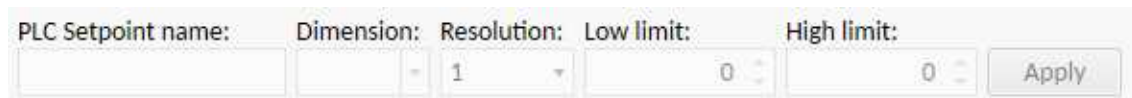


Image 9.130 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 63

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10502                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

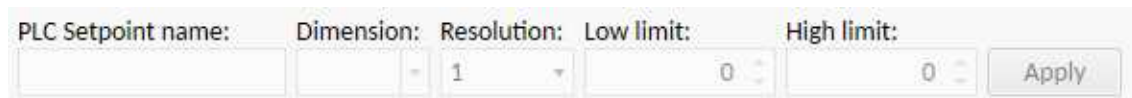


Image 9.131 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 64

|                            |  |                             |            |
|----------------------------|--|-----------------------------|------------|
| <b>Setpoint group</b>      | PLC                                      | <b>Related FW</b>           | 1.0.0      |
| <b>Range [units]</b>       | Depends on resolution of value [-]       |                             |            |
| <b>Default value</b>       | Depends on resolution of value [-]       | <b>Alternative config</b>   | NO         |
| <b>Step</b>                | Depends on resolution of value [-]       |                             |            |
| <b>Comm object</b>         | 10503                                    | <b>Related applications</b> | MINT, SPtM |
| <b>Config level</b>        | Standard                                 |                             |            |
| <b>Setpoint visibility</b> | Only if relevant setpoint is used in PLC |                             |            |

### Description

Adjustable value for input in PLC logic.

#### Configuration of setpoint:

Configuration is made via configuration PC tool IntelliConfig

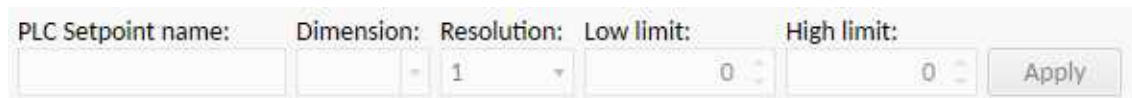


Image 9.132 Screen of configuration from IntelliConfig

|                   |   |
|-------------------|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters)   |
| Dimension         | Dimension of value of the setpoint.   |
| Resolution        | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.      |
| Low limit         | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.  |
| High limit        | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## 9.1.2 Values

### What values are:

Values (or quantities) are analog or binary data objects, measured or computed by the controller, that are intended for reading from the controller screen, PC, MODBUS, etc. Values are organized into groups according to their meaning.

### Invalid flag

If valid data is not available for a particular value, the invalid flag is set to it. This situation may be due to the following:

- ▶ The value is not being evaluated in the scope of the current application and configuration.
- ▶ Sensor fail has been detected on an analog input.
- ▶ The configured ECU or extension module does not provide the particular value.
- ▶ The communication with the ECU or extension module is interrupted.

A value containing the invalid flag is displayed as “####” in IntelliConfig and on the controller screen. If such a value is read out via MODBUS, it will contain the data 32768 in the case of signed values and 65535 in the case of unsigned values.

### List of values groups

|   |     |
|---|-----|
| Group: Engine .....                         | 559 |
| Group: Generator .....                      | 563 |
| Group: Load .....                           | 572 |
| Group: Mains/Bus .....                      | 573 |
| Group: Power Management .....               | 575 |
| Group: Speed/Load ControlLoad Control ..... | 579 |
| Group: Voltage/PF Control .....             | 580 |
| Group: Controller I/O .....                 | 580 |
| Group: Statistics .....                     | 582 |
| Group: InfoInfo .....                       | 587 |
| Group: Log Bout .....                       | 591 |
| Group: Ethernet .....                       | 594 |
| Group: CM-GPRS .....                        | 597 |
| Group: CM-4G-GPS .....                      | 602 |
| Group: Date/Time .....                      | 608 |
| Group: Plug-In I/O .....                    | 608 |
| Group: PLC .....                            | 609 |

For full list of setpoints go to the chapter **List of values (page 556)**.

## List of values

### Engine

|                          |     |
|--------------------------|-----|
| DEF Level .....          | 559 |
| DPF Ash Load .....       | 559 |
| DPF Soot Load .....      | 559 |
| ECU-BIN 1 .....          | 559 |
| ECU-BIN 2 .....          | 560 |
| ECU-BIN 3 .....          | 560 |
| ECU-BIN 4 .....          | 560 |
| ECU-BIN 5 .....          | 560 |
| ECU-BIN 6 .....          | 561 |
| ECU-BIN 7 .....          | 561 |
| ECU-BIN 8 .....          | 561 |
| ECU-BIN 9 .....          | 561 |
| ECU-BIN-EXT-1 .....      | 562 |
| ECU Frequency Select ... | 562 |
| ECU State .....          | 562 |
| RPM .....                | 563 |
| Speed Required RPM ....  | 563 |

### Generator

|                            |     |
|----------------------------|-----|
| Generator Frequency .....  | 568 |
| Generator Voltage L1-L2 .. | 568 |
| Generator Voltage L1-N ..  | 568 |
| Generator Voltage L2-L3 .. | 568 |
| Generator Voltage L2-N ..  | 569 |
| Generator Voltage L3-L1 .. | 569 |
| Generator Voltage L3-N ..  | 569 |
| Slip Angle .....           | 570 |
| Slip Frequency .....       | 570 |
| Nominal Current .....      | 571 |
| Nominal Power .....        | 571 |
| Nominal Voltage .....      | 571 |
| Earth Fault Current .....  | 571 |

### Load

|                       |     |
|-----------------------|-----|
| Generator kW .....    | 563 |
| Generator kW L1 ..... | 563 |

|                            |     |
|----------------------------|-----|
| Generator kW L2 .....      | 564 |
| Generator kW L3 .....      | 564 |
| Generator kVA .....        | 564 |
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## Group: Engine

### DEF Level

|   |        |                      |            |
|---|--------|----------------------|------------|
| Value group                             | Engine | Related FW           | 1.0.0      |
| Units                                   | %      |                      |            |
| Comm object                             | 14522  | Related applications | MINT, SPtM |
| <b>Description</b>                      |        |                      |            |
| The level of diesel exhaust fluid tank. |        |                      |            |

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### DPF Ash Load

|   |        |                      |            |
|---|--------|----------------------|------------|
| Value group   | Engine | Related FW           | 1.0.0      |
| Units   | %      |                      |            |
| Comm object   | 12483  | Related applications | MINT, SPtM |
| <b>Description</b>                                  |        |                      |            |
| The rate of ash in DPF (Diesel particulate filter). |        |                      |            |

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### DPF Soot Load

|  |        |                      |            |
|--|--------|----------------------|------------|
| Value group  | Engine | Related FW           | 1.0.0      |
| Units  | %      |                      |            |
| Comm object  | 12484  | Related applications | MINT, SPtM |
| <b>Description</b>                                   |        |                      |            |
| The rate of soot in DPF (Diesel particulate filter). |        |                      |            |

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### ECU-BIN 1

|  |                      |                      |            |
|--|----------------------|----------------------|------------|
| Value group  | Engine               | Related FW           | 1.0.0      |
| Units  | Depends on ECU value |                      |            |
| Comm object  | 10153                | Related applications | MINT, SPtM |
| <b>Description</b>   |                      |                      |            |
| This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.   |                      |                      |            |
| <p><b>Note:</b> Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature [°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.</p> |                      |                      |            |

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## ECU-BIN 2

|   |                      |                             |            |
|---|----------------------|-----------------------------|------------|
| <b>Value group</b>  | Engine               | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | Depends on ECU value |                             |            |
| <b>Comm object</b>  | 10154                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                      |                             |            |
| This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.  |                      |                             |            |
| <i>Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature [°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.</i> |                      |                             |            |

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## ECU-BIN 3

|   |                      |                             |            |
|---|----------------------|-----------------------------|------------|
| <b>Value group</b>  | Engine               | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | Depends on ECU value |                             |            |
| <b>Comm object</b>  | 10155                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                      |                             |            |
| This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.  |                      |                             |            |
| <i>Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature [°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.</i> |                      |                             |            |

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## ECU-BIN 4

|   |                      |                             |            |
|---|----------------------|-----------------------------|------------|
| <b>Value group</b>  | Engine               | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | Depends on ECU value |                             |            |
| <b>Comm object</b>  | 10156                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                      |                             |            |
| This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.  |                      |                             |            |
| <i>Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature [°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.</i> |                      |                             |            |

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## ECU-BIN 5

|   |                      |                             |            |
|---|----------------------|-----------------------------|------------|
| <b>Value group</b>  | Engine               | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | Depends on ECU value |                             |            |
| <b>Comm object</b>  | 10157                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                      |                             |            |
| This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.  |                      |                             |            |
| <i>Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature [°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.</i> |                      |                             |            |

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## ECU-BIN 6

|   |                      |                             |            |
|---|----------------------|-----------------------------|------------|
| <b>Value group</b>  | Engine               | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | Depends on ECU value |                             |            |
| <b>Comm object</b>  | 10158                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                      |                             |            |
| This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.  |                      |                             |            |
| <i>Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature [°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.</i> |                      |                             |            |

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## ECU-BIN 7

|   |                      |                             |            |
|---|----------------------|-----------------------------|------------|
| <b>Value group</b>  | Engine               | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | Depends on ECU value |                             |            |
| <b>Comm object</b>  | 10159                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                      |                             |            |
| This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.  |                      |                             |            |
| <i>Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature [°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.</i> |                      |                             |            |

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## ECU-BIN 8

|   |                      |                             |            |
|---|----------------------|-----------------------------|------------|
| <b>Value group</b>  | Engine               | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | Depends on ECU value |                             |            |
| <b>Comm object</b>  | 10160                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                      |                             |            |
| This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.  |                      |                             |            |
| <i>Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature [°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.</i> |                      |                             |            |

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## ECU-BIN 9

|   |                      |                             |            |
|---|----------------------|-----------------------------|------------|
| <b>Value group</b>  | Engine               | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | Depends on ECU value |                             |            |
| <b>Comm object</b>  | 10161                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                      |                             |            |
| This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.  |                      |                             |            |
| <i>Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature [°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.</i> |                      |                             |            |

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## ECU-BIN-EXT-1

|  |                      |                             |            |
|--|----------------------|-----------------------------|------------|
| <b>Value group</b>   | Engine               | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | Depends on ECU value |                             |            |
| <b>Comm object</b>   | 10173                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                      |                             |            |
| This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.   |                      |                             |            |
| <p><b>Note:</b> Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature [°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.</p> |                      |                             |            |

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## ECU Frequency Select

|  |        |                             |            |
|--|--------|-----------------------------|------------|
| <b>Value group</b>   | Engine | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | -      |                             |            |
| <b>Comm object</b>   | 12926  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |        |                             |            |
| Shows selected frequency of ECU. The value is calculated from setpoint <b>Nominal Frequency (page 247)</b>   |        |                             |            |
| <ul style="list-style-type: none"> <li>▶ If is <b>Nominal Frequency (page 247)</b> in range from 45 Hz to 54 Hz, is considered as 50 Hz application. The value is set to 0.</li> <li>▶ If is <b>Nominal Frequency (page 247)</b> in range from 55 Hz to 65 Hz, is considered as 60 Hz application. The value is set to 1.</li> </ul> |        |                             |            |

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## ECU State

|  |        |                             |            |
|--|--------|-----------------------------|------------|
| <b>Value group</b>   | Engine | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | -      |                             |            |
| <b>Comm object</b>   | 10034  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |        |                             |            |
| Shows binary status (0 or 1) of ECU:   |        |                             |            |
| <ul style="list-style-type: none"> <li>▶ ECU Yellow Lamp</li> <li>▶ ECU Red Lamp</li> <li>▶ Wait To Start</li> </ul> |        |                             |            |

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## RPM

|  |        |                             |            |
|--|--------|-----------------------------|------------|
| <b>Value group</b>   | Engine | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | RPM    |                             |            |
| <b>Comm object</b>   | 10123  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |        |                             |            |
| This value contains the current engine speed. The value is obtained from one of the following sources: <ul style="list-style-type: none"> <li>▶ ECU, if an ECU is configured</li> <li>▶ Pickup input</li> <li>▶ Generator frequency</li> </ul> |        |                             |            |

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## Speed Required RPM

|                         |        |                             |            |
|-------------------------|--------|-----------------------------|------------|
| <b>Value group</b>      | Engine | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>            | RPM    |                             |            |
| <b>Comm object</b>      | 10006  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>      |        |                             |            |
| Requested engine speed. |        |                             |            |

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## Group: Generator

### Generator kW

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kW        |                             |            |
| <b>Comm object</b>  | 8202      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator active power.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kW L1

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kW        |                             |            |
| <b>Comm object</b>  | 8524      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator active power in phase L1.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kW L2

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kW        |                             |            |
| <b>Comm object</b>  | 8525      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator active power in phase L2.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kW L3

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kW        |                             |            |
| <b>Comm object</b>  | 8526      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator active power in phase L3.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kVA

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kVA       |                             |            |
| <b>Comm object</b>  | 8565      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator apparent power.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kVA L1

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kVA       |                             |            |
| <b>Comm object</b>  | 8530      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator apparent power L1.  |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kVA L2

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kVA       |                             |            |
| <b>Comm object</b>  | 8531      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator apparent power L2.  |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kVA L3

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kVA       |                             |            |
| <b>Comm object</b>  | 8532      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator apparent power L3.  |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kVAr

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kVAr      |                             |            |
| <b>Comm object</b>  | 8203      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator reactive power.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kVAr L1

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kVAr      |                             |            |
| <b>Comm object</b>  | 8527      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator reactive power in phase L1.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kVAr L2

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kVAr      |                             |            |
| <b>Comm object</b>  | 8528      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator reactive power in phase L2.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator kVAr L3

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kVAr      |                             |            |
| <b>Comm object</b>  | 8529      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator reactive power in phase L3.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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### Generator Load Character

|  |           |                             |            |
|--|-----------|-----------------------------|------------|
| <b>Value group</b>   | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]       |                             |            |
| <b>Comm object</b>   | 8395      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |           |                             |            |
| Character of the generator load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1). |           |                             |            |

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### Generator Load Character L1

|  |           |                             |            |
|--|-----------|-----------------------------|------------|
| <b>Value group</b>   | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]       |                             |            |
| <b>Comm object</b>   | 8626      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |           |                             |            |
| Character of the generator load in the L1 phase. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1). |           |                             |            |

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### Generator Load Character L2

|  |           |                             |            |
|--|-----------|-----------------------------|------------|
| <b>Value group</b>   | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]       |                             |            |
| <b>Comm object</b>   | 8627      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |           |                             |            |
| Character of the generator load in the L2 phase. “L” means inductive load, “C” is capacitive and “R” is resistive load (power factor = 1). |           |                             |            |

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### Generator Load Character L3

|  |           |                             |            |
|--|-----------|-----------------------------|------------|
| <b>Value group</b>   | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]       |                             |            |
| <b>Comm object</b>   | 8628      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |           |                             |            |
| Character of the generator load in the L3 phase. “L” means inductive load, “C” is capacitive and “R” is resistive load (power factor = 1). |           |                             |            |

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### Generator Power Factor

|                         |           |                             |            |
|-------------------------|-----------|-----------------------------|------------|
| <b>Generator</b>        | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>            | [-]       |                             |            |
| <b>Comm object</b>      | 8204      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>      |           |                             |            |
| Generator power factor. |           |                             |            |

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### Generator Power Factor L1

|                                     |           |                             |            |
|-------------------------------------|-----------|-----------------------------|------------|
| <b>Generator</b>                    | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                        | [-]       |                             |            |
| <b>Comm object</b>                  | 8533      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                  |           |                             |            |
| Generator power factor in phase L1. |           |                             |            |

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### Generator Power Factor L2

|                                     |           |                             |            |
|-------------------------------------|-----------|-----------------------------|------------|
| <b>Generator</b>                    | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                        | [-]       |                             |            |
| <b>Comm object</b>                  | 8534      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                  |           |                             |            |
| Generator power factor in phase L2. |           |                             |            |

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### Generator Power Factor L3

|                                     |           |                             |            |
|-------------------------------------|-----------|-----------------------------|------------|
| <b>Generator</b>                    | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                        | [-]       |                             |            |
| <b>Comm object</b>                  | 8535      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                  |           |                             |            |
| Generator power factor in phase L3. |           |                             |            |

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### Generator Frequency

|                         |           |                             |            |
|-------------------------|-----------|-----------------------------|------------|
| <b>Value group</b>      | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>            | Hz        |                             |            |
| <b>Comm object</b>      | 8210      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>      |           |                             |            |
| Frequency of generator. |           |                             |            |

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### Generator Voltage L1-L2

|  |           |                             |            |
|--|-----------|-----------------------------|------------|
| <b>Value group</b>   | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | V         |                             |            |
| <b>Comm object</b>   | 9628      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |           |                             |            |
| Generator phase to phase voltage between L1 and L2 phases. |           |                             |            |

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### Generator Voltage L1-N

|                               |           |                             |            |
|-------------------------------|-----------|-----------------------------|------------|
| <b>Value group</b>            | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                  | V         |                             |            |
| <b>Comm object</b>            | 8192      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>            |           |                             |            |
| Generator voltage on phase 1. |           |                             |            |

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### Generator Voltage L2-L3

|  |           |                             |            |
|--|-----------|-----------------------------|------------|
| <b>Value group</b>   | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | V         |                             |            |
| <b>Comm object</b>   | 9629      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |           |                             |            |
| Generator phase to phase voltage between L2 and L3 phases. |           |                             |            |

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### Generator Voltage L2-N

|                               |           |                             |            |
|-------------------------------|-----------|-----------------------------|------------|
| <b>Value group</b>            | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                  | V         |                             |            |
| <b>Comm object</b>            | 8193      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>            |           |                             |            |
| Generator voltage on phase 2. |           |                             |            |

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### Generator Voltage L3-L1

|  |           |                             |            |
|--|-----------|-----------------------------|------------|
| <b>Value group</b>   | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | V         |                             |            |
| <b>Comm object</b>   | 9630      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |           |                             |            |
| Generator phase to phase voltage between L3 and L1 phases. |           |                             |            |

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### Generator Voltage L3-N

|                               |           |                             |            |
|-------------------------------|-----------|-----------------------------|------------|
| <b>Value group</b>            | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                  | V         |                             |            |
| <b>Comm object</b>            | 8194      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>            |           |                             |            |
| Generator voltage on phase 3. |           |                             |            |

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### Generator Current L1

|  |           |                             |            |
|--|-----------|-----------------------------|------------|
| <b>Value group</b>   | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | A         |                             |            |
| <b>Comm object</b>   | 8198      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |           |                             |            |
| Generator current phase L1.  |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via IntelliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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## Generator Current L2

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | A         |                             |            |
| <b>Comm object</b>  | 8199      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator current phase L2.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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## Generator Current L3

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | A         |                             |            |
| <b>Comm object</b>  | 8200      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Generator current phase L3.   |           |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |           |                             |            |

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## Slip Angle

|                                    |           |                             |            |
|------------------------------------|-----------|-----------------------------|------------|
| <b>Value group</b>                 | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                       | °         |                             |            |
| <b>Comm object</b>                 | 8225      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                 |           |                             |            |
| Slip angle during synchronization. |           |                             |            |

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## Slip Frequency

|  |           |                             |            |
|--|-----------|-----------------------------|------------|
| <b>Value group</b>                     | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                           | Hz        |                             |            |
| <b>Comm object</b>                     | 8224      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                     |           |                             |            |
| Slip frequency during synchronization. |           |                             |            |

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### Nominal Current

|                            |           |                             |            |
|----------------------------|-----------|-----------------------------|------------|
| <b>Value group</b>         | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>               | A         |                             |            |
| <b>Comm object</b>         | 9978      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>         |           |                             |            |
| Generator nominal current. |           |                             |            |

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### Nominal Power

|                          |           |                             |            |
|--------------------------|-----------|-----------------------------|------------|
| <b>Value group</b>       | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | V         |                             |            |
| <b>Comm object</b>       | 9018      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |           |                             |            |
| Generator nominal power. |           |                             |            |

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### Nominal Voltage

|                            |           |                             |            |
|----------------------------|-----------|-----------------------------|------------|
| <b>Value group</b>         | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>               | V         |                             |            |
| <b>Comm object</b>         | 9917      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>         |           |                             |            |
| Generator nominal voltage. |           |                             |            |

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### Earth Fault Current

|   |           |                             |            |
|---|-----------|-----------------------------|------------|
| <b>Value group</b>  | Generator | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | A         |                             |            |
| <b>Comm object</b>  | 14325     | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |           |                             |            |
| Measured value of fault for evaluation of earth fault protection. |           |                             |            |

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## Group: Load

### Load kW

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Value group</b>  | Load  | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kW    |                             |            |
| <b>Comm object</b>  | 10601 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |       |                             |            |
| Load active power.  |       |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |       |                             |            |

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### Load kVAr

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Value group</b>  | Load  | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kVAr  |                             |            |
| <b>Comm object</b>  | 10644 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |       |                             |            |
| Load reactive power.  |       |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |       |                             |            |

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### Load Power Factor

|                    |      |                             |            |
|--------------------|------|-----------------------------|------------|
| <b>Load</b>        | Load | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>       | [-]  |                             |            |
| <b>Comm object</b> | 9025 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b> |      |                             |            |
| Load power factor. |      |                             |            |

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### Load Character

|   |      |                             |            |
|---|------|-----------------------------|------------|
| <b>Value group</b>  | Load | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | A    |                             |            |
| <b>Comm object</b>  | 9026 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |      |                             |            |
| Character of the load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).  |      |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |      |                             |            |

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## Group: Mains/Bus

### Mains/Bus Frequency

|                         |       |                             |            |
|-------------------------|-------|-----------------------------|------------|
| <b>Value group</b>      | Mains | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>            | Hz    |                             |            |
| <b>Comm object</b>      | 8211  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>      |       |                             |            |
| Frequency of mains/bus. |       |                             |            |

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### Mains/Bus Voltage L1-L2

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | Mains | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | V     |                             |            |
| <b>Comm object</b>   | 9631  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Mains/Bus phase to phase voltage between L1 and L2 phases. |       |                             |            |

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### Mains/Bus Voltage L1-N

|                               |       |                             |            |
|-------------------------------|-------|-----------------------------|------------|
| <b>Value group</b>            | Mains | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                  | V     |                             |            |
| <b>Comm object</b>            | 8195  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>            |       |                             |            |
| Mains/Bus voltage on phase 1. |       |                             |            |

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### Mains/Bus Voltage L2-L3

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | Mains | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | V     |                             |            |
| <b>Comm object</b>   | 9632  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Mains/Bus phase to phase voltage between L2 and L3 phases. |       |                             |            |

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### Mains/Bus Voltage L2-N

|                               |       |                             |            |
|-------------------------------|-------|-----------------------------|------------|
| <b>Value group</b>            | Mains | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                  | V     |                             |            |
| <b>Comm object</b>            | 8196  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>            |       |                             |            |
| Mains/Bus voltage on phase 2. |       |                             |            |

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### Mains/Bus Voltage L3-L1

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | Mains | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | V     |                             |            |
| <b>Comm object</b>   | 9633  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Mains/Bus phase to phase voltage between L3 and L1 phases. |       |                             |            |

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### Mains/Bus Voltage L3-N

|                               |       |                             |            |
|-------------------------------|-------|-----------------------------|------------|
| <b>Value group</b>            | Mains | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                  | V     |                             |            |
| <b>Comm object</b>            | 8197  | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>            |       |                             |            |
| Mains/Bus voltage on phase 3. |       |                             |            |

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### Mains/Bus Current L1

|                            |       |                             |       |
|----------------------------|-------|-----------------------------|-------|
| <b>Value group</b>         | Mains | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>               | A     |                             |       |
| <b>Comm object</b>         | 8208  | <b>Related applications</b> | SPtM  |
| <b>Description</b>         |       |                             |       |
| Mains current in phase L1. |       |                             |       |

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### Mains Import kW

|                         |       |                             |       |
|-------------------------|-------|-----------------------------|-------|
| <b>Value group</b>      | Mains | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>            | kW    |                             |       |
| <b>Comm object</b>      | 8703  | <b>Related applications</b> | SPtM  |
| <b>Description</b>      |       |                             |       |
| Imported kW from mains. |       |                             |       |

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### Mains Import kVAr

|                           |       |                             |       |
|---------------------------|-------|-----------------------------|-------|
| <b>Value group</b>        | Mains | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>              | kVAr  |                             |       |
| <b>Comm object</b>        | 8704  | <b>Related applications</b> | SPtM  |
| <b>Description</b>        |       |                             |       |
| Imported kVAr from mains. |       |                             |       |

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## Mains Power Factor

|                     |       |                             |       |
|---------------------|-------|-----------------------------|-------|
| <b>Value group</b>  | Mains | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>        | Hz    |                             |       |
| <b>Comm object</b>  | 8705  | <b>Related applications</b> | SPtM  |
| <b>Description</b>  |       |                             |       |
| Mains power factor. |       |                             |       |

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## Mains Load Character

|  |       |                             |       |
|--|-------|-----------------------------|-------|
| <b>Value group</b>   | Mains | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>   | Hz    |                             |       |
| <b>Comm object</b>   | 8709  | <b>Related applications</b> | SPtM  |
| <b>Description</b>   |       |                             |       |
| Character of mains load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1). |       |                             |       |

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## Max Vector ShiftMaxVectorS

|  |                    |                             |       |
|--|--------------------|-----------------------------|-------|
| <b>Value group</b>   | MainsMains protect | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>   | Hz                 |                             |       |
| <b>Comm object</b>   | 9847               | <b>Related applications</b> | SPtM  |
| <b>Description</b>   |                    |                             |       |
| This is maximal measured value of vector shift of the generator voltage. It is set to zero always when Controller goes to parallel to mains operation (When Vector Shift Protection = PARALLEL ONLY) or when MCB gets closed (when Vector shift protection = ENABLED). |                    |                             |       |

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## Group: Power Management

### Engine Priority

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Value group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>  | -                |                             |       |
| <b>Comm object</b>  | 8624             | <b>Related applications</b> | MINT  |
| <b>Description</b>  |                  |                             |       |
| This value shows current priority number. It corresponds to the setpoint <b>Priority (page 333)</b> except following situations:  |                  |                             |       |
| <ul style="list-style-type: none"> <li>▶ If at least one of binary inputs <b>TOP PRIORITY (PAGE 680)</b> is configured on some source and is active</li> <li>▶ <b>#Priority Auto Swap (page 334)</b> is active</li> </ul> |                  |                             |       |

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### Actual Reserve

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Value group</b>                           | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>                                 | kW               |                             |       |
| <b>Comm object</b>                           | 15805            | <b>Related applications</b> | MINT  |
| <b>Description</b>                           |                  |                             |       |
| Actual absolute reserve in power management. |                  |                             |       |

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### Actual Relative Reserve

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Value group</b>                           | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>                                 | %                |                             |       |
| <b>Comm object</b>                           | 10788            | <b>Related applications</b> | MINT  |
| <b>Description</b>                           |                  |                             |       |
| Actual relative reserve in power management. |                  |                             |       |

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### Active Power Required

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Value group</b>   | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | kW                 |                             |            |
| <b>Comm object</b>   | 8663               | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                    |                             |            |
| This value contains actual required load level, which is used as the input into the load regulation loop in the parallel to mains operation. |                    |                             |            |

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### Start Reserve

|                                    |                  |                             |       |
|------------------------------------|------------------|-----------------------------|-------|
| <b>Value group</b>                 | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>                       | kW               |                             |       |
| <b>Comm object</b>                 | 15806            | <b>Related applications</b> | MINT  |
| <b>Description</b>                 |                  |                             |       |
| Actual absolute reserve for start. |                  |                             |       |

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### Stop Reserve

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Value group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>  | kW               |                             |       |
| <b>Comm object</b>  | 15807            | <b>Related applications</b> | MINT  |
| <b>Description</b>  |                  |                             |       |
| Actual absolute reserve - when the reserve is higher than this value the last started gen-set (the gen-set with the highest priority) is stopped. |                  |                             |       |

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### Start Relative Reserve

|                                    |                  |                             |       |
|------------------------------------|------------------|-----------------------------|-------|
| <b>Value group</b>                 | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>                       | %                |                             |       |
| <b>Comm object</b>                 | 10786            | <b>Related applications</b> | MINT  |
| <b>Description</b>                 |                  |                             |       |
| Actual relative reserve for start. |                  |                             |       |

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### Stop Relative Reserve

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Value group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>   | %                |                             |       |
| <b>Comm object</b>   | 10787            | <b>Related applications</b> | MINT  |
| <b>Description</b>   |                  |                             |       |
| Actual relative reserve - when the relative reserve is higher than this value the last started gen-set (the gen-set with the highest priority) is stopped. |                  |                             |       |

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### Actual Active Power In PM

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Value group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>  | kW               |                             |       |
| <b>Comm object</b>  | 10657            | <b>Related applications</b> | MINT  |
| <b>Description</b>  |                  |                             |       |
| Actual value of active power from all gen-sets running in power management. |                  |                             |       |

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### Actual Reactive Power In PM

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Value group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>  | kVAr             |                             |       |
| <b>Comm object</b>  | 10656            | <b>Related applications</b> | MINT  |
| <b>Description</b>  |                  |                             |       |
| Actual value of reactive power from all gen-sets running in power management. |                  |                             |       |

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### Running Nominal Power In PM

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Value group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>   | kW               |                             |       |
| <b>Comm object</b>   | 10658            | <b>Related applications</b> | MINT  |
| <b>Description</b>   |                  |                             |       |
| Actual nominal power of all gen-sets in power management, which are running. |                  |                             |       |

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### Running Nominal Power Of All

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Value group</b>                                       | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>   | kW               |                             |       |
| <b>Comm object</b>                                       | 10999            | <b>Related applications</b> | MINT  |
| <b>Description</b>                                       |                  |                             |       |
| Actual nominal power of all gen-sets, which are running. |                  |                             |       |

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### Available Nominal Power

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Value group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>   | kW               |                             |       |
| <b>Comm object</b>   | 10998            | <b>Related applications</b> | MINT  |
| <b>Description</b>   |                  |                             |       |
| Available nominal power of all gen-sets in power management. |                  |                             |       |

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### Minimal Running Nominal Power

|  |                  |                             |       |
|--|------------------|-----------------------------|-------|
| <b>Value group</b>   | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>   | kW               |                             |       |
| <b>Comm object</b>   | 10012            | <b>Related applications</b> | MINT  |
| <b>Description</b>   |                  |                             |       |
| Actual minimal nominal power of all gen-sets, which are running. |                  |                             |       |

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### Actual Power Band

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Value group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>  | -                |                             |       |
| <b>Comm object</b>  | 8974             | <b>Related applications</b> | MINT  |
| <b>Description</b>  |                  |                             |       |
| State of all gen-sets in actual power band of power management. 1 means that gen-set is running, 0 means that gen set is stopped. |                  |                             |       |
| <b>Note:</b> This value is evaluated only in controller with the lowest CAN address.  |                  |                             |       |

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## Next Power Band

|   |                  |                             |       |
|---|------------------|-----------------------------|-------|
| <b>Value group</b>  | Power Management | <b>Related FW</b>           | 1.0.0 |
| <b>Units</b>  | -                |                             |       |
| <b>Comm object</b>  | 8975             | <b>Related applications</b> | MINT  |
| <b>Description</b>  |                  |                             |       |
| State of all gen-sets in next higher power band of power management.. 1 means that gen-set is running, 0 means that gen set is stopped. |                  |                             |       |
| <i>Note: This value is evaluated only in controller with the lowest CAN address.</i>  |                  |                             |       |

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## Group: Speed/Load ControlLoad Control

### Speed Regulator Output

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Value group</b>  | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | V                  |                             |            |
| <b>Comm object</b>  | 9052               | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                    |                             |            |
| This is the actual voltage on the speed governor output of the controller. In case the output is switched to PWM mode, the relation is 10 V ~ 100 % PWM. -10 V is 0 % PWM |                    |                             |            |

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### Speed Request

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Value group</b>   | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | %                  |                             |            |
| <b>Comm object</b>   | 10137              | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                    |                             |            |
| This value contains the speed control signal expressed in %. This value is used for digital interfacing (via a communication bus) with ECUs that require the requested speed in %. |                    |                             |            |

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### Requested RPM

|  |                    |                             |            |
|--|--------------------|-----------------------------|------------|
| <b>Value group</b>   | Speed/Load Control | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | RPM                |                             |            |
| <b>Comm object</b>   | 10006              | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                    |                             |            |
| This value contains the speed which is currently requested by the controller from the attached ECU. This value is used for digital interfacing (via a communication bus) with ECUs that require the requested speed directly in RPM. |                    |                             |            |

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## Group: Voltage/PF Control

### Reactive Power Required

|                           |                    |                             |            |
|---------------------------|--------------------|-----------------------------|------------|
| <b>Value group</b>        | Voltage/PF Control | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>              | kVAr               |                             |            |
| <b>Comm object</b>        | 12877              | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>        |                    |                             |            |
| Requested reactive power. |                    |                             |            |

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### Voltage Regulator Output

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Value group</b>  | Voltage/PF Control | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | V                  |                             |            |
| <b>Comm object</b>  | 9053               | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                    |                             |            |
| Actual voltage between the AVR OUT and AVR COM terminals. |                    |                             |            |

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### Voltage Request

|   |                    |                             |            |
|---|--------------------|-----------------------------|------------|
| <b>Value group</b>                                      | Voltage/PF Control | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | %                  |                             |            |
| <b>Comm object</b>                                      | 14997              | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                                      |                    |                             |            |
| Internal Voltage request of internal Voltage regulator. |                    |                             |            |

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## Group: Controller I/O

### E-STOP

|  |                |                             |            |
|--|----------------|-----------------------------|------------|
| <b>Value group</b>   | Controller I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]            |                             |            |
| <b>Comm object</b>   | 15780          | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                |                             |            |
| Shows number of E-STOP input - the same principle of visualization like binary inputs.<br>Principle of value (principle of normally close binary input): |                |                             |            |
| <ul style="list-style-type: none"> <li>▶ 1 - E-STOP has voltage - state is OK</li> <li>▶ 0 - E-STOP has no voltage - protection is active</li> </ul>     |                |                             |            |

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### Analog Input 1

|  |               |                             |            |
|--|---------------|-----------------------------|------------|
| <b>Value group</b>   | Controler I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | Configurable  |                             |            |
| <b>Comm object</b>   | 9151          | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |               |                             |            |
| This is the value of the analog input 1 of the controller. |               |                             |            |

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### Analog Input 2

|  |               |                             |            |
|--|---------------|-----------------------------|------------|
| <b>Value group</b>   | Controler I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | Configurable  |                             |            |
| <b>Comm object</b>   | 9152          | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |               |                             |            |
| This is the value of the analog input 2 of the controller. |               |                             |            |

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### Analog Input 3

|  |               |                             |            |
|--|---------------|-----------------------------|------------|
| <b>Value group</b>   | Controler I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | Configurable  |                             |            |
| <b>Comm object</b>   | 9153          | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |               |                             |            |
| This is the value of the analog input 3 of the controller. |               |                             |            |

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### Analog Input 4

|  |               |                             |            |
|--|---------------|-----------------------------|------------|
| <b>Value group</b>   | Controler I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | Configurable  |                             |            |
| <b>Comm object</b>   | 9154          | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |               |                             |            |
| This is the value of the analog input 4 of the controller. |               |                             |            |

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### Battery Volts

|                            |               |                             |            |
|----------------------------|---------------|-----------------------------|------------|
| <b>Value group</b>         | Controler I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>               | V             |                             |            |
| <b>Comm object</b>         | 8213          | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>         |               |                             |            |
| Controller supply voltage. |               |                             |            |

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## Binary Inputs

|   |               |                             |            |
|---|---------------|-----------------------------|------------|
| <b>Value group</b>                            | Controler I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                                  | [-]           |                             |            |
| <b>Comm object</b>                            | 8235          | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                            |               |                             |            |
| State of the binary inputs of the controller. |               |                             |            |

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## Binary Outputs

|  |               |                             |            |
|--|---------------|-----------------------------|------------|
| <b>Value group</b>                             | Controler I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                                   | [-]           |                             |            |
| <b>Comm object</b>                             | 8239          | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                             |               |                             |            |
| State of the binary outputs of the controller. |               |                             |            |

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## D+

|                      |               |                             |            |
|----------------------|---------------|-----------------------------|------------|
| <b>Value group</b>   | Controler I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>         | V             |                             |            |
| <b>Comm object</b>   | 10603         | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |               |                             |            |
| D+ terminal voltage. |               |                             |            |

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## Group: Statistics

### Genset kVArh

|  |            |                             |            |
|--|------------|-----------------------------|------------|
| <b>Value group</b>   | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | kVArh      |                             |            |
| <b>Comm object</b>   | 8539       | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |            |                             |            |
| Counter of gen-set reactive power.   |            |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via IntelliConfig PC tool). In this case the range of value is decrease 10 times.</p> |            |                             |            |

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## Genset kWh

|   |            |                             |            |
|---|------------|-----------------------------|------------|
| <b>Value group</b>  | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kWh        |                             |            |
| <b>Comm object</b>  | 8205       | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |            |                             |            |
| Counter of gen-set active power.  |            |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |            |                             |            |

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## Mains kVArh

|   |            |                             |            |
|---|------------|-----------------------------|------------|
| <b>Value group</b>  | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kVArh      |                             |            |
| <b>Comm object</b>  | 11026      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |            |                             |            |
| Counter of mains reactive power.  |            |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |            |                             |            |

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## Mains kWh

|   |            |                             |            |
|---|------------|-----------------------------|------------|
| <b>Value group</b>  | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | kWh        |                             |            |
| <b>Comm object</b>  | 11025      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |            |                             |            |
| Counter of mains active power.  |            |                             |            |
| <p><b>Note:</b> This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.</p> |            |                             |            |

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## Maintenance 1

|   |            |                             |            |
|---|------------|-----------------------------|------------|
| <b>Value group</b>  | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | hours      |                             |            |
| <b>Comm object</b>  | 10528      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |            |                             |            |
| Countdown until next maintenance 1. Initial value can be set in <b>Maintenance Timer 1 (page 302)</b> . |            |                             |            |

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## Maintenance 2

|   |            |                             |            |
|---|------------|-----------------------------|------------|
| <b>Value group</b>  | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | hours      |                             |            |
| <b>Comm object</b>  | 10529      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |            |                             |            |
| Countdown until next maintenance 2. Initial value can be set in <b>Maintenance Timer 2 (page 303)</b> . |            |                             |            |

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## Maintenance 3

|   |            |                             |            |
|---|------------|-----------------------------|------------|
| <b>Value group</b>  | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | hours      |                             |            |
| <b>Comm object</b>  | 10530      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |            |                             |            |
| Countdown until next maintenance 3. Initial value can be set in <b>Maintenance Timer 3 (page 303)</b> . |            |                             |            |

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## Num E-Stops

|                                |            |                             |            |
|--------------------------------|------------|-----------------------------|------------|
| <b>Value group</b>             | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                   | [-]        |                             |            |
| <b>Comm object</b>             | 11195      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>             |            |                             |            |
| Emergency stop alarms counter. |            |                             |            |

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## Num Starts

|  |            |                             |            |
|--|------------|-----------------------------|------------|
| <b>Value group</b>   | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]        |                             |            |
| <b>Comm object</b>   | 8207       | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |            |                             |            |
| Engine start commands counter. The counter is increased by 1 even if the particular start command will take more than one attempt. |            |                             |            |

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## Rental 1

|   |            |                             |            |
|---|------------|-----------------------------|------------|
| <b>Value group</b>                                    | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | hours      |                             |            |
| <b>Comm object</b>                                    | 14328      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                                    |            |                             |            |
| Remaining hours of <b>Rental Timer 1 (page 441)</b> . |            |                             |            |

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## Rental 2

|  |            |                             |            |
|--|------------|-----------------------------|------------|
| <b>Value group</b>                                   | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | days       |                             |            |
| <b>Comm object</b>                                   | 14369      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                                   |            |                             |            |
| Remaining hours of <b>Rental Timer 2</b> (page 443). |            |                             |            |

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## Running Hours

|   |            |                             |            |
|---|------------|-----------------------------|------------|
| <b>Value group</b>  | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | hours      |                             |            |
| <b>Comm object</b>  | 8206       | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |            |                             |            |
| Engine operation hours counter. The engine hours are incremented in the controller while the engine is running. |            |                             |            |
| <i>Note: If an ECU is configured and it provides engine hours value, the value is taken from the ECU.</i>       |            |                             |            |

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## Shutdowns

|  |            |                             |            |
|--|------------|-----------------------------|------------|
| <b>Value group</b>   | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]        |                             |            |
| <b>Comm object</b>   | 11196      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |            |                             |            |
| Shutdown alarms counter. This counter counts all occurrences of a shutdown alarm, not only real shutdowns of the gen-set, i.e. the counter is increased by 2 if two shutdown alarms appear simultaneously. |            |                             |            |

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## Time Till Empty

|   |            |                             |            |
|---|------------|-----------------------------|------------|
| <b>Value group</b>  | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | days       |                             |            |
| <b>Comm object</b>  | 13770      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |            |                             |            |
| Assessment in days when the fuel tank will be empty.  |            |                             |            |
| <i>Note: This value is based on setpoint <b>Fuel Tank Volume</b> (page 298) and value from ECU Fuel Rate. For correct calculation of this value is necessary to have configured ECU which send Fuel Rate value, otherwise this value can't be calculated.</i> |            |                             |            |

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## Time Till Empty

|  |            |                             |            |
|--|------------|-----------------------------|------------|
| <b>Value group</b>   | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | hours      |                             |            |
| <b>Comm object</b>   | 13771      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |            |                             |            |
| Assessment in hours when the fuel tank will be empty.  |            |                             |            |
| <p><b>Note:</b> This value is based on setpoint <b>Fuel Tank Volume (page 298)</b> and value from ECU Fuel Rate. For correct calculation of this value is necessary to have configured ECU which send Fuel Rate value, otherwise this value can't be calculated.</p> |            |                             |            |

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## Time Till Empty

|  |            |                             |            |
|--|------------|-----------------------------|------------|
| <b>Value group</b>   | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | minutes    |                             |            |
| <b>Comm object</b>   | 13772      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |            |                             |            |
| Assessment in minutes when the fuel tank will be empty.  |            |                             |            |
| <p><b>Note:</b> This value is based on setpoint <b>Fuel Tank Volume (page 298)</b> and value from ECU Fuel Rate. For correct calculation of this value is necessary to have configured ECU which send Fuel Rate value, otherwise this value can't be calculated.</p> |            |                             |            |

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## Total Fuel Consumption

|  |            |                             |            |
|--|------------|-----------------------------|------------|
| <b>Value group</b>   | Statistics | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | L          |                             |            |
| <b>Comm object</b>   | 9040       | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |            |                             |            |
| Value containing total amount of consumed fuel by engine. The controller automatically updates this value every 30 s. The controller can calculate it in three ways:   |            |                             |            |
| <ul style="list-style-type: none"> <li>▶ Direct reading from ECU</li> <li>▶ Calculation based on actual fuel consumption reading from ECU</li> <li>▶ Calculation from fuel level drop in tank (using Fuel Level Analog Input + <b>Fuel Tank Volume (page 298)</b> setpoint)</li> </ul> |            |                             |            |
| <p><b>Note:</b> The accuracy of Total Fuel Consumption depends on the precision of ECU values or precision of <b>Fuel Tank Volume (page 298)</b> and fuel level sensor.</p>  |            |                             |            |

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## Group: InfoInfo

### Application Mode

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]     |                             |            |
| <b>Comm object</b>  | 14446   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| <p>This Value mirrors the active application in the controller.</p> <p>The intend of use it to display the value of the active application in IntelliConfig or at the screen of the controller.</p> |         |                             |            |

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### Load Shedding StatusStatLdShed

|  |                      |                             |            |
|--|----------------------|-----------------------------|------------|
| <b>Value group</b>   | IL InfoLoad shedding | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]                  |                             |            |
| <b>Comm object</b>   | 9591                 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                      |                             |            |
| <p>The value contains actual "load shedding stage. The Value can get the values of the range 0 to 3, where 0 means no load shedding stage is active and 1, 2 or 3 means that the corresponding loadshedding stage is active.</p> |                      |                             |            |

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### Engine State

|  |      |                             |            |
|--|------|-----------------------------|------------|
| <b>Value group</b>   | Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]  |                             |            |
| <b>Comm object</b>   | 9244 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |      |                             |            |
| <p>The value contains actual "engine state" message which is shown on the main screen of the controller.</p> |      |                             |            |

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### Breaker State

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]     |                             |            |
| <b>Comm object</b>  | 9245    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| <p>The value contains actual "breaker state" message which is shown on the main screen of the controller.</p> |         |                             |            |

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## Timer Text

|  |         |                             |            |
|--|---------|-----------------------------|------------|
| <b>Value group</b>   | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]     |                             |            |
| <b>Comm object</b>   | 10040   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |         |                             |            |
| <p>The value contains the numeric code of the “Current process timer” text which is shown on the main screen of the controller.</p> <p>The assignment of texts to the codes can be obtained using IntelliConfig. Open any connection (also offline with a previously saved archive) and go to the Tools ribbon -&gt; Generate CFG image (all). The resulting file will contain the assignment of texts to the codes.</p> |         |                             |            |

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## Connection Type

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]     |                             |            |
| <b>Comm object</b>  | 12944   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| <p>The text of this value represents the connection type which is adjusted in setpoint <b>Connection type (page 244)</b>.</p> |         |                             |            |

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## SPI Module A

|  |         |                             |            |
|--|---------|-----------------------------|------------|
| <b>Value group</b>   | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]     |                             |            |
| <b>Comm object</b>   | 14447   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |         |                             |            |
| <p>The name of plug-in module which is inserted in slot A.</p> |         |                             |            |

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## SPI Module B

|  |         |                             |            |
|--|---------|-----------------------------|------------|
| <b>Value group</b>   | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]     |                             |            |
| <b>Comm object</b>   | 14448   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |         |                             |            |
| <p>The name of plug-in module which is inserted in slot B.</p> |         |                             |            |

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### Timer Value

|   |            |                             |            |
|---|------------|-----------------------------|------------|
| <b>Value group</b>  | IL Info    | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [HH:MM:SS] |                             |            |
| <b>Comm object</b>  | 14147      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |            |                             |            |
| The value contains the "Current process timer" value which is shown on the main screen of the controller. |            |                             |            |

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### ID String

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]     |                             |            |
| <b>Comm object</b>  | 24501   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| Name of controller which is used in IntelliConfig in command bar. |         |                             |            |

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### FW Version

|  |         |                             |            |
|--|---------|-----------------------------|------------|
| <b>Value group</b>                       | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                             | [-]     |                             |            |
| <b>Comm object</b>                       | 24339   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                       |         |                             |            |
| Major and minor firmware version number. |         |                             |            |

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### Application

|  |         |                             |            |
|--|---------|-----------------------------|------------|
| <b>Value group</b>                                   | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]     |                             |            |
| <b>Comm object</b>                                   | 8480    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                                   |         |                             |            |
| The value contains actual application in controller. |         |                             |            |

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### FW Branch

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]     |                             |            |
| <b>Comm object</b>  | 8707    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| The value contains actual branch of firmware in controller. |         |                             |            |

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## Password Decode

|  |         |                             |            |
|--|---------|-----------------------------|------------|
| <b>Value group</b>   | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]     |                             |            |
| <b>Comm object</b>   | 24202   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |         |                             |            |
| This value contains a number which can be used for retrieving a lost password. Send this number together with the controller serial number to your distributor if you have lost your password. |         |                             |            |

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## CAN16

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | V       |                             |            |
| <b>Comm object</b>  | 8546    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| Bits of this value show "1" if the controller receives messages from the controller which has address corresponding with the bit position. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16. |         |                             |            |

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## CAN32

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | V       |                             |            |
| <b>Comm object</b>  | 8827    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| Bits of this value show "1" if the controller receives messages from the controller which has address corresponding with the bit position. Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32. |         |                             |            |

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## Reg16

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  |         |                             |            |
| <b>Comm object</b>  | 11081   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| Bits of this value show "1" if the controller which has address corresponding with the bit position plays active role in the power management. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16. |         |                             |            |

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## Reg32

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  |         |                             |            |
| <b>Comm object</b>  | 11082   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| Bits of this value show "1" if the controller which has address corresponding with the bit position plays active role in the power management. Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32. |         |                             |            |

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## Gen Loaded 16

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | V       |                             |            |
| <b>Comm object</b>  | 10196   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| Bits of this value show "1" if the controller which has address corresponding with the bit position plays active role in the power management. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16. |         |                             |            |

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## Gen Loaded 32

|   |         |                             |            |
|---|---------|-----------------------------|------------|
| <b>Value group</b>  | IL Info | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | V       |                             |            |
| <b>Comm object</b>  | 10197   | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |         |                             |            |
| Bits of this value show "1" if the controller which has address corresponding with the bit position plays active role in the power management. Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32. |         |                             |            |

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## Group: Log Bout

### Log Bout 1

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 9143     | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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### Log Bout 2

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 9144     | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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### Log Bout 3

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 9145     | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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### Log Bout 4

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 9146     | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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### Log Bout 5

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 9147     | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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### Log Bout 6

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 9148     | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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### Log Bout 7

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 9149     | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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### Log Bout 8

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 9150     | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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### Log Bout 9

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 11896    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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### Log Bout 10

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 11897    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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### Log Bout 11

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Log Bout | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 11898    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| State of binary outputs. |          |                             |            |

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## Group: Ethernet

### AirGate Status

| <b>Value group</b>   | Ethernet  | <b>Related FW</b>           | 1.0.0      |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
|--|---|-----------------------------|------------|------|-------------|---|--------------------------------|---|--|---|--|---|---|---|--|---|--------------------------------------|
| <b>Units</b>   | [-]   |                             |            |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
| <b>Comm object</b>   | 24344   | <b>Related applications</b> | MINT, SPtM |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
| <b>Description</b>   |   |                             |            |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
| Diagnostic code for AirGate connection. Helps in troubleshooting.  |   |                             |            |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
| <table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Ethernet cable is disconnected</td> </tr> <tr> <td>1</td> <td>Controller registered, waiting for authorization</td> </tr> <tr> <td>2</td> <td>Not possible to register, controller blacklisted</td> </tr> <tr> <td>3</td> <td>Not possible to register, server has no more capacity</td> </tr> <tr> <td>4</td> <td>Not possible to register, other reason</td> </tr> <tr> <td>5</td> <td>Controller registered and authorized</td> </tr> </tbody> </table> |   |                             |            | Code | Description | 0 | Ethernet cable is disconnected | 1 | Controller registered, waiting for authorization | 2 | Not possible to register, controller blacklisted | 3 | Not possible to register, server has no more capacity | 4 | Not possible to register, other reason | 5 | Controller registered and authorized |
| Code   | Description   |                             |            |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
| 0  | Ethernet cable is disconnected                        |                             |            |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
| 1  | Controller registered, waiting for authorization      |                             |            |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
| 2  | Not possible to register, controller blacklisted      |                             |            |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
| 3  | Not possible to register, server has no more capacity |                             |            |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
| 4  | Not possible to register, other reason                |                             |            |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |
| 5  | Controller registered and authorized                  |                             |            |      |             |   |                                |   |  |   |  |   |   |   |  |   |                                      |

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### AirGate ID

|   |          |                             |            |
|---|----------|-----------------------------|------------|
| <b>Value group</b>  | Ethernet | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]      |                             |            |
| <b>Comm object</b>  | 24345    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |          |                             |            |
| Identification string generated by AirGate server for the purpose of establishing communication via IntelliConfig or any other supported PC tool. |          |                             |            |

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### Primary DNS

|                             |          |                             |            |
|-----------------------------|----------|-----------------------------|------------|
| <b>Value group</b>          | Ethernet | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                | [-]      |                             |            |
| <b>Comm object</b>          | 24181    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>          |          |                             |            |
| Current domain name server. |          |                             |            |

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### Secondary DNS

|                    |          |                             |            |
|--------------------|----------|-----------------------------|------------|
| <b>Value group</b> | Ethernet | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>       | [-]      |                             |            |
| <b>Comm object</b> |          | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b> |          |                             |            |
|                    |          |                             |            |

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### ETH Interface Status

|   |          |                             |            |
|---|----------|-----------------------------|------------|
| <b>Value group</b>                        | Ethernet | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                              | [-]      |                             |            |
| <b>Comm object</b>                        | 24180    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                        |          |                             |            |
| Current status of ethernet communication. |          |                             |            |

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### Ethernet PHY mode

|                    |          |                             |            |
|--------------------|----------|-----------------------------|------------|
| <b>Value group</b> | Ethernet | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>       | [-]      |                             |            |
| <b>Comm object</b> |          | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b> |          |                             |            |
|                    |          |                             |            |

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### Current Gateway

|                          |          |                             |            |
|--------------------------|----------|-----------------------------|------------|
| <b>Value group</b>       | Ethernet | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>             | [-]      |                             |            |
| <b>Comm object</b>       | 24182    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>       |          |                             |            |
| Current gateway address. |          |                             |            |

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### Current IP Address

|                                       |          |                             |            |
|---------------------------------------|----------|-----------------------------|------------|
| <b>Value group</b>                    | Ethernet | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                          | [-]      |                             |            |
| <b>Comm object</b>                    | 24184    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                    |          |                             |            |
| Current IP address of the controller. |          |                             |            |

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## Last Email Result

| <b>Value group</b>   | Ethernet   | <b>Related FW</b>           | 1.0.0      |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
|--|--|-----------------------------|------------|------|-------------|---|------------------------------|---|--|---|---|---|---------------------------|---|---------------------------|----|---------------------------------|----|------------------|----|-----------------|----|--------------------------------|----|------------------------------|----|---------------------------|----|--------------------------|----|---------------------------|----|---|----|---|----|------------------------------|----|--|----|---|
| <b>Units</b>   | [-]  |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| <b>Comm object</b>   | 24332  | <b>Related applications</b> | MINT, SPtM |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| <b>Description</b>   |  |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| Result of last email, which was sent by controller.  |  |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| <table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Email was successfully sent.</td> </tr> <tr> <td>2</td> <td>It is not possible to establish connection with SMTP server.</td> </tr> <tr> <td>3</td> <td>SMTP server is not ready for communication.</td> </tr> <tr> <td>8</td> <td>HELO command was refused.</td> </tr> <tr> <td>9</td> <td>EHLO command was refused.</td> </tr> <tr> <td>11</td> <td>AUTH LOGIN command was refused.</td> </tr> <tr> <td>12</td> <td>Wrong user name.</td> </tr> <tr> <td>13</td> <td>Wrong password.</td> </tr> <tr> <td>14</td> <td>MAIL FROM command was refused.</td> </tr> <tr> <td>15</td> <td>RCPT TO command was refused.</td> </tr> <tr> <td>16</td> <td>DATA command was refused.</td> </tr> <tr> <td>17</td> <td>Sending of email failed.</td> </tr> <tr> <td>20</td> <td>QUIT command was refused.</td> </tr> <tr> <td>25</td> <td>It is impossible to create data for command DATA.</td> </tr> <tr> <td>26</td> <td>It is impossible to read data for command DATA.</td> </tr> <tr> <td>27</td> <td>Email address can't be read.</td> </tr> <tr> <td>30</td> <td>SMTP server address translation error (from DNS server).</td> </tr> <tr> <td>31</td> <td>Error reading email content data (24327).</td> </tr> </tbody> </table> |  |                             |            | Code | Description | 0 | Email was successfully sent. | 2 | It is not possible to establish connection with SMTP server. | 3 | SMTP server is not ready for communication. | 8 | HELO command was refused. | 9 | EHLO command was refused. | 11 | AUTH LOGIN command was refused. | 12 | Wrong user name. | 13 | Wrong password. | 14 | MAIL FROM command was refused. | 15 | RCPT TO command was refused. | 16 | DATA command was refused. | 17 | Sending of email failed. | 20 | QUIT command was refused. | 25 | It is impossible to create data for command DATA. | 26 | It is impossible to read data for command DATA. | 27 | Email address can't be read. | 30 | SMTP server address translation error (from DNS server). | 31 | Error reading email content data (24327). |
| Code   | Description  |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 0  | Email was successfully sent.                                 |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 2  | It is not possible to establish connection with SMTP server. |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 3  | SMTP server is not ready for communication.                  |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 8  | HELO command was refused.                                    |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 9  | EHLO command was refused.                                    |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 11   | AUTH LOGIN command was refused.                              |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 12   | Wrong user name.   |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 13   | Wrong password.  |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 14   | MAIL FROM command was refused.                               |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 15   | RCPT TO command was refused.                                 |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 16   | DATA command was refused.                                    |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 17   | Sending of email failed.                                     |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 20   | QUIT command was refused.                                    |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 25   | It is impossible to create data for command DATA.            |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 26   | It is impossible to read data for command DATA.              |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 27   | Email address can't be read.                                 |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 30   | SMTP server address translation error (from DNS server).     |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |
| 31   | Error reading email content data (24327).                    |                             |            |      |             |   |                              |   |  |   |   |   |                           |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |                           |    |   |    |   |    |                              |    |  |    |   |

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## MAC Address

|   |          |                             |            |
|---|----------|-----------------------------|------------|
| <b>Value group</b>  | Ethernet | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]      |                             |            |
| <b>Comm object</b>  | 24333    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |          |                             |            |
| Current MAC address of the controller ethernet interface. |          |                             |            |

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## Current Subnet Mask

|                      |          |                             |            |
|----------------------|----------|-----------------------------|------------|
| <b>Value group</b>   | Ethernet | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>         | [-]      |                             |            |
| <b>Comm object</b>   | 24183    | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |          |                             |            |
| Current subnet mask. |          |                             |            |

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## Group: CM-GPRS

### AirGate Status

| <b>Value group</b>   | CM-GPRS; CM-4G-GPS (4G part)                          | <b>Related FW</b>           | 1.0.0      |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
|--|---|-----------------------------|------------|------|-------------|---|--------------------------|---|--|---|--|---|---|---|--|---|--------------------------------------|
| <b>Units</b>   | [-]   |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| <b>Comm object</b>   | 24308   | <b>Related applications</b> | MINT, SPtM |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| <b>Description</b>   |   |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| Diagnostic code for AirGate connection. Helps in troubleshooting.  |   |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| <table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>SIM card is not inserted</td> </tr> <tr> <td>1</td> <td>Controller registered, waiting for authorization</td> </tr> <tr> <td>2</td> <td>Not possible to register, controller blacklisted</td> </tr> <tr> <td>3</td> <td>Not possible to register, server has no more capacity</td> </tr> <tr> <td>4</td> <td>Not possible to register, other reason</td> </tr> <tr> <td>5</td> <td>Controller registered and authorized</td> </tr> </tbody> </table> |   |                             |            | Code | Description | 0 | SIM card is not inserted | 1 | Controller registered, waiting for authorization | 2 | Not possible to register, controller blacklisted | 3 | Not possible to register, server has no more capacity | 4 | Not possible to register, other reason | 5 | Controller registered and authorized |
| Code   | Description   |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 0  | SIM card is not inserted                              |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 1  | Controller registered, waiting for authorization      |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 2  | Not possible to register, controller blacklisted      |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 3  | Not possible to register, server has no more capacity |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 4  | Not possible to register, other reason                |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 5  | Controller registered and authorized                  |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |

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### AirGate ID

|   |                              |                             |            |
|---|------------------------------|-----------------------------|------------|
| <b>Value group</b>  | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]                          |                             |            |
| <b>Comm object</b>  | 24309                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                              |                             |            |
| Identification string generated by AirGate server for the purpose of establishing communication via IntelliConfig or any other supported PC tool. |                              |                             |            |

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## Connection Type

|                              |                              |                             |            |
|------------------------------|------------------------------|-----------------------------|------------|
| <b>Value group</b>           | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                 | [-]                          |                             |            |
| <b>Comm object</b>           | 24146                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>           |                              |                             |            |
| The type of data connection. |                              |                             |            |

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## Cell Diag Code

|  |                              |                             |            |
|--|------------------------------|-----------------------------|------------|
| <b>Value group</b>                                   | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]                          |                             |            |
| <b>Comm object</b>                                   | 24288                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                                   |                              |                             |            |
| Diagnostic code for the CM-GPRS or CM-4G-GPS module. |                              |                             |            |

### GSM Diag Code – Common list of diagnostic codes for cellular modules

| Code | Description   |
|------|---|
| 0    | OK. No error.   |
| 1    | Not possible to hang up.  |
| 2    | Modul is switched off   |
| 3    | Module is switched on   |
| 4    | Module – error in initialization  |
| 5    | Module – not possible to set the APN  |
| 6    | Module – not possible to connect to GPRS network  |
| 7    | Module – not possible to retrieve IP address  |
| 8    | Module – not accepted DNS IP address  |
| 9    | Error in modem detection  |
| 10   | Error in initialization of analog modem   |
| 11   | SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking |
| 12   | No GSM signal   |
| 13   | Not possible to read the SIM card parameters  |
| 14   | GSM modem did not accepted particular initialization command, possibly caused by locked SIM card              |
| 15   | Unknown modem   |
| 16   | Bad answer to complement initialization string  |
| 17   | Not possible to read GSM signal strength  |
| 18   | CDMA modem not detected   |
| 19   | No CDMA network   |

|     |  |
|-----|--|
| 20  | Unsuccessful registration to CDMA network        |
| 21  | SIMCom/ME909s: can't read FW version             |
| 22  | SIMCom: GSM signal not found                     |
| 23  | SIMCom: can't detect module speed                |
| 24  | SIMCom: HW reset issued                          |
| 25  | PUK is required                                  |
| 26  | Error of SIM card detected                       |
| 27  | ME909s: can't set module bps                     |
| 28  | ME909s: can't set link configuration             |
| 29  | ME909s: can't do power-off                       |
| 30  | ME909s: can't do power-on                        |
| 31  | ME909s: can't do hardware reset                  |
| 32  | ME909s: ME909s not started                       |
| 33  | ME909s: switch off issued                        |
| 34  | ME909s: switch on issued                         |
| 35  | ME909s: HW reset issued                          |
| 36  | ME909s: can't switch echo off                    |
| 37  | ME909s: can't find out state of registration     |
| 38  | ME909s: GSM signal not found                     |
| 39  | ME909s: no SIM memory for SMS                    |
| 40  | ME909s: waiting for registration                 |
| 41  | Can't read operator name                         |
| 42  | ME909s: can't set flow control                   |
| 43  | APN not typed                                    |
| 255 | Only running communication is needed to indicate |

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### Cell ErrorRate

|  |                              |                             |            |
|--|------------------------------|-----------------------------|------------|
| <b>Value group</b>   | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | %                            |                             |            |
| <b>Comm object</b>   | 24300                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                              |                             |            |
| This value contains information about relative quality of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. The lower value means higher quality of signal. |                              |                             |            |

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## Cell Signal Lev

|   |                              |                             |            |
|---|------------------------------|-----------------------------|------------|
| <b>Value group</b>  | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | %                            |                             |            |
| <b>Comm object</b>  | 24302                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                              |                             |            |
| This value contains information about relative strength of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. It is a relative value helping to find the best signal and for troubleshooting cases. |                              |                             |            |

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## Cell Status

|  |                              |                             |            |
|--|------------------------------|-----------------------------|------------|
| <b>Value group</b>   | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]                          |                             |            |
| <b>Comm object</b>   | 24290                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                              |                             |            |
| The text of this value represents the status of the GSM modem. |                              |                             |            |

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## Last Email Result

| <b>Value group</b>   | CM-GPRS; CM-4G-GPS (4G part)                                 | <b>Related FW</b>           | 1.0.0      |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
|--|--|-----------------------------|------------|------|-------------|---|------------------------------|---|--|---|---|---|---------------------------------------|---|----------------------------|---|------------------------|---|------------------------|---|---------------------------|----|---------------------------------|----|------------------|----|-----------------|----|--------------------------------|----|------------------------------|----|---------------------------|----|--------------------------|----|--|----|--|----|---------------------------|----|---------------------|----|--------------------------------------|----|------------------------|----|---|----|---|----|--------------------|----|-------------------------------------|
| <b>Units</b>   | [-]  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| <b>Comm object</b>   | 24307  | <b>Related applications</b> | MINT, SPtM |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| <b>Description</b>   |  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| Result of last email, which was sent by controller.  |  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| <table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>0</td><td>Email was successfully sent.</td></tr> <tr><td>2</td><td>It is not possible to establish connection with SMTP server.</td></tr> <tr><td>3</td><td>SMTP server is not ready for communication.</td></tr> <tr><td>4</td><td>Maximum length of data can't be read.</td></tr> <tr><td>5</td><td>No appeal to send command.</td></tr> <tr><td>6</td><td>Command can't be send.</td></tr> <tr><td>7</td><td>Command can't be send.</td></tr> <tr><td>8</td><td>HELO command was refused.</td></tr> <tr><td>11</td><td>AUTH LOGIN command was refused.</td></tr> <tr><td>12</td><td>Wrong user name.</td></tr> <tr><td>13</td><td>Wrong password.</td></tr> <tr><td>14</td><td>MAIL FROM command was refused.</td></tr> <tr><td>15</td><td>RCPT TO command was refused.</td></tr> <tr><td>16</td><td>DATA command was refused.</td></tr> <tr><td>17</td><td>Sending of email failed.</td></tr> <tr><td>18</td><td>SMTP server refused the data of email.</td></tr> <tr><td>19</td><td>SMTP server refused the data of email.</td></tr> <tr><td>20</td><td>QUIT command was refused.</td></tr> <tr><td>21</td><td>Lost of connection.</td></tr> <tr><td>23</td><td>Error during closing the connection.</td></tr> <tr><td>24</td><td>No answer from server.</td></tr> <tr><td>25</td><td>It is impossible to create data for command DATA.</td></tr> <tr><td>26</td><td>It is impossible to read data for command DATA.</td></tr> <tr><td>28</td><td>Error of encoding.</td></tr> <tr><td>29</td><td>There was no attempt to send email.</td></tr> </tbody> </table> |  |                             |            | Code | Description | 0 | Email was successfully sent. | 2 | It is not possible to establish connection with SMTP server. | 3 | SMTP server is not ready for communication. | 4 | Maximum length of data can't be read. | 5 | No appeal to send command. | 6 | Command can't be send. | 7 | Command can't be send. | 8 | HELO command was refused. | 11 | AUTH LOGIN command was refused. | 12 | Wrong user name. | 13 | Wrong password. | 14 | MAIL FROM command was refused. | 15 | RCPT TO command was refused. | 16 | DATA command was refused. | 17 | Sending of email failed. | 18 | SMTP server refused the data of email. | 19 | SMTP server refused the data of email. | 20 | QUIT command was refused. | 21 | Lost of connection. | 23 | Error during closing the connection. | 24 | No answer from server. | 25 | It is impossible to create data for command DATA. | 26 | It is impossible to read data for command DATA. | 28 | Error of encoding. | 29 | There was no attempt to send email. |
| Code   | Description  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 0  | Email was successfully sent.                                 |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 2  | It is not possible to establish connection with SMTP server. |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 3  | SMTP server is not ready for communication.                  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 4  | Maximum length of data can't be read.                        |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 5  | No appeal to send command.                                   |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 6  | Command can't be send.                                       |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 7  | Command can't be send.                                       |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 8  | HELO command was refused.                                    |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 11   | AUTH LOGIN command was refused.                              |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 12   | Wrong user name.   |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 13   | Wrong password.  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 14   | MAIL FROM command was refused.                               |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 15   | RCPT TO command was refused.                                 |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 16   | DATA command was refused.                                    |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 17   | Sending of email failed.                                     |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 18   | SMTP server refused the data of email.                       |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 19   | SMTP server refused the data of email.                       |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 20   | QUIT command was refused.                                    |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 21   | Lost of connection.  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 23   | Error during closing the connection.                         |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 24   | No answer from server.                                       |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 25   | It is impossible to create data for command DATA.            |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 26   | It is impossible to read data for command DATA.              |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 28   | Error of encoding.   |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 29   | There was no attempt to send email.                          |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |

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## Operator

|   |                              |                             |            |
|---|------------------------------|-----------------------------|------------|
| <b>Value group</b>  | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]                          |                             |            |
| <b>Comm object</b>  | 24147                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                              |                             |            |
| The name of operator which to SIM card is connected.  |                              |                             |            |
| <i>Note: If roaming service is used then prefix "R" is added before the name of operator.</i> |                              |                             |            |

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## Group: CM-4G-GPS

### Altitude

|                      |                      |                             |            |
|----------------------|----------------------|-----------------------------|------------|
| <b>Value group</b>   | CM-4G-GPS (GPS part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>         | m                    |                             |            |
| <b>Comm object</b>   | 24266                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                      |                             |            |
| Actual GPS altitude. |                      |                             |            |

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### HomePosDist

|   |                      |                             |            |
|---|----------------------|-----------------------------|------------|
| <b>Value group</b>  | CM-4G-GPS (GPS part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | km                   |                             |            |
| <b>Comm object</b>  | 11680                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                      |                             |            |
| Actual distance from home position. Home position is adjusted via setpoints <b>Home Latitude (page 446)</b> and <b>Home Longitude (page 446)</b> or by binary input <b>GEO HOME POSITION (PAGE 668)</b> . |                      |                             |            |

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### Latitude

|   |                      |                             |            |
|---|----------------------|-----------------------------|------------|
| <b>Value group</b>  | CM-4G-GPS (GPS part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]                  |                             |            |
| <b>Comm object</b>  | 24268                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                      |                             |            |
| Actual GPS latitude. Positions on north hemisphere have positive value, position on south hemisphere have negative value. |                      |                             |            |

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## Longitude

|  |                      |                             |            |
|--|----------------------|-----------------------------|------------|
| <b>Value group</b>   | CM-4G-GPS (GPS part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]                  |                             |            |
| <b>Comm object</b>   | 24267                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                      |                             |            |
| Actual GPS longitude. Positions on east hemisphere have positive value, position on west hemisphere have negative value. |                      |                             |            |

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## Satellites

|  |                      |                             |            |
|--|----------------------|-----------------------------|------------|
| <b>Value group</b>                               | CM-4G-GPS (GPS part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                                     | [-]                  |                             |            |
| <b>Comm object</b>                               | 24265                | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                               |                      |                             |            |
| Number of available satellites for GPS location. |                      |                             |            |

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## AirGate ID

|   |                              |                             |            |
|---|------------------------------|-----------------------------|------------|
| <b>Value group</b>  | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]                          |                             |            |
| <b>Comm object</b>  | 24309                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                              |                             |            |
| Identification string generated by AirGate server for the purpose of establishing communication via IntelliConfig or any other supported PC tool. |                              |                             |            |

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## AirGate Status

| <b>Value group</b>   | CM-GPRS; CM-4G-GPS (4G part)                          | <b>Related FW</b>           | 1.0.0      |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
|--|---|-----------------------------|------------|------|-------------|---|--------------------------|---|--|---|--|---|---|---|--|---|--------------------------------------|
| <b>Units</b>   | [-]   |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| <b>Comm object</b>   | 24308   | <b>Related applications</b> | MINT, SPtM |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| <b>Description</b>   |   |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| Diagnostic code for AirGate connection. Helps in troubleshooting.  |   |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| <table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>SIM card is not inserted</td> </tr> <tr> <td>1</td> <td>Controller registered, waiting for authorization</td> </tr> <tr> <td>2</td> <td>Not possible to register, controller blacklisted</td> </tr> <tr> <td>3</td> <td>Not possible to register, server has no more capacity</td> </tr> <tr> <td>4</td> <td>Not possible to register, other reason</td> </tr> <tr> <td>5</td> <td>Controller registered and authorized</td> </tr> </tbody> </table> |   |                             |            | Code | Description | 0 | SIM card is not inserted | 1 | Controller registered, waiting for authorization | 2 | Not possible to register, controller blacklisted | 3 | Not possible to register, server has no more capacity | 4 | Not possible to register, other reason | 5 | Controller registered and authorized |
| Code   | Description   |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 0  | SIM card is not inserted                              |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 1  | Controller registered, waiting for authorization      |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 2  | Not possible to register, controller blacklisted      |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 3  | Not possible to register, server has no more capacity |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 4  | Not possible to register, other reason                |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |
| 5  | Controller registered and authorized                  |                             |            |      |             |   |                          |   |  |   |  |   |   |   |  |   |                                      |

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## Connection Type

|                              |                              |                             |            |
|------------------------------|------------------------------|-----------------------------|------------|
| <b>Value group</b>           | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                 | [-]                          |                             |            |
| <b>Comm object</b>           | 24146                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>           |                              |                             |            |
| The type of data connection. |                              |                             |            |

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## Cell Diag Code

| <b>Value group</b>   | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |      |             |   |               |   |                          |   |                       |   |                       |
|--|------------------------------|-----------------------------|------------|------|-------------|---|---------------|---|--------------------------|---|-----------------------|---|-----------------------|
| <b>Units</b>   | [-]                          |                             |            |      |             |   |               |   |                          |   |                       |   |                       |
| <b>Comm object</b>   | 24288                        | <b>Related applications</b> | MINT, SPtM |      |             |   |               |   |                          |   |                       |   |                       |
| <b>Description</b>   |                              |                             |            |      |             |   |               |   |                          |   |                       |   |                       |
| Diagnostic code for the CM-GPRS or CM-4G-GPS module.   |                              |                             |            |      |             |   |               |   |                          |   |                       |   |                       |
| <b>GSM Diag Code – Common list of diagnostic codes for cellular modules</b>  |                              |                             |            |      |             |   |               |   |                          |   |                       |   |                       |
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| Code   | Description                  |                             |            |      |             |   |               |   |                          |   |                       |   |                       |
| 0  | OK. No error.                |                             |            |      |             |   |               |   |                          |   |                       |   |                       |
| 1  | Not possible to hang up.     |                             |            |      |             |   |               |   |                          |   |                       |   |                       |
| 2  | Modul is switched off        |                             |            |      |             |   |               |   |                          |   |                       |   |                       |
| 3  | Module is switched on        |                             |            |      |             |   |               |   |                          |   |                       |   |                       |

|    |   |
|----|---|
| 4  | Module – error in initialization  |
| 5  | Module – not possible to set the APN  |
| 6  | Module – not possible to connect to GPRS network  |
| 7  | Module – not possible to retrieve IP address  |
| 8  | Module – not accepted DNS IP address  |
| 9  | Error in modem detection  |
| 10 | Error in initialization of analog modem   |
| 11 | SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking |
| 12 | No GSM signal   |
| 13 | Not possible to read the SIM card parameters  |
| 14 | GSM modem did not accepted particular initialization command, possibly caused by locked SIM card              |
| 15 | Unknown modem   |
| 16 | Bad answer to complement initialization string  |
| 17 | Not possible to read GSM signal strength  |
| 18 | CDMA modem not detected   |
| 19 | No CDMA network   |
| 20 | Unsuccessful registration to CDMA network   |
| 21 | SIMCom/ME909s: can't read FW version  |
| 22 | SIMCom: GSM signal not found  |
| 23 | SIMCom: can't detect module speed   |
| 24 | SIMCom: HW reset issued   |
| 25 | PUK is required   |
| 26 | Error of SIM card detected  |
| 27 | ME909s: can't set module bps  |
| 28 | ME909s: can't set link configuration  |
| 29 | ME909s: can't do power-off  |
| 30 | ME909s: can't do power-on   |
| 31 | ME909s: can't do hardware reset   |
| 32 | ME909s: ME909s not started  |
| 33 | ME909s: switch off issued   |
| 34 | ME909s: switch on issued  |
| 35 | ME909s: HW reset issued   |
| 36 | ME909s: can't switch echo off   |
| 37 | ME909s: can't find out state of registration  |
| 38 | ME909s: GSM signal not found  |
| 39 | ME909s: no SIM memory for SMS   |
| 40 | ME909s: waiting for registration  |

|     |  |
|-----|--|
| 41  | Can't read operator name                         |
| 42  | ME909s: can't set flow control                   |
| 43  | APN not typed                                    |
| 255 | Only running communication is needed to indicate |

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### Cell ErrorRate

|  |                              |                             |            |
|--|------------------------------|-----------------------------|------------|
| <b>Value group</b>   | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | %                            |                             |            |
| <b>Comm object</b>   | 24300                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                              |                             |            |
| This value contains information about relative quality of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. The lower value means higher quality of signal. |                              |                             |            |

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### Cell Signal Lev

|   |                              |                             |            |
|---|------------------------------|-----------------------------|------------|
| <b>Value group</b>  | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | %                            |                             |            |
| <b>Comm object</b>  | 24302                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                              |                             |            |
| This value contains information about relative strength of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. It is a relative value helping to find the best signal and for troubleshooting cases. |                              |                             |            |

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### Cell Status

|  |                              |                             |            |
|--|------------------------------|-----------------------------|------------|
| <b>Value group</b>   | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]                          |                             |            |
| <b>Comm object</b>   | 24290                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |                              |                             |            |
| The text of this value represents the status of the GSM modem. |                              |                             |            |

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## Last Email Result

| <b>Value group</b>   | CM-GPRS; CM-4G-GPS (4G part)                                 | <b>Related FW</b>           | 1.0.0      |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
|--|--|-----------------------------|------------|------|-------------|---|------------------------------|---|--|---|---|---|---------------------------------------|---|----------------------------|---|------------------------|---|------------------------|---|---------------------------|----|---------------------------------|----|------------------|----|-----------------|----|--------------------------------|----|------------------------------|----|---------------------------|----|--------------------------|----|--|----|--|----|---------------------------|----|---------------------|----|--------------------------------------|----|------------------------|----|---|----|---|----|--------------------|----|-------------------------------------|
| <b>Units</b>   | [-]  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| <b>Comm object</b>   | 24307  | <b>Related applications</b> | MINT, SPtM |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| <b>Description</b>   |  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| Result of last email, which was sent by controller.  |  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| <table border="1"> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>0</td><td>Email was successfully sent.</td></tr> <tr><td>2</td><td>It is not possible to establish connection with SMTP server.</td></tr> <tr><td>3</td><td>SMTP server is not ready for communication.</td></tr> <tr><td>4</td><td>Maximum length of data can't be read.</td></tr> <tr><td>5</td><td>No appeal to send command.</td></tr> <tr><td>6</td><td>Command can't be send.</td></tr> <tr><td>7</td><td>Command can't be send.</td></tr> <tr><td>8</td><td>HELO command was refused.</td></tr> <tr><td>11</td><td>AUTH LOGIN command was refused.</td></tr> <tr><td>12</td><td>Wrong user name.</td></tr> <tr><td>13</td><td>Wrong password.</td></tr> <tr><td>14</td><td>MAIL FROM command was refused.</td></tr> <tr><td>15</td><td>RCPT TO command was refused.</td></tr> <tr><td>16</td><td>DATA command was refused.</td></tr> <tr><td>17</td><td>Sending of email failed.</td></tr> <tr><td>18</td><td>SMTP server refused the data of email.</td></tr> <tr><td>19</td><td>SMTP server refused the data of email.</td></tr> <tr><td>20</td><td>QUIT command was refused.</td></tr> <tr><td>21</td><td>Lost of connection.</td></tr> <tr><td>23</td><td>Error during closing the connection.</td></tr> <tr><td>24</td><td>No answer from server.</td></tr> <tr><td>25</td><td>It is impossible to create data for command DATA.</td></tr> <tr><td>26</td><td>It is impossible to read data for command DATA.</td></tr> <tr><td>28</td><td>Error of encoding.</td></tr> <tr><td>29</td><td>There was no attempt to send email.</td></tr> </tbody> </table> |  |                             |            | Code | Description | 0 | Email was successfully sent. | 2 | It is not possible to establish connection with SMTP server. | 3 | SMTP server is not ready for communication. | 4 | Maximum length of data can't be read. | 5 | No appeal to send command. | 6 | Command can't be send. | 7 | Command can't be send. | 8 | HELO command was refused. | 11 | AUTH LOGIN command was refused. | 12 | Wrong user name. | 13 | Wrong password. | 14 | MAIL FROM command was refused. | 15 | RCPT TO command was refused. | 16 | DATA command was refused. | 17 | Sending of email failed. | 18 | SMTP server refused the data of email. | 19 | SMTP server refused the data of email. | 20 | QUIT command was refused. | 21 | Lost of connection. | 23 | Error during closing the connection. | 24 | No answer from server. | 25 | It is impossible to create data for command DATA. | 26 | It is impossible to read data for command DATA. | 28 | Error of encoding. | 29 | There was no attempt to send email. |
| Code   | Description  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 0  | Email was successfully sent.                                 |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 2  | It is not possible to establish connection with SMTP server. |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 3  | SMTP server is not ready for communication.                  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 4  | Maximum length of data can't be read.                        |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 5  | No appeal to send command.                                   |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 6  | Command can't be send.                                       |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 7  | Command can't be send.                                       |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 8  | HELO command was refused.                                    |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 11   | AUTH LOGIN command was refused.                              |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 12   | Wrong user name.   |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 13   | Wrong password.  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 14   | MAIL FROM command was refused.                               |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 15   | RCPT TO command was refused.                                 |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 16   | DATA command was refused.                                    |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 17   | Sending of email failed.                                     |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 18   | SMTP server refused the data of email.                       |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 19   | SMTP server refused the data of email.                       |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 20   | QUIT command was refused.                                    |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 21   | Lost of connection.  |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 23   | Error during closing the connection.                         |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 24   | No answer from server.                                       |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 25   | It is impossible to create data for command DATA.            |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 26   | It is impossible to read data for command DATA.              |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 28   | Error of encoding.   |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |
| 29   | There was no attempt to send email.                          |                             |            |      |             |   |                              |   |  |   |   |   |                                       |   |                            |   |                        |   |                        |   |                           |    |                                 |    |                  |    |                 |    |                                |    |                              |    |                           |    |                          |    |  |    |  |    |                           |    |                     |    |                                      |    |                        |    |   |    |   |    |                    |    |                                     |

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## Operator

|   |                              |                             |            |
|---|------------------------------|-----------------------------|------------|
| <b>Value group</b>  | CM-GPRS; CM-4G-GPS (4G part) | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>  | [-]                          |                             |            |
| <b>Comm object</b>  | 24147                        | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>  |                              |                             |            |
| The name of operator which to SIM card is connected.  |                              |                             |            |
| <i>Note: If roaming service is used then prefix "R" is added before the name of operator.</i> |                              |                             |            |

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## Group: Date/Time

### Time

|                    |           |                             |            |
|--------------------|-----------|-----------------------------|------------|
| <b>Value group</b> | Date/Time | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>       | HH:MM:SS  |                             |            |
| <b>Comm object</b> | 24554     | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b> |           |                             |            |
| Shows setup time.  |           |                             |            |

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### Date

|                    |            |                             |            |
|--------------------|------------|-----------------------------|------------|
| <b>Value group</b> | Date/Time  | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>       | DD.MM.YYYY |                             |            |
| <b>Comm object</b> | 24553      | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b> |            |                             |            |
| Shows setup date.  |            |                             |            |

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## Group: Plug-In I/O

### EM BIO A

|  |             |                             |            |
|--|-------------|-----------------------------|------------|
| <b>Value group</b>                             | Plug-In I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                                   | [-]         |                             |            |
| <b>Comm object</b>                             | 14291       | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                             |             |                             |            |
| Binary inputs from extension module in slot A. |             |                             |            |

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## EM BIO B

|  |             |                             |            |
|--|-------------|-----------------------------|------------|
| <b>Value group</b>                             | Plug-In I/O | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                                   | [-]         |                             |            |
| <b>Comm object</b>                             | 14292       | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>                             |             |                             |            |
| Binary inputs from extension module in slot B. |             |                             |            |

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## Group: PLC

### PLC Resource 1

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]   |                             |            |
| <b>Comm object</b>   | 10504 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). |       |                             |            |

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### PLC Resource 2

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]   |                             |            |
| <b>Comm object</b>   | 10505 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). |       |                             |            |

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### PLC Resource 3

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]   |                             |            |
| <b>Comm object</b>   | 10506 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). |       |                             |            |

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### PLC Resource 4

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]   |                             |            |
| <b>Comm object</b>   | 10507 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). |       |                             |            |

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### PLC Resource 5

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]   |                             |            |
| <b>Comm object</b>   | 10508 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). |       |                             |            |

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### PLC Resource 6

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]   |                             |            |
| <b>Comm object</b>   | 10509 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). |       |                             |            |

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### PLC Resource 7

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]   |                             |            |
| <b>Comm object</b>   | 10510 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). |       |                             |            |

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### PLC Resource 8

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Value group</b>   | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>   | [-]   |                             |            |
| <b>Comm object</b>   | 10511 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>   |       |                             |            |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). |       |                             |            |

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### PLC-BOUT 1

|                                 |       |                             |            |
|---------------------------------|-------|-----------------------------|------------|
| <b>Value group</b>              | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                    | [-]   |                             |            |
| <b>Comm object</b>              | 10424 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>              |       |                             |            |
| State of binary outputs of PLC. |       |                             |            |

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## PLC-BOUT 2

|                                 |       |                             |            |
|---------------------------------|-------|-----------------------------|------------|
| <b>Value group</b>              | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                    | [-]   |                             |            |
| <b>Comm object</b>              | 10425 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>              |       |                             |            |
| State of binary outputs of PLC. |       |                             |            |

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## PLC-BOUT 3

|                                 |       |                             |            |
|---------------------------------|-------|-----------------------------|------------|
| <b>Value group</b>              | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                    | [-]   |                             |            |
| <b>Comm object</b>              | 10426 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>              |       |                             |            |
| State of binary outputs of PLC. |       |                             |            |

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## PLC-BOUT 4

|                                 |       |                             |            |
|---------------------------------|-------|-----------------------------|------------|
| <b>Value group</b>              | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                    | [-]   |                             |            |
| <b>Comm object</b>              | 10427 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>              |       |                             |            |
| State of binary outputs of PLC. |       |                             |            |

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## PLC-BOUT 5

|                                 |       |                             |            |
|---------------------------------|-------|-----------------------------|------------|
| <b>Value group</b>              | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                    | [-]   |                             |            |
| <b>Comm object</b>              | 10428 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>              |       |                             |            |
| State of binary outputs of PLC. |       |                             |            |

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## PLC-BOUT 6

|                                 |       |                             |            |
|---------------------------------|-------|-----------------------------|------------|
| <b>Value group</b>              | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                    | [-]   |                             |            |
| <b>Comm object</b>              | 10429 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>              |       |                             |            |
| State of binary outputs of PLC. |       |                             |            |

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**PLC-BOUT 7**

|                                 |       |                             |            |
|---------------------------------|-------|-----------------------------|------------|
| <b>Value group</b>              | PLC   | <b>Related FW</b>           | 1.0.0      |
| <b>Units</b>                    | [-]   |                             |            |
| <b>Comm object</b>              | 10430 | <b>Related applications</b> | MINT, SPtM |
| <b>Description</b>              |       |                             |            |
| State of binary outputs of PLC. |       |                             |            |

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## 9.1.3 Logical binary inputs

### What Logical binary inputs are:

Logical binary inputs are inputs for binary values and functions.

### Alphabetical groups of Logical binary inputs

|              |     |
|--------------|-----|
| LBI: A ..... | 615 |
| LBI: B ..... | 616 |
| LBI: C ..... | 664 |
| LBI: D ..... | 664 |
| LBI: E ..... | 665 |
| LBI: F ..... | 665 |
| LBI: G ..... | 667 |
| LBI: H ..... | 669 |
| LBI: I ..... | 669 |
| LBI: L ..... | 670 |
| LBI: M ..... | 671 |
| LBI: N ..... | 673 |
| LBI: O ..... | 674 |
| LBI: R ..... | 674 |
| LBI: S ..... | 680 |
| LBI: T ..... | 680 |





For full list of Logical binary inputs go to the chapter **Logical binary inputs alphabetically (page 614)**.

## Logical binary inputs alphabetically

|                          |     |                            |     |                           |     |
|--------------------------|-----|----------------------------|-----|---------------------------|-----|
| Access Lock .....        | 615 | BIN Protection 33 .....    | 648 | Mains Fail Block .....    | 671 |
| Alternate Config 2 ..... | 615 | BIN Protection 34 .....    | 649 | Manual Load               |     |
| Alternate Config 3 ..... | 615 | BIN Protection 35 .....    | 650 | Reconnection .....        | 671 |
| AMF Start Block .....    | 615 | BIN Protection 36 .....    | 651 | MCB Button .....          | 671 |
| Battery Charger .....    | 616 | BIN Protection 37 .....    | 652 | MCB Feedback .....        | 672 |
| BIN Protection 1 .....   | 616 | BIN Protection 38 .....    | 653 | Min Run Power Active .... | 673 |
| BIN Protection 02 .....  | 617 | BIN Protection 39 .....    | 654 | NCB Feedback .....        | 673 |
| BIN Protection 03 .....  | 618 | BIN Protection 40 .....    | 655 | Not Used .....            | 673 |
| BIN Protection 04 .....  | 619 | BIN Protection 41 .....    | 656 | Oil Pressure .....        | 674 |
| BIN Protection 05 .....  | 620 | BIN Protection 42 .....    | 657 | Regeneration Force .....  | 674 |
| BIN Protection 06 .....  | 621 | BIN Protection 43 .....    | 658 | Regeneration Inhib .....  | 674 |
| BIN Protection 07 .....  | 622 | BIN Protection 44 .....    | 659 | Remote AUTO .....         | 675 |
| BIN Protection 08 .....  | 623 | BIN Protection 45 .....    | 660 | Remote Ctrl Lock .....    | 675 |
| BIN Protection 09 .....  | 624 | BIN Protection 46 .....    | 661 | Remote MAN .....          | 675 |
| BIN Protection 10 .....  | 625 | BIN Protection 47 .....    | 662 | Remote OFF .....          | 676 |
| BIN Protection 11 .....  | 626 | BIN Protection 48 .....    | 663 | Remote Start/Stop .....   | 677 |
| BIN Protection 12 .....  | 627 | Coolant Temp .....         | 664 | Remote TEST .....         | 678 |
| BIN Protection 13 .....  | 628 | Droop Unload Disl .....    | 664 | Remote Test On Load ....  | 679 |
| BIN Protection 14 .....  | 629 | Emergency MAN .....        | 665 | Sd Override .....         | 680 |
| BIN Protection 15 .....  | 630 | Emergency Stop .....       | 665 | Start Button .....        | 680 |
| BIN Protection 16 .....  | 631 | Fault Reset Button .....   | 665 | Stop Button .....         | 680 |
| BIN Protection 17 .....  | 632 | Force Droop Oper .....     | 665 | Top Priority .....        | 680 |
| BIN Protection 18 .....  | 633 | Force Island .....         | 666 |                           |     |
| BIN Protection 19 .....  | 634 | Force Parallel .....       | 666 |                           |     |
| BIN Protection 20 .....  | 635 | Force Protection Disable . | 666 |                           |     |
| BIN Protection 21 .....  | 636 | Fuel Level .....           | 667 |                           |     |
| BIN Protection 22 .....  | 637 | Fuel Pump On/Off .....     | 667 |                           |     |
| BIN Protection 23 .....  | 638 | GCB Button .....           | 667 |                           |     |
| BIN Protection 24 .....  | 639 | GCB Feedback .....         | 668 |                           |     |
| BIN Protection 25 .....  | 640 | Geo Home Position .....    | 668 |                           |     |
| BIN Protection 26 .....  | 641 | Geo-Fencing Enabled ....   | 669 |                           |     |
| BIN Protection 27 .....  | 642 | Group link .....           | 669 |                           |     |
| BIN Protection 28 .....  | 643 | Horn Reset Button .....    | 669 |                           |     |
| BIN Protection 29 .....  | 644 | Idle Speed .....           | 669 |                           |     |
| BIN Protection 30 .....  | 645 | Lang Selection 1 .....     | 670 |                           |     |
| BIN Protection 31 .....  | 646 | Lang Selection 2 .....     | 670 |                           |     |
| BIN Protection 32 .....  | 647 | Load Res 2 Active .....    | 670 |                           |     |

## LBI: A

### Access Lock

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1     |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>When this input is closed, no setpoints can be adjusted from controller's front panel and controller mode (OFF / MAN / AUTO / TEST) cannot be changed.</p> <p><b>Note:</b> Access Lock does not protect setpoints and mode changing from IntelliConfig. To avoid unqualified changes the selected setpoints have to be password protected.</p> <p>Also the buttons Fault Reset  and Horn Reset  are not blocked at all and buttons Start  and Stop  in MAN mode are not blocked.</p> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

### Alternate Config 2

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 859   |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>This binary input can switch between configuration sets. When this binary input is active, setpoints in Alternate Config group are switched to the second set (setpoints with number 2).</p> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

### Alternate Config 3

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 860   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This binary input can switch between configuration sets. When this binary input is active, setpoints in Alternate Config group are switched to the third set (setpoints with number 3).</p> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

### AMF Start Block

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 211   |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>This binary input can allow or block the AMF start. In case of running gen-set in AUTO mode gen-set goes to cooling procedure and stops.</p> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

## LBI: B

### Battery Charger

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 623   |                             |            |
| <b>Description</b>  |       |                             |            |
| When binary input is active and his delay <b>Battery Charger Fail Delay (page 302)</b> is out of time than alarm <b>Battery Charger Fail (page 795)</b> is activated, written into history log and logical binary output <b>AL BATTERY CHARGER (PAGE 686)</b> is activated. |       |                             |            |

🔍 back to Logical binary inputs alphabetically

### BIN Protection 1

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9999  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                              |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                       |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                     |                             |            |
| Wrm  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signaled with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signaled with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signaled with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signaled with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

🔍 back to Logical binary inputs alphabetically

## BIN Protection 02

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9998  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 03

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9997  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)



## BIN Protection 04

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9996  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 05

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9995  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 06

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9994  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[▲ back to Logical binary inputs alphabetically](#)

## BIN Protection 07

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9993  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[▲ back to Logical binary inputs alphabetically](#)

## BIN Protection 08

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9992  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 09

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9991  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 10

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9990  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 11

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9989  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)



## BIN Protection 12

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9988  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 13

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9987  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 14

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9986  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 15

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9985  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 16

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9984  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[▲ back to Logical binary inputs alphabetically](#)

## BIN Protection 17

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9983  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[▲ back to Logical binary inputs alphabetically](#)

## BIN Protection 18

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9982  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b style="color: red;">Protection types</b>                    |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 19

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9981  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)



## BIN Protection 20

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9980  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

 [back to Logical binary inputs alphabetically](#)

## BIN Protection 21

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9979  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 22

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9978  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 23

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9977  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 24

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9976  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 25

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9975  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 26

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9974  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 27

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9973  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[▲ back to Logical binary inputs alphabetically](#)



## BIN Protection 28

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9972  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 29

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9971  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 30

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9970  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 31

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9969  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 32

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9968  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 33

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9967  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 34

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9966  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 35

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9965  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                              |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                       |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                     |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signaled with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signaled with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signaled with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signaled with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)



## BIN Protection 36

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9964  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[▲ back to Logical binary inputs alphabetically](#)

## BIN Protection 37

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9963  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 38

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9962  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 39

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9961  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 40

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9960  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 41

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9959  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

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## BIN Protection 42

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9958  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 43

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9957  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)



## BIN Protection 44

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9956  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

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## BIN Protection 45

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9955  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## BIN Protection 46

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 9954  |                             |            |
| <b>Description</b>   |   |                             |            |
| This binary input is for general input function used as alarm. |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.                                |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active.                         |                             |            |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |                             |            |
| Wrn  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| MP   | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |                             |            |
| MPR  | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |                             |            |
| BO   | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |                             |            |
| BOR  | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |                             |            |
| FLS  | Sensor fail protection.   |                             |            |

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## BIN Protection 47

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9953  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

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## BIN Protection 48

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9952  |                             |            |

### Description

This binary input is for general input function used as alarm.

### Protection types

|            |   |
|------------|---|
| Monitoring | Binary input is not used for protection or any other function. Signal is only monitored.                                |
| HistRecOnl | Binary input is not used for protection. Only history record is made if binary input is active.                         |
| AL Indic   | Binary input is not used for protection. Only alarmlist record is made if binary input is active.                       |
| Wrn        | Binary input is used for warning protection only.   |
| Stp        | Binary input is used for slow stop protection   |
| BOC        | Binary input is used for BOC (Breaker Open and Cooling) protection.   |
| Sd         | Binary input is used for shutdown protection.   |
| MP         | Mains protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list.        |
| MPR        | Mains protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.          |
| BO         | Breaker open protection without reset. Protection is signalized with red LED status but the alarm is not in alarm list. |
| BOR        | Breaker open protection with reset. Protection is signalized with red LED status and alarm is recorded in alarm list.   |
| FLS        | Sensor fail protection.   |

[◀ back to Logical binary inputs alphabetically](#)

## LBI: C

### Coolant Temp

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>                                    | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>                                   | 625   |                             |            |
| <b>Description</b>                                   |   |                             |            |
| Binary input for COOLANT TEMP (PAGE 771) protection. |   |                             |            |
| <b>Protection types</b>                              |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.        |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active. |                             |            |
| Wrm  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.                             |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |

🔍 back to Logical binary inputs alphabetically

## LBI: D

### Droop Unload Disl

|  |       |                             |      |
|--|-------|-----------------------------|------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT |
| <b>Comm object</b>   | 597   |                             |      |
| <b>Description</b>   |       |                             |      |
| Activation of this logical binary input avoids the soft unload function of the gen-set if it is running in droop. GCB is opened immediately after the stop request or pressing of GCB button. If this input is not active the unloading is given by the setpoint <b>Load Ramp (page 353)</b> . |       |                             |      |
| <b>Note:</b> <i>This function is used when there is no other gen-set to take over the load of the gen-set which is being unloaded.</i>   |       |                             |      |

🔍 back to Logical binary inputs alphabetically

## LBI: E

### Emergency MAN

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 45    |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>This input is designed to allow the gen-set or breakers to be controlled externally, not by the controller. This feature can be useful in case of or in case of some failure, which disables the gen-set or breakers to be controlled by the controller, but the gen-set itself is operational.</p> <p>The controller behaves in the following way:</p> <ul style="list-style-type: none"> <li>▶ Shows the text EmergMan in the engine status on the main screen.</li> <li>▶ Stops all functions regarding the gen-set or breaker control, deactivates all outputs related to it.</li> <li>▶ Stop Fail alarm is not being evaluated and stop solenoid is not activated if nonzero speed is detected.</li> <li>▶ When the input is deactivated, the controller takes control according to the situation in the moment of deactivation, i.e. the gen-set remains running loaded if it was running and GCB was closed in the moment the input was deactivated.</li> </ul> |       |                             |            |

⬅ back to Logical binary inputs alphabetically


### Emergency Stop

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 40    |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>When this binary input is activated, gen-set is immediately stopped. Also binary outputs are disconnected. Alarm <b>Emergency Stop (page 820)</b> is activated.</p> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

## LBI: F

### Fault Reset Button

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 191   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Binary input has the same function as Fault Reset button  on the IntelliGen 500 front panel.</p> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

### Force Droop Oper

|   |       |                             |      |
|---|-------|-----------------------------|------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT |
| <b>Comm object</b>  | 788   |                             |      |
| <b>Description</b>  |       |                             |      |
| <p>When this logical binary input is active, the regulations is forced to droop (the same behavior like the setpoint <b>Load/Var Sharing Regulation Type (page 361) = Droop</b>).</p> |       |                             |      |

⬅ back to Logical binary inputs alphabetically

## Force Island

|  |       |                             |      |
|--|-------|-----------------------------|------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | SPtM |
| <b>Comm object</b>   | 787   |                             |      |
| <b>Description</b>   |       |                             |      |
| Activation of this logical binary input start the gen-set and go to island operation. Transition of load from mains is adjusted via setpoint <b>Transfer Mains To Gen Bus (page 351)</b> . |       |                             |      |

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## Force Parallel

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 786   |                             |            |
| <b>Description</b>  |       |                             |            |
| Activation of this logical binary input start the gen-set system and go to parallel operation if mains is healthy. Island operation is not allowed. |       |                             |            |

[◀ back to Logical binary inputs alphabetically](#)

## Force Protection Disable

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 920   |                             |            |
| <b>Description</b>   |       |                             |            |
| Selected protections are disabled, if LBI: Force Protection Disable is active..  |       |                             |            |
| Activation and deactivation of this binary input will create history record:   |       |                             |            |
| <ul style="list-style-type: none"> <li>▶ Force Protection Disable active</li> <li>▶ Force Protection Disable inactive</li> </ul> |       |                             |            |
| Behaviour depends on configuration of LBI - normally close or normally open.   |       |                             |            |

[◀ back to Logical binary inputs alphabetically](#)



## Fuel Level

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>                                  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>                                 | 626   |                             |            |
| <b>Description</b>                                 |   |                             |            |
| Binary input for FUEL LEVEL (PAGE 772) protection. |   |                             |            |
| <b>Protection types</b>                            |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.        |                             |            |
| HistRecOnl   | Binary input is not used for protection. Only history record is made if binary input is active. |                             |            |
| Wrm  | Binary input is used for warning protection only.   |                             |            |
| Stp  | Binary input is used for slow stop protection   |                             |            |
| BOC  | Binary input is used for BOC (Breaker Open and Cooling) protection.                             |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |

🔍 back to Logical binary inputs alphabetically


## Fuel Pump On/Off

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 694   |                             |            |
| <b>Description</b>   |       |                             |            |
| This binary input is used for manual control of binary output FUEL PUMP (PAGE 715).  |       |                             |            |
| <i>Note: This binary input is basically designed for ON and OFF switch (switch with arrestment in these positions) because controller reacts to rising and falling edge of signal in this input.</i>                                     |       |                             |            |
| <b>IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 667) is configured then binary output FUEL PUMP (PAGE 715) is control by this binary input. Setpoints Fuel Pump On (page 299) and Fuel Pump Off (page 300) are not evaluated!</b> |       |                             |            |
| <b>IMPORTANT: It is necessary to configure analog input FUEL LEVEL (PAGE 772) for proper function of this binary input.</b>  |       |                             |            |

🔍 back to Logical binary inputs alphabetically

## LBI: G

### GCB Button

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 193   |                             |            |
| <b>Description</b>  |       |                             |            |
| Binary input has the same function as GCB button  on the IntelliGen 500 front panel. It is evaluated in MAN mode only. |       |                             |            |

🔍 back to Logical binary inputs alphabetically

## GCB Feedback

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 63    |                             |            |

### Description

Use this input for indication whether the generator circuit breaker is open or closed.

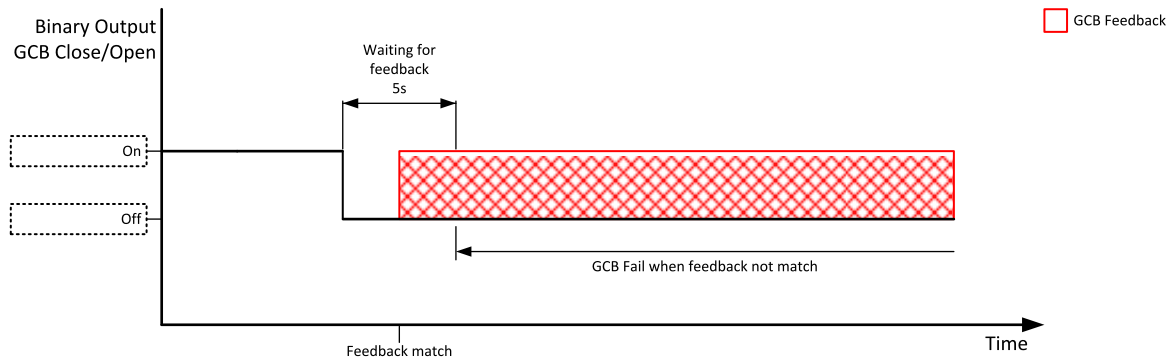


Image 9.133 GCB Feedback 1

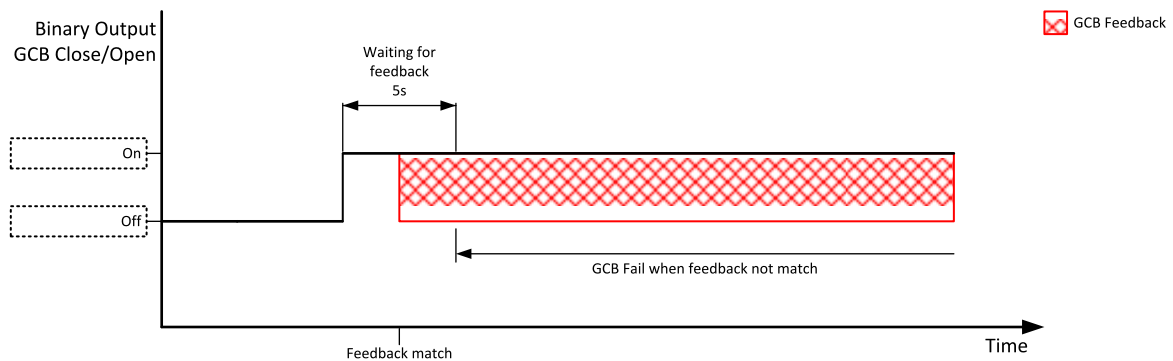


Image 9.134 GCB Feedback 2

**Note:** IntelliGen 500 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.

🔍 back to Logical binary inputs alphabetically

## Geo Home Position

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 219   |                             |            |

### Description

This binary input can be used to adjust home position of gen-set. In case that binary input is active, setpoints **Home Latitude (page 446)** and **Home Longitude (page 446)** are adjusted automatically from actual coordinates from GPS signal.

**Note:** Input has to be activated for at least 2 seconds.

🔍 back to Logical binary inputs alphabetically

## Geo-Fencing Enabled

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 218   |                             |            |
| <b>Description</b>  |       |                             |            |
| This binary input enables or disables <b>Fence 1 Protection (page 449)</b> and <b>Fence 2 Protection (page 450)</b> if <b>Geo-Fencing (page 448)</b> is adjusted to value "LBI Enable". |       |                             |            |

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## Group link

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 59    |                             |            |
| <b>Description</b>   |       |                             |            |
| This input is used for logical connection and disconnection of two gen-set groups selected with setpoints <b>Group Link L (page 344)</b> and <b>Group Link R (page 345)</b> . If the input is active, then the two selected groups will perform power management, load sharing and kVAr sharing together as one large group. |       |                             |            |
| <i><b>Note:</b> This function is independent on the group which the particular controller belongs to, i.e. the controller can provide linking function e.g. for groups 3,4 although it belongs to group 2.</i>   |       |                             |            |

[▲ back to Logical binary inputs alphabetically](#)

## LBI: H

### Horn Reset Button

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 192   |                             |            |
| <b>Description</b>   |       |                             |            |
| Binary input has the same function as Horn reset  button on the IntelliGen 500 front panel. |       |                             |            |

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## LBI: I

### Idle Speed

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 624   |                             |            |
| <b>Description</b>  |       |                             |            |
| This binary input changes cooling speed from nominal to idle. |       |                             |            |

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## LBI: L

### Lang Selection 1

| <b>Related FW</b>   | 1.0.0         | <b>Related applications</b> | MINT, SPtM |              |               |                 |                                |   |                          |  |   |                 |  |   |                |
|---|---------------|-----------------------------|------------|--------------|---------------|-----------------|--------------------------------|---|--------------------------|--|---|-----------------|--|---|----------------|
| <b>Comm object</b>  | 107           |                             |            |              |               |                 |                                |   |                          |  |   |                 |  |   |                |
| <b>Description</b>  |               |                             |            |              |               |                 |                                |   |                          |  |   |                 |  |   |                |
| Use this binary input with binary input <b>LANG SELECTION 2 (PAGE 670)</b> to choose required language of controller. The system is based on binary numbers.  |               |                             |            |              |               |                 |                                |   |                          |  |   |                 |  |   |                |
| <table border="1"> <thead> <tr> <th>Binary input</th> <th>Binary number</th> <th>Active language</th> </tr> </thead> <tbody> <tr> <td>Language Selection 1 is active</td> <td>1</td> <td>First language (English)</td> </tr> <tr> <td><b>LANG SELECTION 2 (PAGE 670)</b> is active</td> <td>2</td> <td>Second language</td> </tr> <tr> <td>Language Selection 1 and <b>LANG SELECTION 2 (PAGE 670)</b> are active</td> <td>3</td> <td>Third language</td> </tr> </tbody> </table> |               |                             |            | Binary input | Binary number | Active language | Language Selection 1 is active | 1 | First language (English) | <b>LANG SELECTION 2 (PAGE 670)</b> is active | 2 | Second language | Language Selection 1 and <b>LANG SELECTION 2 (PAGE 670)</b> are active | 3 | Third language |
| Binary input  | Binary number | Active language             |            |              |               |                 |                                |   |                          |  |   |                 |  |   |                |
| Language Selection 1 is active  | 1             | First language (English)    |            |              |               |                 |                                |   |                          |  |   |                 |  |   |                |
| <b>LANG SELECTION 2 (PAGE 670)</b> is active  | 2             | Second language             |            |              |               |                 |                                |   |                          |  |   |                 |  |   |                |
| Language Selection 1 and <b>LANG SELECTION 2 (PAGE 670)</b> are active  | 3             | Third language              |            |              |               |                 |                                |   |                          |  |   |                 |  |   |                |

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### Lang Selection 2

| <b>Related FW</b>   | 1.0.0         | <b>Related applications</b> | MINT, SPtM |              |               |                 |  |   |                          |                            |   |                 |  |   |                |
|---|---------------|-----------------------------|------------|--------------|---------------|-----------------|--|---|--------------------------|----------------------------|---|-----------------|--|---|----------------|
| <b>Comm object</b>  | 108           |                             |            |              |               |                 |  |   |                          |                            |   |                 |  |   |                |
| <b>Description</b>  |               |                             |            |              |               |                 |  |   |                          |                            |   |                 |  |   |                |
| Use this binary input with binary input <b>LANG SELECTION 1 (PAGE 670)</b> to choose required language of controller. The system is based on binary numbers.  |               |                             |            |              |               |                 |  |   |                          |                            |   |                 |  |   |                |
| <table border="1"> <thead> <tr> <th>Binary input</th> <th>Binary number</th> <th>Active language</th> </tr> </thead> <tbody> <tr> <td><b>LANG SELECTION 1 (PAGE 670)</b> is active</td> <td>1</td> <td>First language (English)</td> </tr> <tr> <td>Lang Selection 2 is active</td> <td>2</td> <td>Second language</td> </tr> <tr> <td><b>LANG SELECTION 1 (PAGE 670)</b> and Lang Selection 2 are active</td> <td>3</td> <td>Third language</td> </tr> </tbody> </table> |               |                             |            | Binary input | Binary number | Active language | <b>LANG SELECTION 1 (PAGE 670)</b> is active | 1 | First language (English) | Lang Selection 2 is active | 2 | Second language | <b>LANG SELECTION 1 (PAGE 670)</b> and Lang Selection 2 are active | 3 | Third language |
| Binary input  | Binary number | Active language             |            |              |               |                 |  |   |                          |                            |   |                 |  |   |                |
| <b>LANG SELECTION 1 (PAGE 670)</b> is active  | 1             | First language (English)    |            |              |               |                 |  |   |                          |                            |   |                 |  |   |                |
| Lang Selection 2 is active  | 2             | Second language             |            |              |               |                 |  |   |                          |                            |   |                 |  |   |                |
| <b>LANG SELECTION 1 (PAGE 670)</b> and Lang Selection 2 are active  | 3             | Third language              |            |              |               |                 |  |   |                          |                            |   |                 |  |   |                |

[back to Logical binary inputs alphabetically](#)

### Load Res 2 Active

|   |       |                             |      |
|---|-------|-----------------------------|------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT |
| <b>Comm object</b>  | 49    |                             |      |
| <b>Description</b>  |       |                             |      |
| Activation of this logical binary input changes the set of load reserve setpoint, which are used in <b>Power management (page 79)</b> . This input is used to activate the load reserve set 2 instead of the set 1, which is active by default. |       |                             |      |

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## LBI: M

### Mains Fail Block

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 622   |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>If the input is closed, the automatic start of the gen-set at Mains failure is blocked. In case of running gen-set in AUTO mode, timer <b>Mains Return Delay (page 319)</b> is started and when it elapses GCB is opened, gen-set goes to cooling procedure and stops. When GCB is opened after <b>Open Transfer Min Break (page 350)</b> the MCB is closed.</p> <p><i>Note: This input simulates healthy Mains.</i></p> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

### Manual Load Reconnection

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 60    |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This input is used for manual reconnection of the last disconnected part of the load, if the load has dropped below the setpoint <b>Load Reconnection Level (page 330)</b>. This works only if automatic reconnection is disabled, i.e. the setpoint <b>Auto Load Reconnection (page 331)</b> = Disabled.</p> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

### MCB Button

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 194   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This binary input has the same function as MCB button <input type="checkbox"/> on the IntelliGen 500 front panel. It is evaluated in MAN mode only.</p> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

**MCB Feedback**

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 65    |                             |            |

**Description**

Use this input for indication whether the mains circuit breaker is open or closed.

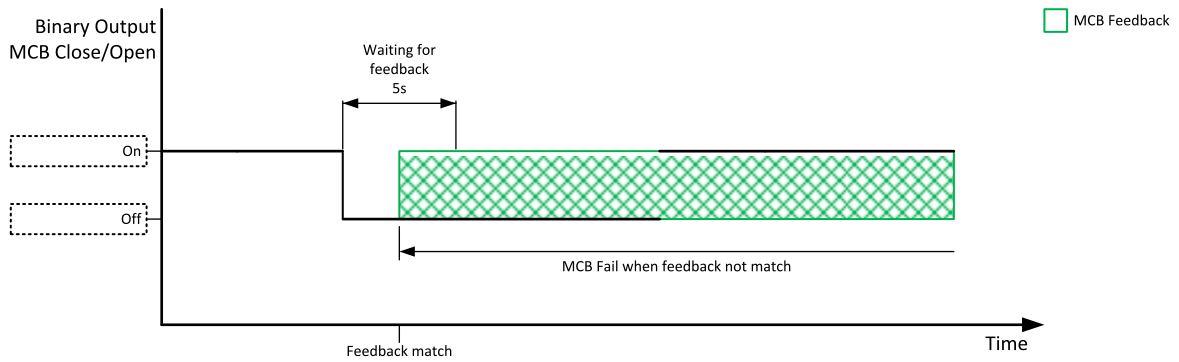


Image 9.135 MCB Feedback 1

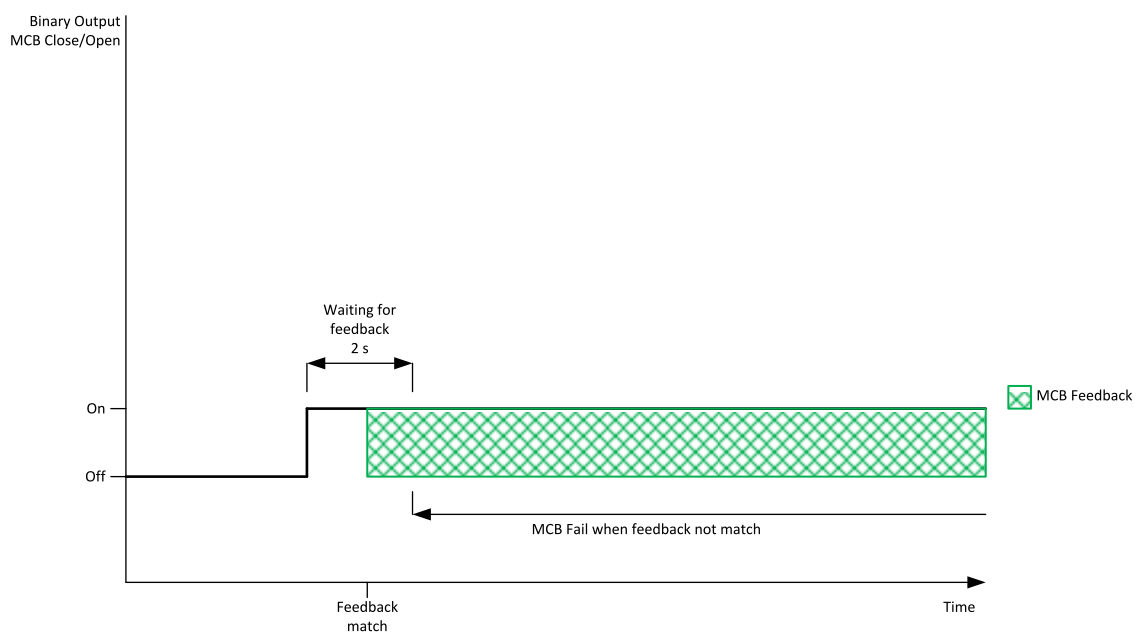


Image 9.136 MCB Feedback 2

**Note:** IntelliGen 500 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.

🔍 back to Logical binary inputs alphabetically

### Min Run Power Active

|   |       |                             |      |
|---|-------|-----------------------------|------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT |
| <b>Comm object</b>  | 52    |                             |      |
| <b>Description</b>  |       |                             |      |
| This input is used to activate the function minimal running power, which is adjusted via setpoint <b>#Min Run Power</b> (page 339). |       |                             |      |

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### LBI: N

#### NCB Feedback

|  |       |                             |      |
|--|-------|-----------------------------|------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT |
| <b>Comm object</b>   | 67    |                             |      |
| <b>Description</b>   |       |                             |      |
| This input is used for connection of feedback contact from the neutral contactor. If the input is active, the controller will consider the neutral contactor as closed and vice versa. See also setpoint <b>#Neutral Contactor Control</b> (page 237). |       |                             |      |

[↶ back to Logical binary inputs alphabetically](#)

### Not Used

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 184   |                             |            |
| <b>Description</b>  |       |                             |            |
| Binary input has no function. Use this configuration when binary input is not used. |       |                             |            |

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## LBI: O

### Oil Pressure

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 43  |                             |            |
| <b>Description</b>   |   |                             |            |
| Binary input for <b>OIL PRESSURE (PAGE 774)</b> protection.  |   |                             |            |
| <b>Protection types</b>  |   |                             |            |
| Monitoring   | Binary input is not used for protection or any other function. Signal is only monitored.        |                             |            |
| HistRecOnI   | Binary input is not used for protection. Only history record is made if binary input is active. |                             |            |
| Wrm  | Binary input is used for warning protection only.   |                             |            |
| Sd   | Binary input is used for shutdown protection.   |                             |            |
| <b>IMPORTANT: This binary input is also used for evaluating engine running condition.</b>  |   |                             |            |
| <b>Example:</b> Normally close connection - when LBI is closed then oil pressure is OK and is higher than starting oil pressure.                             |   |                             |            |
| <b>Note:</b> In case that you want to use binary input of oil pressure sensor just for protection please use one of the <b>BIN PROTECTION 1 (PAGE 616)</b> . |   |                             |            |

🔍 back to Logical binary inputs alphabetically

## LBI: R

### Regeneration Force

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 680   |                             |            |
| <b>Description</b>   |       |                             |            |
| When this binary input is activated, the controller send request for force regeneration of DPF (diesel particulate filter) to ECU. |       |                             |            |
| <b>Note:</b> ECU with Tier IV support is required for proper functionality.  |       |                             |            |

🔍 back to Logical binary inputs alphabetically

### Regeneration Inhib

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 679   |                             |            |
| <b>Description</b>   |       |                             |            |
| When this binary input is activated, the controller sends request to inhibit regeneration of DPF (diesel particulate filter) to ECU. |       |                             |            |
| <b>Note:</b> ECU with Tier IV support is required for proper functionality.  |       |                             |            |

🔍 back to Logical binary inputs alphabetically



## Remote AUTO

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 620   |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>The controller is switched to the AUTO mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>This binary input has the lowest priority from Remote OFF / MAN / AUTO / TEST binary inputs</p> <p>Remote control priority:</p> <ul style="list-style-type: none"> <li>▶ Remote OFF (Highest priority)</li> <li>▶ Remote TEST</li> <li>▶ Remote MAN</li> <li>▶ Remote AUTO (Lowest Priority)</li> </ul> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

## Remote Ctrl Lock

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 4     |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>If the input is active, the controller will not accept any actions regarding the system control – e.g. writing of commands and setpoint changes via remote communication interfaces.</p> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

## Remote MAN

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 618   |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>The controller is switched to the MAN mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>Remote control priority:</p> <ul style="list-style-type: none"> <li>▶ Remote OFF (Highest priority)</li> <li>▶ Remote TEST</li> <li>▶ Remote MAN</li> <li>▶ Remote AUTO (Lowest Priority)</li> </ul> |       |                             |            |

⬅ back to Logical binary inputs alphabetically

**Remote OFF**

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 617   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>The controller is switched to the OFF mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>Remote control priority:</p> <ul style="list-style-type: none"><li>▶ Remote OFF (Highest priority)</li><li>▶ Remote TEST</li><li>▶ Remote MAN</li><li>▶ Remote AUTO (Lowest Priority)</li></ul> |       |                             |            |

🔍 back to Logical binary inputs alphabetically

## Remote Start/Stop

|  |   |                             |            |
|--|---|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0   | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 38  |                             |            |
| <b>Description</b>   |   |                             |            |
| Use this input to start and stop the gen-set in AUTO mode and TEST mode.   |   |                             |            |
| <b>Taken action in SPtM application (AUTO Mode)</b>  |   |                             |            |
| Active   | Start genset, synchronization, parallel operation (baseload/Imp/Exp), Regardless the Mains params OK. <ul style="list-style-type: none"> <li>▶ Start the genstet to Island if Mains Not OK</li> <li>▶ Reverse synchronisation when mains gets restored</li> </ul>   |                             |            |
| Inactive   | Unloading of the genset if it is running in parallel, stop the genset.  |                             |            |
| <b>Taken action in MINT application (AUTO Mode)</b>  |   |                             |            |
| Active   | Start the Genset - After Powermanagement/ #System Start Delay (Actually is using the existing <b>REMOTE START/STOP (PAGE 677)</b> internaly (this LBI is not visible in any application)).  |                             |            |
| Inactive   | Stop the Genset - After Powermanagement/ #System Stop Delay (Actually is using the existing LBI <b>REMOTE START/STOP (PAGE 677)</b> internaly (this LBI is not visible in any application)).  |                             |            |
| <b>Taken action in AMF application (AUTO Mode)</b>   |   |                             |            |
| Active   | <ul style="list-style-type: none"> <li>▶ Start the genset and stay running with opened GCB if Mains OK.</li> <li>▶ Go to Island if Mains fails (due to AMF function).</li> <li>▶ If Mains is not OK the AMF function starts the genset to Island anyway.</li> </ul> |                             |            |
| Inactive   | <ul style="list-style-type: none"> <li>▶ Stop the genset if Mains is OK.</li> <li>▶ If Mains not Ok the genset stays running due to AMF function anyway.</li> </ul>   |                             |            |
| <b>Taken action in MRS application (AUTO Mode)</b>   |   |                             |            |
| Active   | <ul style="list-style-type: none"> <li>▶ Start the Genset - No delay</li> <li>▶ Close GCB</li> </ul>  |                             |            |
| Inactive   | <ul style="list-style-type: none"> <li>▶ Open GCB</li> <li>▶ Stop the Genset - No delay</li> </ul>  |                             |            |
| <p><b>Note:</b> In the SPTM and AMF application there are more LBIs that can influence the state of the application and can be in the collision with the Common LBI Remote Start/Stop.</p> |   |                             |            |

🔍 back to Logical binary inputs alphabetically

**Remote TEST**

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 621   |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>The controller is switched to the TEST mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.</p> <p>Remote control priority:</p> <ul style="list-style-type: none"><li>▶ Remote OFF (Highest priority)</li><li>▶ Remote TEST</li><li>▶ Remote MAN</li><li>▶ Remote AUTO (Lowest Priority)</li></ul> |       |                             |            |

🔍 back to Logical binary inputs alphabetically

## Remote Test On Load

|   |  |   |            |
|---|--|---|------------|
| <b>Related FW</b>   | 1.0.0  | <b>Related applications</b>   | MINT, SPtM |
| <b>Comm object</b>  | 61   |   |            |
| <b>Description</b>  |  |   |            |
| Closing of the GCB in MRS and MINT or transferring of the load from the mains to genset in SPTM and AMF |  |   |            |
| <b>Application</b>  | <b>TEST</b>  | <b>Remote TEST On Load</b>  |            |
| SPTM  | Gen-set started and running until the TEST mode deactivated. | <p><b>Active:</b> Gen-set is put to TEST mode. On the top of it the load is transfered to the genset. The same behaviour like the LBI <b>FORCE ISLAND (PAGE 666)</b>. The load transfer according to the settings is performed.</p> <p><i><b>Note:</b> Whenever the LBI REMOTE START/STOP (PAGE 677) is active, the LBI REMOTE TEST ON LOAD (PAGE 679) has higher priority because it takes the same action like LBI FORCE ISLAND (PAGE 666)</i></p> <p><b>Inactive:</b> Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions. (the load can be transfered back to the mains (OFF, AUTO) or stay on the genset (MAN)).</p> |            |
| MRS   |  | <p><b>Active:</b> Gen-set is put to TEST mode. On the top of it the GCB is closed. The same behaviour like the LBI <b>REMOTE START/STOP (PAGE 677)</b></p> <p><b>Inactive:</b> Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions.</p>   |            |
| MINT  |  | <p><b>Active:</b> Gen-set is put to TEST mode. On the top of it the GCB is closed (synchronized if the common bus bar is not dead). The same behaviour like the LBI <b>REMOTE START/STOP (PAGE 677)</b>.</p> <p><b>Inactive:</b> Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions.</p>   |            |
| AMF   |  | <p><b>Active:</b> Gen-set is put to TEST mode. On the top of it the load is transfered to the genset. The same behaviour like the LBI <b>FORCE ISLAND (PAGE 666)</b>. The open load transfer is performed.</p> <p><b>Inactive:</b> Genset comes back to the original mode and behaves accordingly to this mode and other conditions. (the load can be transfered back to the mains (OFF, AUTO) or stay on the genset (MAN)).</p>  |            |

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## LBI: S

### Sd Override

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 44    |                             |            |
| <b>Description</b>  |       |                             |            |
| If this input is active, all alarms except Emergency Stop and Overspeed are suppressed. The suppressed alarms will be displayed in the alarm list, but they will not take effect regarding the gen-set control. |       |                             |            |
| <p><b>Note:</b> <i>Sd Override (page 680)</i> is indicated in the alarm list if Sd Override mode is active to inform the operator that the engine is not protected.</p>   |       |                             |            |
| <b>IMPORTANT: MISUSE OF THIS INPUT CAN CAUSE DAMAGE TO THE GEN-SET!</b>   |       |                             |            |


⬅ back to Logical binary inputs alphabetically

### Start Button

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 189   |                             |            |
| <b>Description</b>   |       |                             |            |
| Binary input has the same function as Start Button  on the IntelliGen 500 front panel. It is evaluated in MAN mode only. |       |                             |            |

⬅ back to Logical binary inputs alphabetically

### Stop Button

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 190   |                             |            |
| <b>Description</b>   |       |                             |            |
| Binary input has the same function as Stop Button  on the IntelliGen 500 front panel. It is evaluated in MAN Mode only. |       |                             |            |

⬅ back to Logical binary inputs alphabetically

## LBI: T

### Top Priority

|  |       |                             |      |
|--|-------|-----------------------------|------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT |
| <b>Comm object</b>   | 199   |                             |      |
| <b>Description</b>   |       |                             |      |
| If this input is active, the controller will have the highest priority in the group independent of the setpoint Priority (page 333). |       |                             |      |

⬅ back to Logical binary inputs alphabetically

## 9.1.4 Logical binary outputs

### What Logical binary outputs are:

Logical binary outputs are outputs for binary values and functions.

### Alphabetical groups of Logical binary outputs

|              |     |
|--------------|-----|
| LBO: A ..... | 684 |
| LBO: B ..... | 706 |
| LBO: C ..... | 710 |
| LBO: D ..... | 711 |
| LBO: E ..... | 711 |
| LBO: F ..... | 714 |
| LBO: G ..... | 716 |
| LBO: H ..... | 722 |
| LBO: I ..... | 723 |
| LBO: L ..... | 725 |
| LBO: M ..... | 725 |
| LBO: N ..... | 730 |
| LBO: P ..... | 731 |
| LBO: R ..... | 734 |
| LBO: S ..... | 735 |
| LBO: T ..... | 740 |

For full list of Logical binary outputs go to the chapter **Logical binary outputs alphabetically (page 682)**.

## Logical binary outputs alphabetically

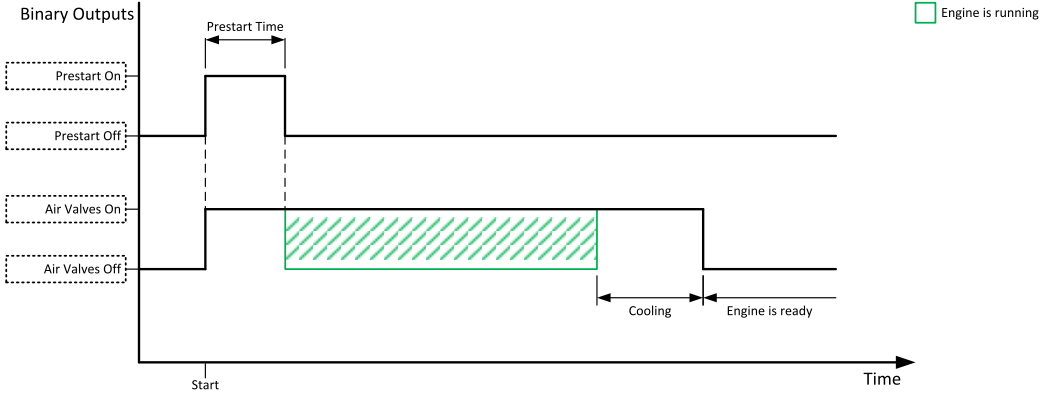
|                           |     |                         |     |                           |     |
|---------------------------|-----|-------------------------|-----|---------------------------|-----|
| Air Valves .....          | 684 | AL Maintenance 1 .....  | 692 | BIN 1 Status .....        | 706 |
| AL AIN 1 Sd+BOC .....     | 684 | AL Maintenance 2 .....  | 692 | BIN 2 Status .....        | 707 |
| AL AIN 1 Wrm .....        | 684 | AL Maintenance 3 .....  | 692 | BIN 3 Status .....        | 707 |
| AL AIN 2 Sd+BOC .....     | 685 | AL Oil Press Sd .....   | 692 | BIN 4 Status .....        | 708 |
| AL AIN 2 Wrm .....        | 685 | AL Oil Press Wrm .....  | 692 | BIN 5 Status .....        | 708 |
| AL AIN 3 Sd+BOC .....     | 685 | AL Overcurrent .....    | 693 | BIN 6 Status .....        | 709 |
| AL AIN 3 Wrm .....        | 685 | AL Overload BOC .....   | 693 | BIN 7 Status .....        | 709 |
| AL AIN 4 Sd+BOC .....     | 685 | AL Overload Wrm .....   | 693 | BIN 8 Status .....        | 710 |
| AL AIN 4 Wrm .....        | 686 | AL Overspeed .....      | 693 | Cooling Pump .....        | 710 |
| AL Battery Flat .....     | 686 | AL Rental Timer 1 ..... | 694 | Cooling .....             | 711 |
| AL Battery Charger .....  | 686 | AL Rental Timer 2 ..... | 694 | Display Fail .....        | 711 |
| AL Battery Voltage .....  | 686 | AL Start Fail .....     | 695 | ECU Communic Error ....   | 711 |
| AL Common BOC .....       | 686 | AL Stop Fail .....      | 695 | ECU Communic OK .....     | 711 |
| AL Common Fls .....       | 687 | AL Underspeed .....     | 695 | ECU Power Relay .....     | 712 |
| AL Common SdMPR .....     | 687 | Alarm .....             | 695 | ECU Red Lamp .....        | 712 |
| AL Common Stp .....       | 687 | AIN Switch01 .....      | 696 | ECU Run Stop .....        | 713 |
| AL Common Wrm .....       | 687 | AIN Switch02 .....      | 696 | ECU Wait To Start .....   | 713 |
| AL CoolantTemp Low ....   | 688 | AIN Switch03 .....      | 697 | ECU Yellow Lamp .....     | 713 |
| AL CoolantTemp Sd .....   | 688 | AIN Switch04 .....      | 697 | Exercise Timer 1 .....    | 713 |
| AL CoolantTemp Wrm ....   | 688 | AIN Switch05 .....      | 698 | Exercise Timer 2 .....    | 714 |
| AL D+ Fail .....          | 688 | AIN Switch06 .....      | 698 | FltRes .....              | 714 |
| AL Earth Fault .....      | 688 | AIN Switch07 .....      | 699 | Frequency Select .....    | 714 |
| AL Fence 1 .....          | 689 | AIN Switch08 .....      | 699 | Fuel Pump .....           | 715 |
| AL Fence 2 .....          | 689 | AIN Switch09 .....      | 700 | Fuel Solenoid .....       | 715 |
| AL Fuel Level Sd .....    | 689 | AIN Switch10 .....      | 700 | GCB Close/Open .....      | 716 |
| AL Fuel Level Wrm .....   | 689 | AIN Switch11 .....      | 701 | GCB OFF Coil .....        | 717 |
| AL Gen Freq Wrm .....     | 689 | AIN Switch12 .....      | 701 | GCB ON Coil .....         | 718 |
| AL GenBus Frequency ...   | 690 | AIN Switch13 .....      | 702 | GCB UV Coil .....         | 718 |
| AL Gen Overfrequency ...  | 690 | AIN Switch14 .....      | 702 | GeneratorBus Healthy ...  | 720 |
| AL Gen Overvoltage .....  | 690 | AIN Switch15 .....      | 703 | Glow Plugs .....          | 720 |
| AL Gen Underfrequency ... | 690 | AIN Switch16 .....      | 703 | Heartbeat .....           | 722 |
| AL Gen Undervoltage ..... | 690 | AIN Switch17 .....      | 704 | HEST Lamp .....           | 722 |
| AL Gen Voltage Wrm .....  | 691 | AIN Switch18 .....      | 704 | Horn .....                | 722 |
| AL GenBus Voltage .....   | 691 | AIN Switch19 .....      | 705 | Idle/Nominal .....        | 723 |
| AL Mains Fail .....       | 691 | AIN Switch20 .....      | 705 | Ignition .....            | 723 |
| AL Mains Frequency .....  | 691 | AVR Down .....          | 706 | Ignition On .....         | 724 |
| AL Mains Voltage .....    | 691 | AVR Up .....            | 706 | Load Shedding Stage 1 ... | 725 |



|                           |     |
|---------------------------|-----|
| Load Shedding Stage 2 ... | 725 |
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| System Reserve OK .....   | 739 |
| Temperature Switch .....  | 740 |

## LBO: A

### Air Valves

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1247  |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This output closes together with binary output <b>PRESTART</b> (PAGE 732) and opens after the engine is stopped or in case that engine is not ready.</p>  |       |                             |            |
|  <p>The diagram shows the timing of binary outputs for air valves. It includes signals for Prestart On/Off, Air Valves On/Off, and a green shaded area representing 'Engine is running'. Key time intervals marked are 'Prestart Time', 'Cooling', and 'Engine is ready'. The 'Start' event is indicated on the time axis.</p> |       |                             |            |
| Image 9.137 Air Valves   |       |                             |            |

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### AL AIN 1 Sd+BOC

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1386  |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>The output is closed when there is the shutdown or BOC alarm from the analog input 1 of the controller present in the alarmlist or isn't confirmed.</p> |       |                             |            |

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### AL AIN 1 Wrn

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1382  |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>The output is closed when there is the warning alarm from the analog input 1 of the controller present in the alarmlist or isn't confirmed.</p> |       |                             |            |

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### AL AIN 2 Sd+BOC

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1387  |                             |            |
| <b>Description</b>  |       |                             |            |
| The output is closed when there is the shutdown or BOC alarm from the analog input 2 of the controller present in the alarmlist or isn't confirmed. |       |                             |            |

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### AL AIN 2 Wrn

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1383  |                             |            |
| <b>Description</b>  |       |                             |            |
| The output is closed when there is the warning alarm from the analog input 2 of the controller present in the alarmlist or isn't confirmed. |       |                             |            |

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### AL AIN 3 Sd+BOC

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1388  |                             |            |
| <b>Description</b>  |       |                             |            |
| The output is closed when there is the shutdown or BOC alarm from the analog input 3 of the controller present in the alarmlist or isn't confirmed. |       |                             |            |

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### AL AIN 3 Wrn

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1384  |                             |            |
| <b>Description</b>  |       |                             |            |
| The output is closed when there is the warning alarm from the analog input 3 of the controller present in the alarmlist or isn't confirmed. |       |                             |            |

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### AL AIN 4 Sd+BOC

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1389  |                             |            |
| <b>Description</b>  |       |                             |            |
| The output is closed when there is the shutdown or BOC alarm from the analog input 4 of the controller present in the alarmlist or isn't confirmed. |       |                             |            |

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### AL AIN 4 Wrn

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1385  |                             |            |
| <b>Description</b>  |       |                             |            |
| The output is closed when there is the warning alarm from the analog input 4 of the controller present in the alarmlist or isn't confirmed. |       |                             |            |

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### AL Battery Flat

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1292  |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when the <b>Sd Battery Flat (page 821)</b> or <b>Wrn Battery &lt; Voltage (page 801)</b> <b>Wrn Battery Voltage (page 795)</b> alarm is present in the alarmlist or isn't confirm. |       |                             |            |

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### AL Battery Charger

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1272  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when the <b>Battery Charger Fail (page 795)</b> alarm is present in the alarmlist or isn't confirmed. |       |                             |            |


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### AL Battery Voltage

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1293  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when the <b>Wrn Battery Voltage (page 795)</b> <b>Wrn Battery &gt; Voltage (page 800)</b> or <b>Wrn Battery &lt; Voltage (page 801)</b> alarm is present in the alarmlist or isn't confirm. |       |                             |            |


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### AL Common BOC

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 9     |                             |            |
| <b>Description</b>  |       |                             |            |
| Output closes when any BOC alarm appears.   |       |                             |            |
| The output opens, if:   |       |                             |            |
| <ul style="list-style-type: none"> <li>▶ No BOC alarm is active and</li> <li>▶ Fault reset  button is pressed</li> </ul> |       |                             |            |


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## AL Common Fls

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 6     |                             |            |
| <b>Description</b>  |       |                             |            |
| Output closes when any sensor fail alarm appears.   |       |                             |            |
| The output opens, if:   |       |                             |            |
| <ul style="list-style-type: none"> <li>▶ No sensor fail alarm is active and</li> <li>▶ Fault reset  button is pressed</li> </ul> |       |                             |            |


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## AL Common SdMPR

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 4     |                             |            |
| <b>Description</b>  |       |                             |            |
| Output closes when any shutdown mains protection with reset alarm appears.  |       |                             |            |
| The output opens, if:   |       |                             |            |
| <ul style="list-style-type: none"> <li>▶ No shutdown mains protection with reset alarm is active and</li> <li>▶ Fault reset  button is pressed</li> </ul> |       |                             |            |


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## AL Common Stp

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 5     |                             |            |
| <b>Description</b>  |       |                             |            |
| Output closes when any slow stop alarm appears.   |       |                             |            |
| The output opens, if:   |       |                             |            |
| <ul style="list-style-type: none"> <li>▶ No slow stop alarm is active and</li> <li>▶ Fault reset  button is pressed</li> </ul> |       |                             |            |

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## AL Common Wrn

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 3     |                             |            |
| <b>Description</b>  |       |                             |            |
| Output closes when any warning alarm appears.   |       |                             |            |
| The output opens, if:   |       |                             |            |
| <ul style="list-style-type: none"> <li>▶ No warning alarm is active and</li> <li>▶ Fault reset  button is pressed</li> </ul> |       |                             |            |

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### AL CoolantTemp Low

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1295  |                             |            |
| <b>Description</b>   |       |                             |            |
| The output is closed when there is the <b>Wrn Coolant Temperature Low (page 801)</b> alarm from the COOLANT TEMP (PAGE 771) in the alarmlist or isn't confirmed. |       |                             |            |

🔍 Logical binary outputs alphabetically (page 682)

### AL CoolantTemp Sd

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1421  |                             |            |
| <b>Description</b>   |       |                             |            |
| The output is closed when there is the shutdown or BOC alarm from the COOLANT TEMP (PAGE 771) in the alarmlist or isn't confirmed. |       |                             |            |

🔍 Logical binary outputs alphabetically (page 682)

### AL CoolantTemp Wrn

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1420  |                             |            |
| <b>Description</b>  |       |                             |            |
| The output is closed when there is the warning alarm from the COOLANT TEMP (PAGE 771) in the alarmlist or isn't confirmed.                |       |                             |            |
| <p><i>Note: Binary output is also active if protection type is set to HistRecOnl and threshold level for history record is reach.</i></p> |       |                             |            |

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### AL D+ Fail

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1260  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when the <b>Wrn Charging Alternator Fail (page 800)</b> alarm is present in the alarmlist or isn't confirm. |       |                             |            |

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### AL Earth Fault

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1294  |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when the <b>Sd Earth Fault Current (page 822)</b> alarm is present in alarm list or isn't confirm. |       |                             |            |
| <p><i>Note: It is strongly recommended to use this output only onetime.</i></p>  |       |                             |            |

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## AL Fence 1

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1548  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when the <a href="#">Wrn Fence 1 Alarm (page 802)</a> or <a href="#">BOC Fence 1 Alarm (page 831)</a> or <a href="#">Sd Fence 1 Alarm (page 823)</a> (depends on configuration of alarm type) alarm is present in the alarmlist or isn't confirm. |       |                             |            |

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## AL Fence 2

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1549  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when the <a href="#">Wrn Fence 2 Alarm (page 803)</a> or <a href="#">BOC Fence 2 Alarm (page 832)</a> or <a href="#">Sd Fence 2 Alarm (page 823)</a> (depends on configuration of alarm type) alarm is present in the alarmlist or isn't confirm. |       |                             |            |

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## AL Fuel Level Sd

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1423  |                             |            |
| <b>Description</b>   |       |                             |            |
| The output is closed when there is the shutdown or BOC alarm from the <a href="#">FUEL LEVEL (PAGE 772)</a> in the alarmlist or isn't confirmed. |       |                             |            |

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## AL Fuel Level Wrn

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1422  |                             |            |
| <b>Description</b>   |       |                             |            |
| The output is closed when there is the warning alarm from the <a href="#">FUEL LEVEL (PAGE 772)</a> in the alarmlist or isn't confirmed.         |       |                             |            |
| <p><b>Note:</b> Binary output is also active if protection type is set to <i>HistRecOnl</i> and threshold level for history record is reach.</p> |       |                             |            |

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## AL Gen Freq Wrn

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1267  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active generator frequency warning alarm is present in alarmlist or isn't confirm. |       |                             |            |

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### AL GenBus Frequency

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1266  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when at least one generator frequency BOC or Sd alarm is present in alarmlist or isn't confirm. |       |                             |            |

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### AL Gen Overfrequency

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1264  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when at least one generator overfrequency alarm is present in alarmlist or isn't confirm. |       |                             |            |

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### AL Gen Overvoltage

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1261  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when at least one generator overvoltage alarm is present in alarmlist or isn't confirm. |       |                             |            |

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### AL Gen Underfrequency

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1265  |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when at least one generator underfrequency alarm is present in alarmlist or isn't confirm. |       |                             |            |

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### AL Gen Undervoltage

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1262  |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when at least one generator undervoltage alarm is present in alarmlist or isn't confirm. |       |                             |            |

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### AL Gen Voltage Wrn

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1289  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when at least one generator voltage warning alarm is present in alarmlist or isn't confirm. |       |                             |            |

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### AL GenBus Voltage

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1263  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when at least one generator voltage BOC or Sd alarm is present in alarmlist or isn't confirm. |       |                             |            |

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### AL Mains Fail

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 197   |                             |            |
| <b>Description</b>  |       |                             |            |
| Output for signaling Mains Failure. This output is active when at least one mains frequency BOC or Sd alarm or at least one mains voltage BOC or Sd alarm is present in alarmlist or isn't confirmed. |       |                             |            |

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### AL Mains Frequency

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1271  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when at least one mains frequency BOC or Sd alarm is present in alarmlist or isn't confirm. |       |                             |            |

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### AL Mains Voltage

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1270  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when at least one mains voltage BOC or Sd alarm is present in the alarmlist or isn't confirm. |       |                             |            |

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### AL Maintenance 1

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1254  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when the Alarm Maintenance 1 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 1 isn't confirm. |       |                             |            |

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### AL Maintenance 2

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1255  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when the Alarm Maintenance 2 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 2 isn't confirm. |       |                             |            |

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### AL Maintenance 3

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1256  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when the Alarm Maintenance 3 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 3 isn't confirm. |       |                             |            |

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### AL Oil Press Sd

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1419  |                             |            |
| <b>Description</b>   |       |                             |            |
| The output is closed when there is the shutdown alarm from the <b>OIL PRESSURE (PAGE 774)</b> in the alarmlist or isn't confirmed. |       |                             |            |

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### AL Oil Press Wrn

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1418  |                             |            |
| <b>Description</b>   |       |                             |            |
| The output is closed when there is the warning alarm from the <b>OIL PRESSURE (PAGE 774)</b> in the alarmlist or isn't confirmed.                |       |                             |            |
| <p><b>Note:</b> Binary output is also active if protection type is set to <i>HistRecOnl</i> and threshold level for history record is reach.</p> |       |                             |            |

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## AL Overcurrent

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 109   |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when the <b>BOC Overcurrent IDMT (page 836)</b> or <b>BOC Short Circuit (page 837)</b> alarm is present in alarmlist or isn't confirm. |       |                             |            |

[◀ back to Logical binary outputs alphabetically](#)

## AL Overload BOC

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1268  |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when the <b>Sd Overload (page 828)</b> alarm is present in the alarmlist or isn't confirm. |       |                             |            |

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## AL Overload Wrn

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1269  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when the <b>Wrn Overload (page 810)</b> alarm is present in alarmlist or isn't confirm. |       |                             |            |

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## AL Overspeed

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 779   |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when the <b>Sd Overspeed (page 829)</b> alarm is present in the alarmlist or isn't confirm. |       |                             |            |

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## AL Rental Timer 1

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1370  |                             |            |

### Description

The binary output closes when the **Rental Timer 1 (page 441)** elapsed.

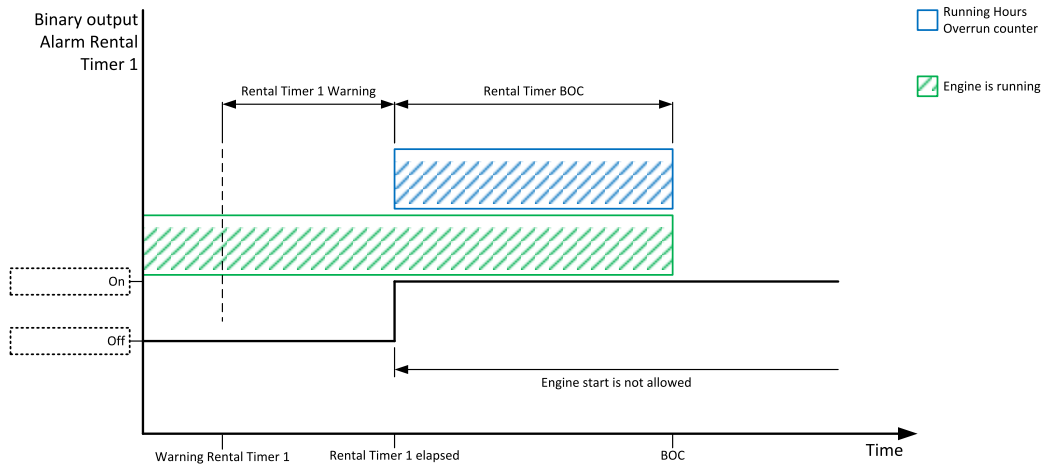


Image 9.138 Rental Timer 1

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## AL Rental Timer 2

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1371  |                             |            |

### Description

The binary output closes when the **Rental Timer 2 (page 443)** elapsed.

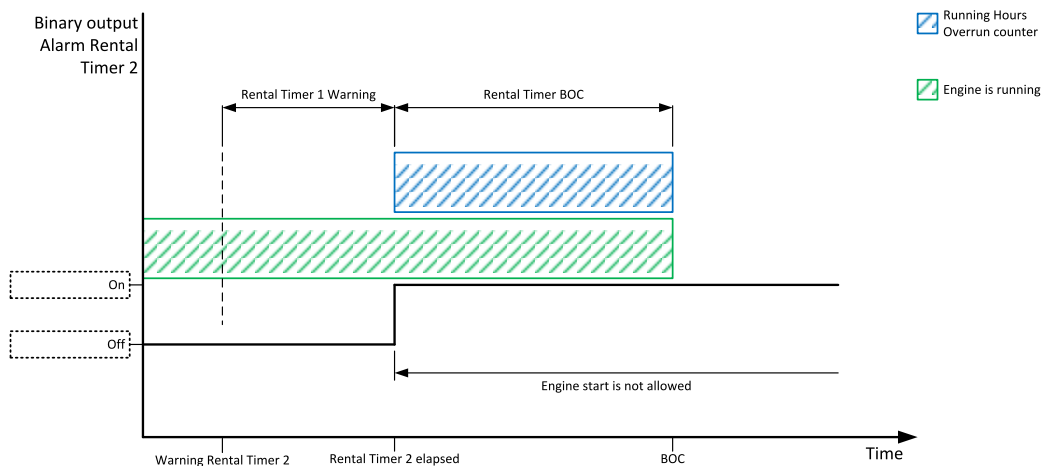


Image 9.139 Rental Timer 2

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### AL Start Fail

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1291  |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when the <b>Sd Start Fail (page 830)</b> alarm is present in the alarmlist or isn't confirm. |       |                             |            |

⬅ back to Logical binary outputs alphabetically

### AL Stop Fail

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 339   |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when the <b>Wrn Stop Fail (page 811)</b> alarm is present in the alarmlist or isn't confirm. |       |                             |            |

⬅ back to Logical binary outputs alphabetically

### AL Underspeed

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1296  |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when the <b>Sd Underspeed (page 830)</b> alarm is present in the alarmlist or isn't confirm. |       |                             |            |

⬅ back to Logical binary outputs alphabetically

### Alarm

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 2     |                             |            |
| <b>Description</b>  |       |                             |            |
| The output is designed to be used as external alarm indication such as a red bulb in the control room etc. The output is active when at least one unconfirmed alarm is present in the alarmlist and remains active until confirmation of alarm. |       |                             |            |

⬅ back to Logical binary outputs alphabetically

## AIN Switch01

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1400  |                             |            |

### Description

This is an output from the General Analog Input 1 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 1 On** (page 367) and **Analog Switch 1 Off** (page 368). The value is measured from **AIN SWITCH 01** (PAGE 764) analog input.

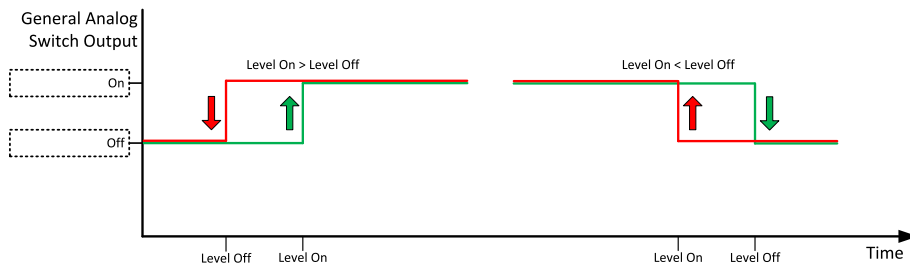


Image 9.140 General analog input 1 switch

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## AIN Switch02

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1401  |                             |            |

### Description

This is an output from the General Analog Input 2 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 2 On** (page 370) and **Analog Switch 2 Off** (page 371). The value is measured from **AIN SWITCH 02** (PAGE 764) analog input.

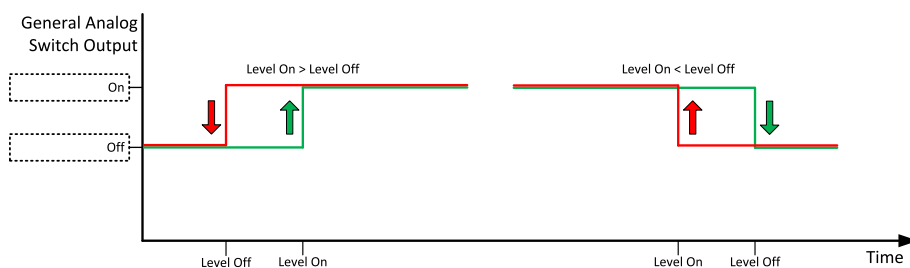


Image 9.141 General analog input 2 switch

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## AIN Switch03

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1402  |                             |            |

### Description

This is an output from the General Analog Input 3 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 3 On** (page 373) and **Analog Switch 3 Off** (page 374). The value is measured from **AIN SWITCH 03** (PAGE 764) analog input.

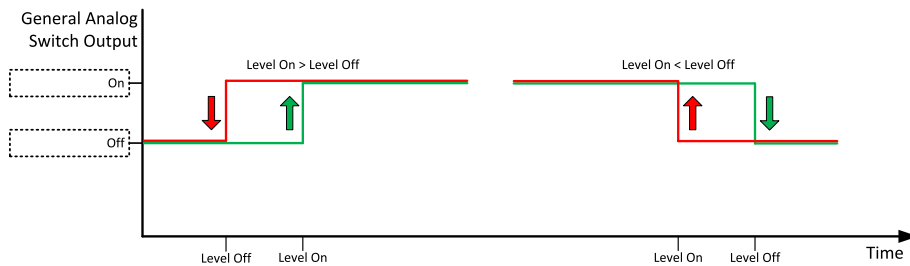


Image 9.142 General analog input 3 switch

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## AIN Switch04

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1403  |                             |            |

### Description

This is an output from the General Analog Input 4 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 4 On** (page 376) and **Analog Switch 4 Off** (page 377). The value is measured from **AIN SWITCH 04** (PAGE 765) analog input.

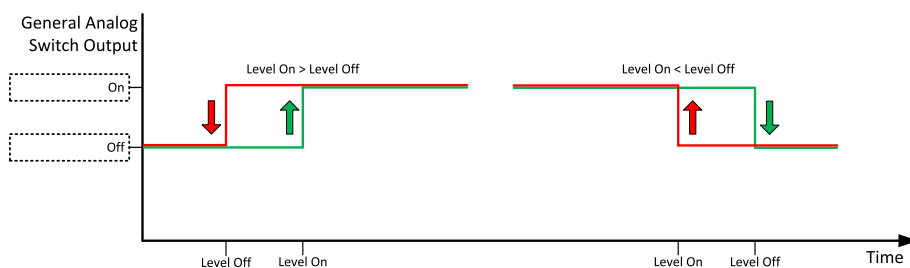


Image 9.143 General analog input 4 switch

[Logical binary outputs alphabetically \(page 682\)](#)

## AIN Switch05

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1787  |                             |            |

### Description

This is an output from the General Analog Input 5 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 5 On** (page 379) and **Analog Switch 5 Off** (page 380). The value is measured from **AIN SWITCH 05** (PAGE 765) analog input.

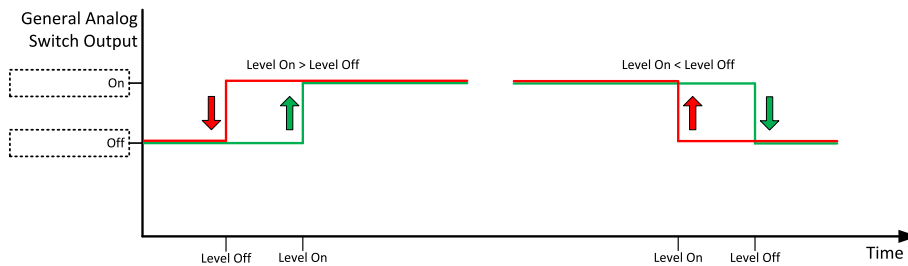


Image 9.144 General analog input 5 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch06

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1788  |                             |            |

### Description

This is an output from the General Analog Input 6 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 6 On** (page 382) and **Analog Switch 6 Off** (page 383). The value is measured from **AIN SWITCH 06** (PAGE 765) analog input.

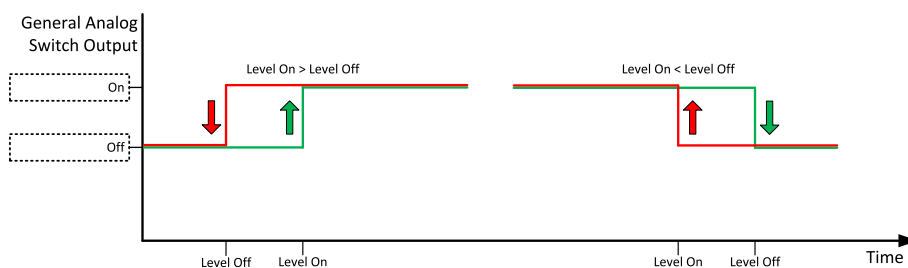


Image 9.145 General analog input 6 switch

### Logical binary outputs alphabetically (page 682)



## AIN Switch07

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1789  |                             |            |

### Description

This is an output from the General Analog Input 7 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 7 On** (page 385) and **Analog Switch 7 Off** (page 386). The value is measured from **AIN SWITCH 07** (PAGE 766) analog input.

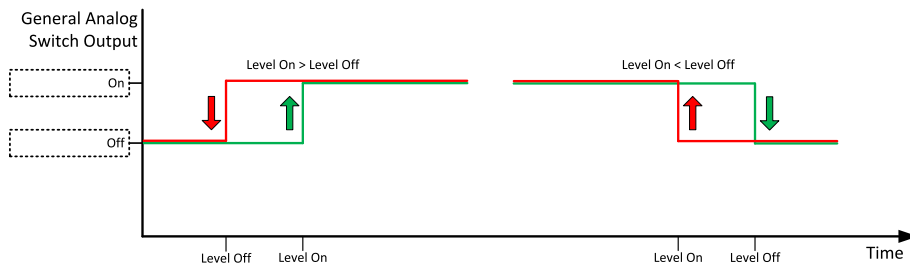


Image 9.146 General analog input 7 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch08

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1790  |                             |            |

### Description

This is an output from the General Analog Input 8 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 8 On** (page 388) and **Analog Switch 8 Off** (page 389). The value is measured from **AIN SWITCH 08** (PAGE 766) analog input.

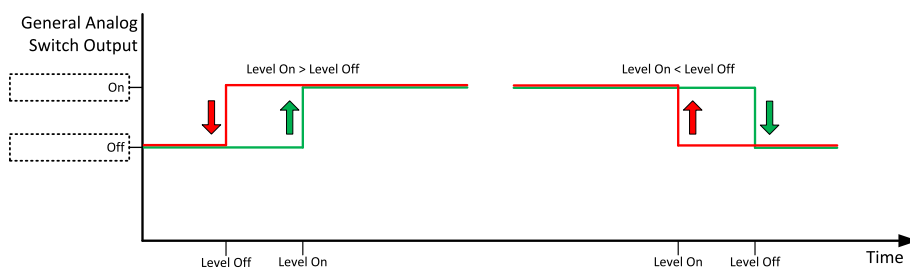


Image 9.147 General analog input 8 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch09

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1791  |                             |            |

### Description

This is an output from the General Analog Input 9 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 9 On** (page 391) and **Analog Switch 9 Off** (page 392). The value is measured from **AIN SWITCH 09** (PAGE 766) analog input.

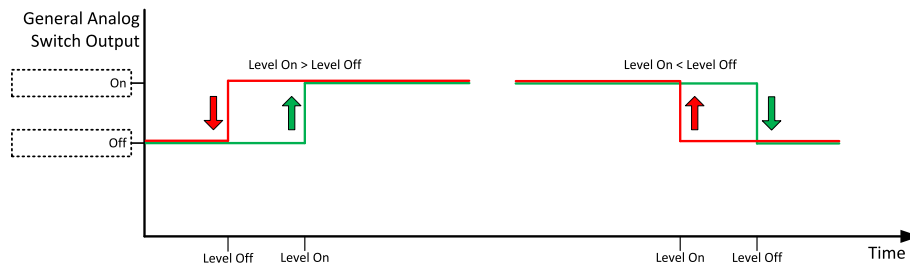


Image 9.148 General analog input 9 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch10

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1792  |                             |            |

### Description

This is an output from the General Analog Input 10 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 10 On** (page 394) and **Analog Switch 10 Off** (page 395). The value is measured from **AIN SWITCH 10** (PAGE 767) analog input.

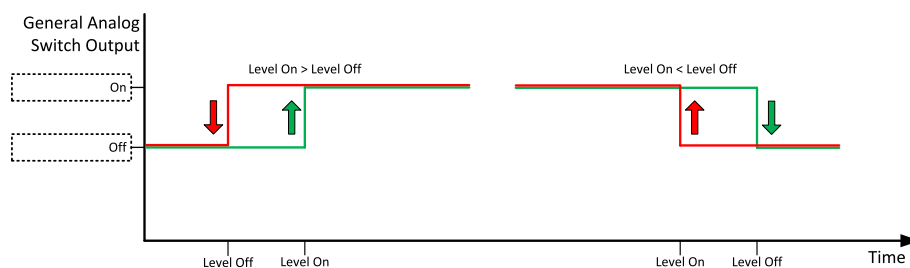


Image 9.149 General analog input 10 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch11

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1793  |                             |            |

### Description

This is an output from the General Analog Input 11 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 11 On** (page 397) and **Analog Switch 11 Off** (page 398). The value is measured from **AIN SWITCH 11** (PAGE 767) analog input.

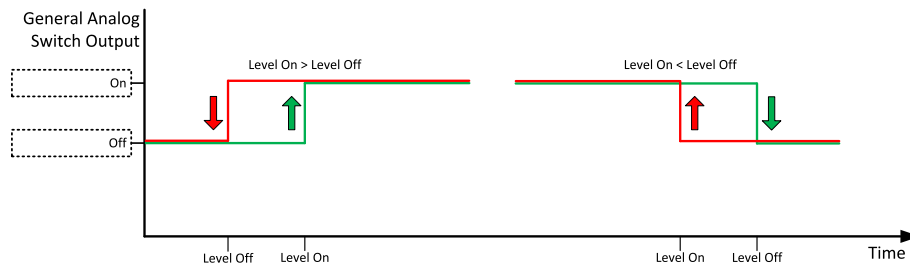


Image 9.150 General analog input 11 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch12

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1794  |                             |            |

### Description

This is an output from the General Analog Input 12 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 12 On** (page 400) and **Analog Switch 12 Off** (page 401). The value is measured from **AIN SWITCH 12** (PAGE 767) analog input.

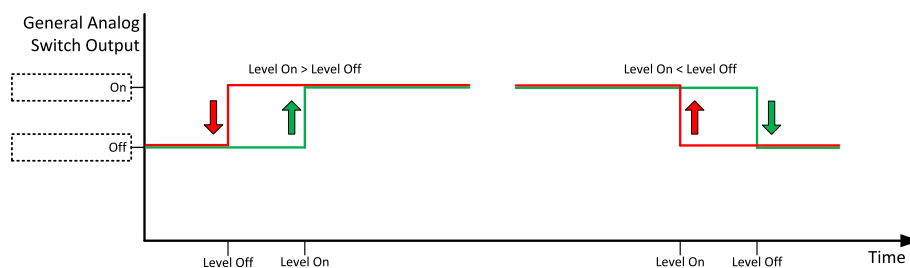


Image 9.151 General analog input 12 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch13

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1795  |                             |            |

### Description

This is an output from the General Analog Input 13 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 13 On** (page 403) and **Analog Switch 13 Off** (page 404). The value is measured from **AIN SWITCH 13** (PAGE 768) analog input.

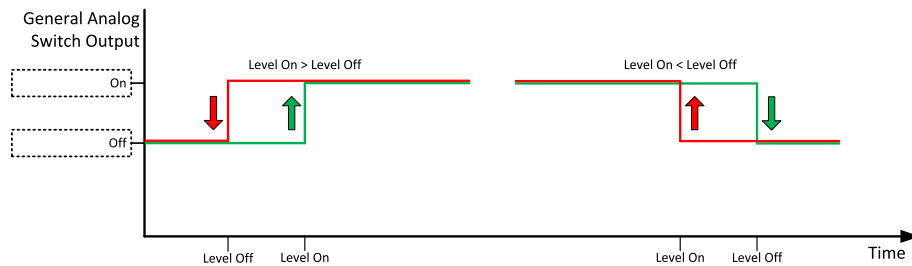


Image 9.152 General analog input 13 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch14

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1796  |                             |            |

### Description

This is an output from the General Analog Input 14 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 14 On** (page 406) and **Analog Switch 14 Off** (page 407). The value is measured from **AIN SWITCH 14** (PAGE 768) analog input.

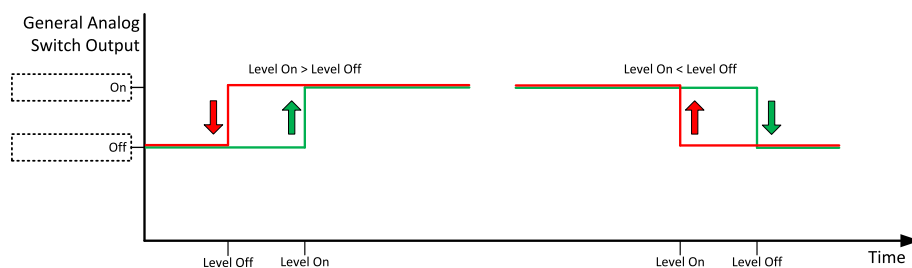


Image 9.153 General analog input 14 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch15

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1797  |                             |            |

### Description

This is an output from the General Analog Input 15 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 15 On** (page 409) and **Analog Switch 15 Off** (page 410). The value is measured from **AIN SWITCH 15** (PAGE 768) analog input.

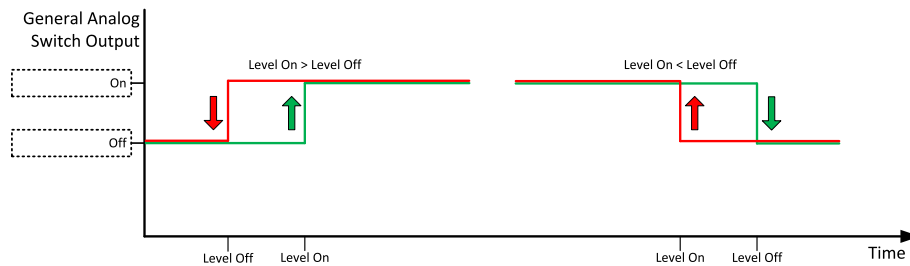


Image 9.154 General analog input 15 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch16

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1798  |                             |            |

### Description

This is an output from the General Analog Input 16 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 16 On** (page 412) and **Analog Switch 16 Off** (page 413). The value is measured from **AIN SWITCH 16** (PAGE 769) analog input.

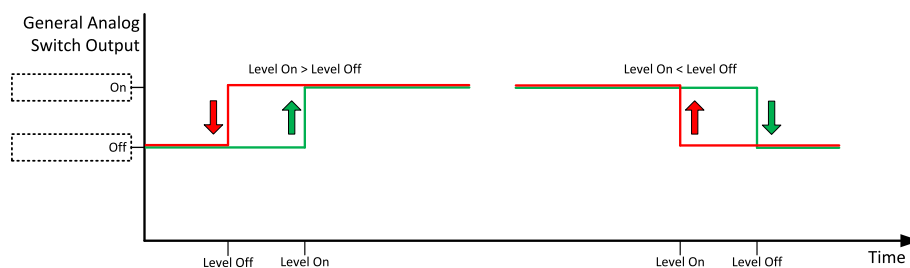


Image 9.155 General analog input 16 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch17

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1799  |                             |            |

### Description

This is an output from the General Analog Input 17 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 17 On** (page 415) and **Analog Switch 17 Off** (page 416). The value is measured from **AIN SWITCH 17** (PAGE 769) analog input.

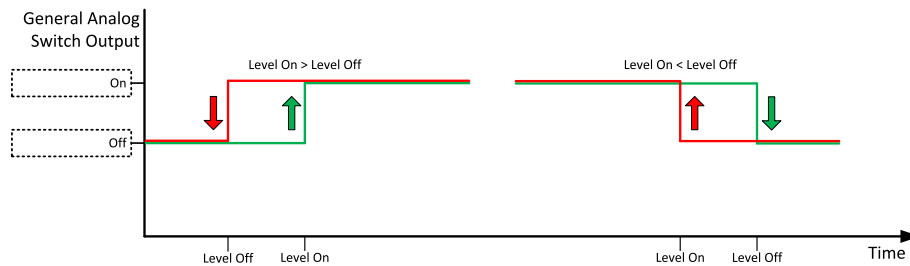


Image 9.156 General analog input 17 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch18

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1800  |                             |            |

### Description

This is an output from the General Analog Input 18 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 18 On** (page 418) and **Analog Switch 18 Off** (page 419). The value is measured from **AIN SWITCH 18** (PAGE 769) analog input.

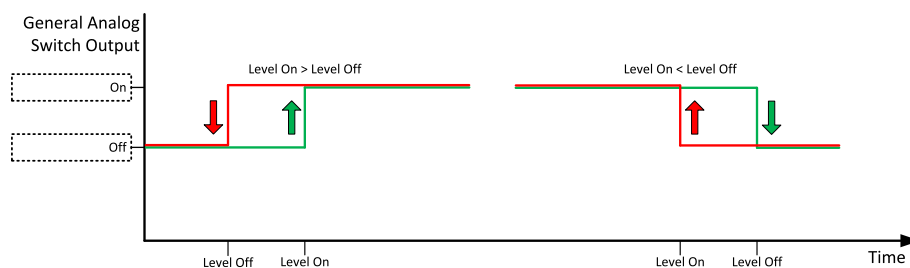


Image 9.157 General analog input 18 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch19

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1801  |                             |            |

### Description

This is an output from the General Analog Input 19 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 19 On** (page 421) and **Analog Switch 19 Off** (page 422). The value is measured from **AIN SWITCH 19** (PAGE 770) analog input.

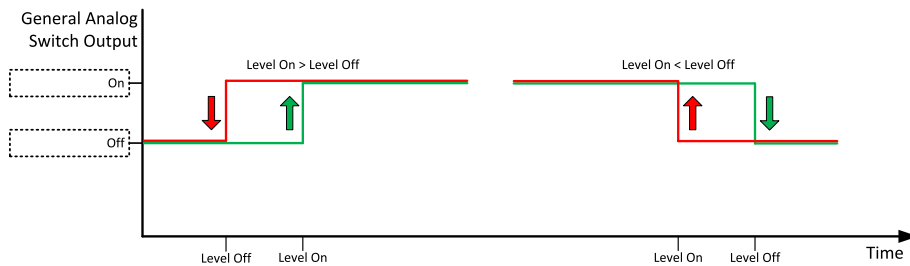


Image 9.158 General analog input 19 switch

### Logical binary outputs alphabetically (page 682)

## AIN Switch20

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1802  |                             |            |

### Description

This is an output from the General Analog Input 20 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 20 On** (page 424) and **Analog Switch 20 Off** (page 425). The value is measured from **AIN SWITCH 20** (PAGE 770) analog input.

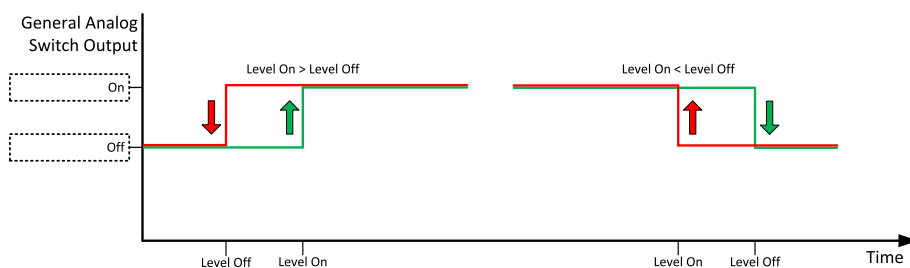


Image 9.159 General analog input 20 switch

### Logical binary outputs alphabetically (page 682)

## AVR Down

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 55    |                             |            |
| <b>Description</b>   |       |                             |            |
| This output together with the complementary output <b>AVR UP (PAGE 706)</b> is designed for voltage and power factor control at gen-sets, where the AVR does not support analog control. |       |                             |            |

⬅ back to Logical binary outputs alphabetically

## AVR Up

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 54    |                             |            |
| <b>Description</b>   |       |                             |            |
| This output together with the complementary output <b>AVR DOWN (PAGE 706)</b> is designed for voltage and power factor control at gen-sets, where the AVR does not support analog control. |       |                             |            |

⬅ back to Logical binary outputs alphabetically

## LBO: B

### BIN 1 Status

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1374  |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is closed, when Binary Input 1 is active and open when Binary Input 1 is inactive. When Binary Input 1 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist. |       |                             |            |

**Note:** When LBI 1 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.

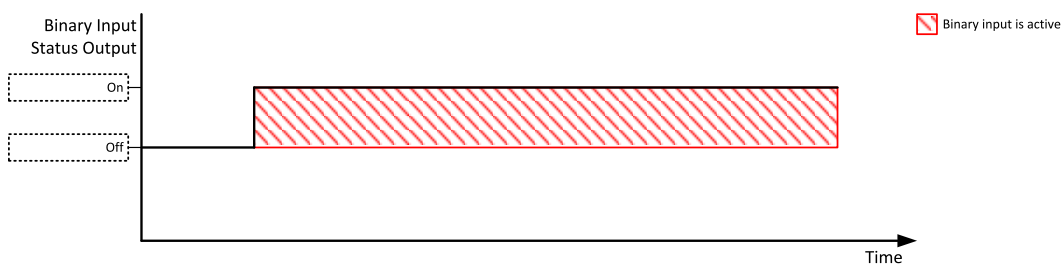
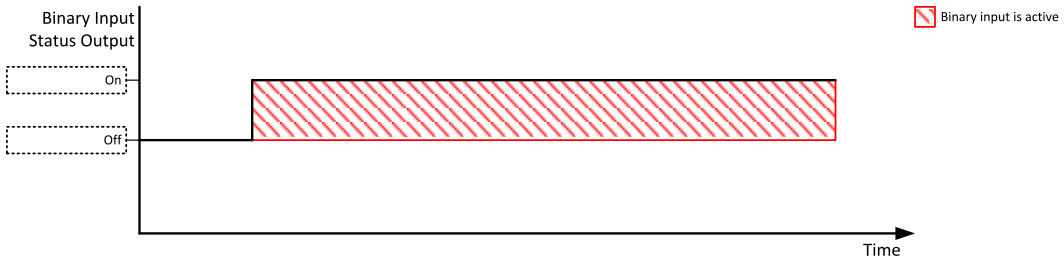


Image 9.160 Binary Input 1 Status

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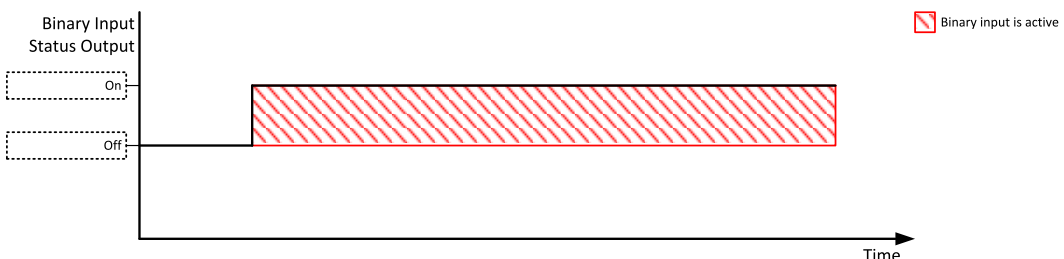


## BIN 2 Status

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1375  |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This output is closed, when Binary Input 2 is active and open when Binary Input 2 is inactive. When Binary Input 2 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 2 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p> |       |                             |            |
|    |       |                             |            |
| Image 9.161 Binary Input 2 Status  |       |                             |            |

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## BIN 3 Status

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1376  |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This output is closed, when Binary Input 3 is active and open when Binary Input 3 is inactive. When Binary Input 3 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 3 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p> |       |                             |            |
|    |       |                             |            |
| Image 9.162 Binary Input 3 Status  |       |                             |            |

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## BIN 4 Status

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1377  |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This output is closed, when Binary Input 4 is active and open when Binary Input 4 is inactive. When Binary Input 4 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 4 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p> |       |                             |            |
|  |       |                             |            |
| Image 9.163 Binary Input 4 Status  |       |                             |            |

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## BIN 5 Status

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1378  |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This output is closed, when Binary Input 5 is active and open when Binary Input 5 is inactive. When Binary Input 5 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 5 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p> |       |                             |            |
|  |       |                             |            |
| Image 9.164 Binary Input 5 Status  |       |                             |            |

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## BIN 6 Status

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1379  |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This output is closed, when Binary Input 6 is active and open when Binary Input 6 is inactive. When Binary Input 6 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 6 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p> |       |                             |            |
|  |       |                             |            |
| Image 9.165 Binary Input 6 Status  |       |                             |            |

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## BIN 7 Status

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1380  |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This output is closed, when Binary Input 7 is active and open when Binary Input 7 is inactive. When Binary Input 7 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.</p> <p><b>Note:</b> When LBI 7 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.</p> |       |                             |            |
|  |       |                             |            |
| Image 9.166 Binary Input 7 Status  |       |                             |            |

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## BIN 8 Status

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1381  |                             |            |

**Description**

This output is closed, when Binary Input 8 is active and open when Binary Input 8 is inactive. When Binary Input 8 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.

**Note:** When LBI 8 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.

Image 9.167 Binary Input 8 Status

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## LBO: C

### Cooling Pump

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 40    |                             |            |

**Description**

This output is dedicated for coolant pump control. It is closed in the moment the gen-set is started and remains closed until the gen-set is stopped and **After Cooling Time (page 282)** elapses or the cranking pause or the Emergency Stop occurs or the controller is switched to OFF mode.

Image 9.168 Cooling Pump

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## Cooling

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>                                   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>                                  | 74    |                             |            |
| <b>Description</b>                                  |       |                             |            |
| The output closes when gen-set is in Cooling state. |       |                             |            |

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## LBO: D

### Display Fail

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>                                 | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>                                |       |                             |            |
| <b>Description</b>                                |       |                             |            |
| This output indicates controller display failure. |       |                             |            |

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## LBO: E

### ECU Communic Error

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 348   |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when an ECU is configured, but the communication with the ECU is not established or has dropped out.  |       |                             |            |
| <p><b>Note:</b> When <i>ECU POWER RELAY (PAGE 712)</i> is not configured, output is evaluated all the time. If <i>ECU POWER RELAY (PAGE 712)</i> is configured, output is evaluated only when engine is not stop (<i>ECU POWER RELAY (PAGE 712)</i> is active).</p> |       |                             |            |

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### ECU Communic OK

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 347   |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when an ECU is configured, connected and the communication with the ECU is established.   |       |                             |            |
| <p><b>Note:</b> When <i>ECU POWER RELAY (PAGE 712)</i> is not configured, output is evaluated all the time. If <i>ECU POWER RELAY (PAGE 712)</i> is configured, output is evaluated only when engine is not stop (<i>ECU POWER RELAY (PAGE 712)</i> is active).</p> |       |                             |            |

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## ECU Power Relay

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 116   |                             |            |

### Description

This output is to be used for control of “keyswitch” input of an ECU. If the particular ECU does not have keyswitch or a similar input, it can be used for control of DC power for the ECU.

The output closes together with **PRESTART** (PAGE 732) and remains closed for the entire duration that the engine is running. It is opened at the moment that the engine comes to a stop (i.e. together with the **FUEL SOLENOID** (PAGE 715)).

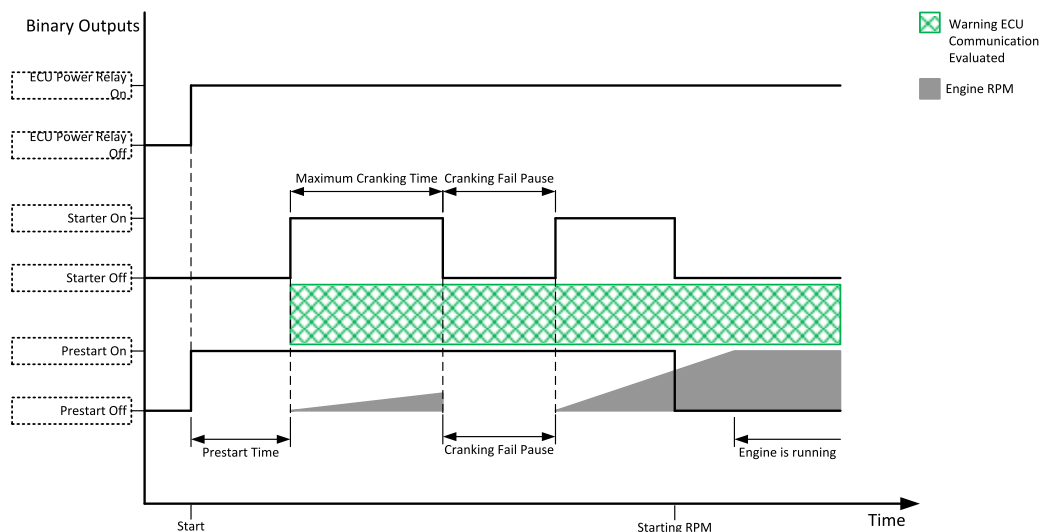


Image 9.169 ECU Power Relay

**IMPORTANT:** This LBO also affects evaluation of **Sd ECU Communication Fail** (page 822) or **Wrn ECU Communication Fail** (page 802) alarms. With configured LBO ECU Power Relay, these alarms are evaluated only when this LBO is active. Without configured LBO ECU Power Relay, these alarm are evaluated all the time.

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## ECU Red Lamp

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 350   |                             |            |

### Description

This output is active when the ECU sends an active “red lamp” flag, i.e. it has detected a critical malfunction and the engine should not be operated until a service check is performed. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all.

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## ECU Run Stop

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>                        | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>                       | 958   |                             |            |
| <b>Description</b>                       |       |                             |            |
| Signal for starting and stopping of ECU. |       |                             |            |

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## ECU Wait To Start

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 959   |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when the ECU Wait To Start lamp is received. |       |                             |            |

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## ECU Yellow Lamp

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 349   |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active when the ECU sends an active “yellow lamp” flag, i.e. it has detected a non-critical malfunction. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all. |       |                             |            |

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## Exercise Timer 1

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1250  |                             |            |
| <b>Description</b>  |       |                             |            |
| This is an output from the Exercise timer 1. This output makes it easy to make periodic tests of the gen-set and its activation depends on the setpoints in the <b>Subgroup: Timer 1 (page 427)</b> subgroup. This output is active when Timer 1 is active. |       |                             |            |
| <b>Note:</b> <i>In the event that both Timers are active at the same time, Subgroup: Timer 1 (page 427) has a higher priority than Subgroup: Timer 2 (page 434).</i>  |       |                             |            |

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## Exercise Timer 2

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1251  |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>This is an output from the Exercise timer 2. This output makes it easy to make periodic tests of the gen-set and its activation depends on the setpoints in the <b>Subgroup: Timer 2 (page 434)</b> subgroup. This output is active when Timer 2 is active.</p> <p><i>Note: In the event that both Timers are active at the same time, <b>Subgroup: Timer 1 (page 427)</b> has a higher priority than <b>Subgroup: Timer 2 (page 434)</b>.</i></p> |       |                             |            |

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## LBO: F

### FitRes

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 592   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This output provides 1s pulse when:</p> <ul style="list-style-type: none"> <li>▶ Fault Reset button is pressed on the controller front facia or</li> <li>▶ Fault Reset button is pressed on any of external local/remote terminals or</li> <li>▶ Fault Reset command is received via communication line or</li> <li>▶ the input FAULT RESET BUTTON is activated.</li> </ul> |       |                             |            |

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## Frequency Select

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1815  |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>The Frequency select output is opened when Nominal Frequency (Frequency Settings) is equal to 50Hz and closed when Nominal Frequency (Frequency Settings) is equal to 60Hz.</p> |       |                             |            |

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## Fuel Pump

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 1253  |                             |            |

### Description

Output closes when the value of Fuel Level lies under the value of **Fuel Pump On (page 299)** setpoint and opens when value of **Fuel Pump Off (page 300)** is reached.

This output also can be closed by binary input **FUEL PUMP ON/OFF (PAGE 667)**. In this case the binary output **FUEL PUMP ON (PAGE 299)** is closed until the binary input **FUEL PUMP ON/OFF (PAGE 667)** is active or until the value of **Fuel Pump Off (page 300)** is reached.

**Note:** Setpoints *Fuel Pump On (page 299)* and *Fuel Pump Off (page 300)* are invisible until configuration of this LBO.

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## Fuel Solenoid

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 22    |                             |            |

### Description

This output controls the fuel solenoid valve.

The output closes before binary output **STARTER (PAGE 737)**. The lead time is adjusted by setpoint **Fuel Solenoid Lead (page 276)**.

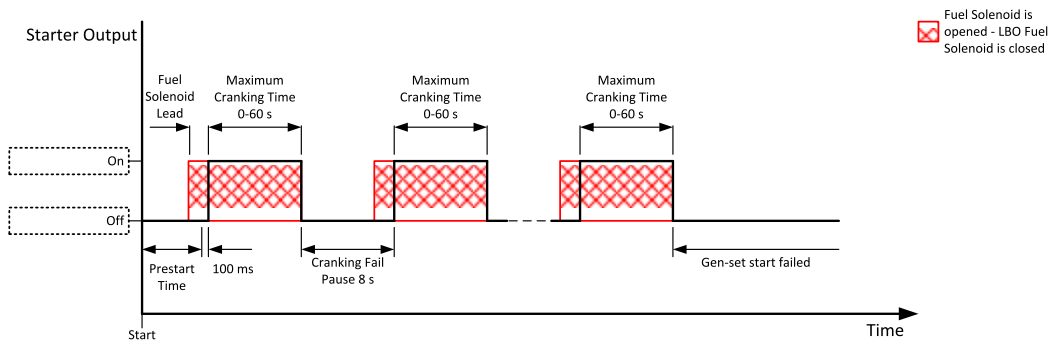


Image 9.170 Fuel Solenoid 1

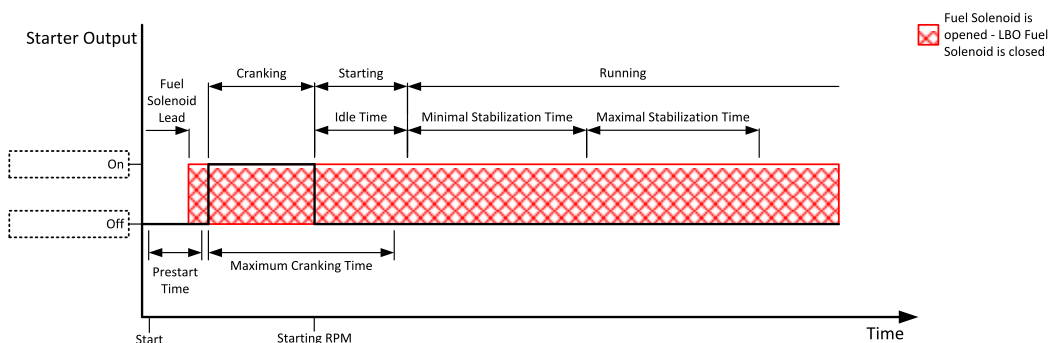


Image 9.171 Fuel Solenoid 2

The output opens when:

- ▶ Emergency Stop comes
- ▶ cooled gen-set is stopped
- ▶ in pause between repeated starts

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## LBO: G

### GCB Close/Open

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 41    |                             |            |

#### Description

The output controls the generator circuit breaker. Its state represents the breaker position requested by the controller. The breaker must react within 5 seconds to a close or open command, otherwise an alarm is issued.

**Note:** *InteliGen 500 controllers can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*

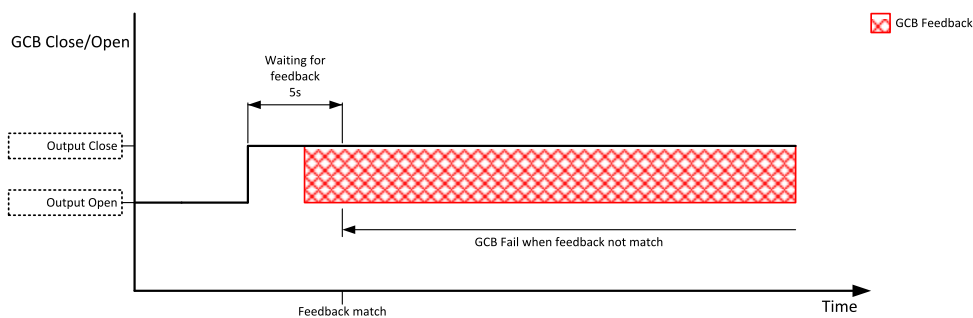


Image 9.172 GCB Close command

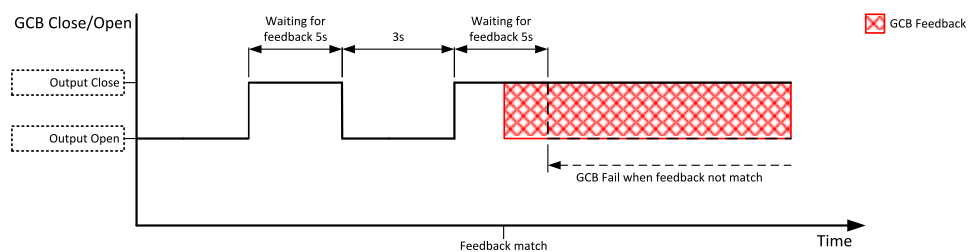
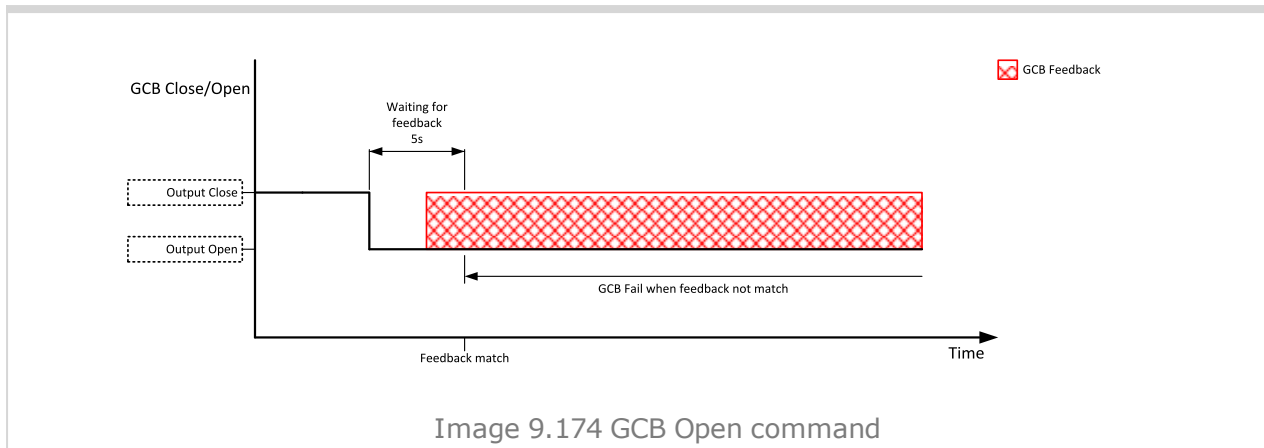


Image 9.173 Repeated GCB Close command



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### GCB OFF Coil

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 43    |                             |            |

**Description**

The output is intended for control of open coil of generator circuit breaker. The output gives a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 5 seconds.

Image 9.175 GCB OFF Coil command

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## GCB ON Coil

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 42    |                             |            |

### Description

The output is intended for control of close coil of generator circuit breaker. The output gives at least 5 second pulse in the moment the breaker has to be closed.

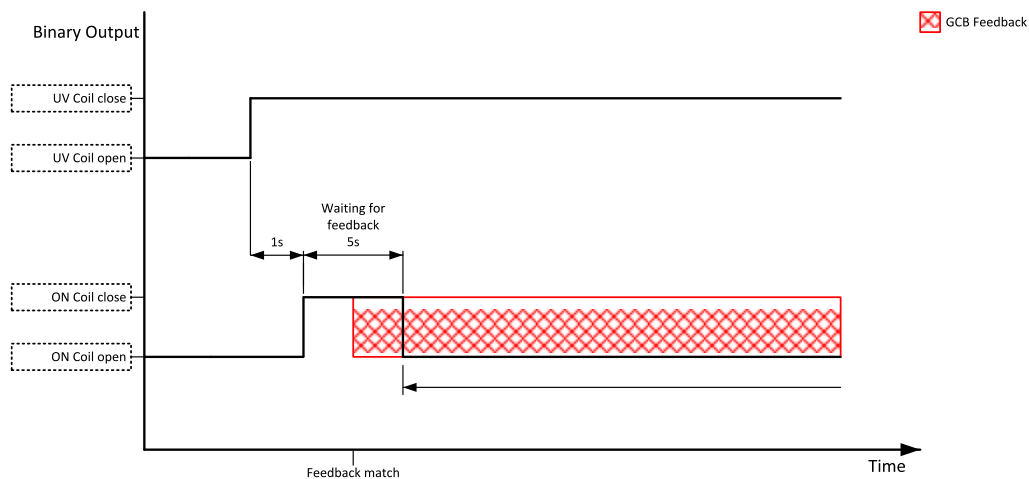


Image 9.176 GCB ON Coil close command

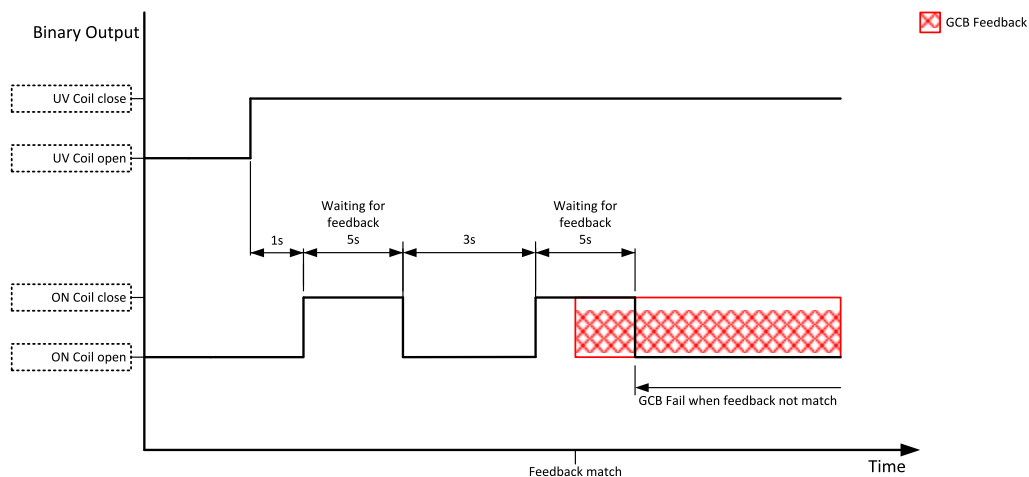


Image 9.177 Repeated GCB ON coil close command

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## GCB UV Coil

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 44    |                             |            |

### Description

The output is intended for control of undervoltage coil of generator circuit breaker. The output is active the

whole time when the generator is running. The output is deactivated for at least 5 seconds in the moment the breaker has to be switched off.

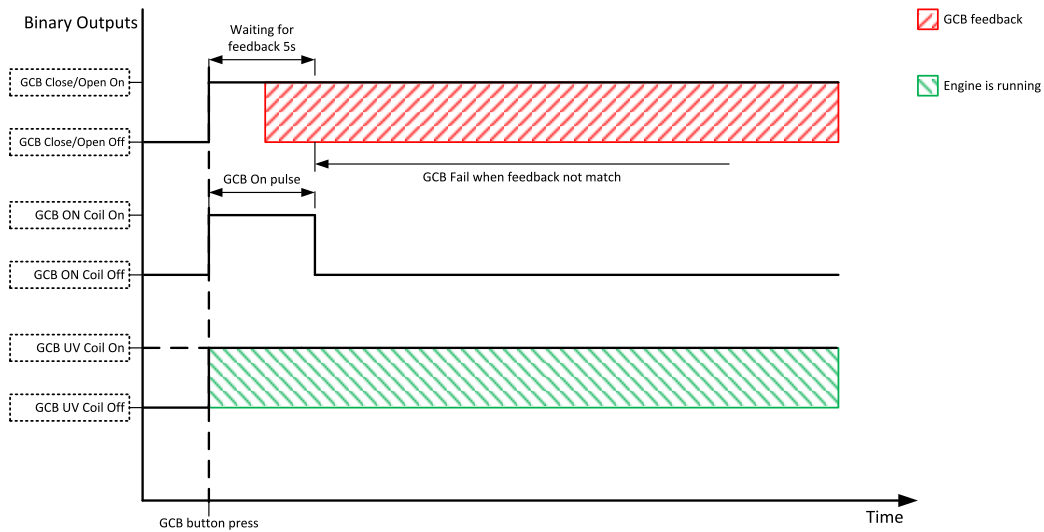


Image 9.178 GCB UV Coil close command

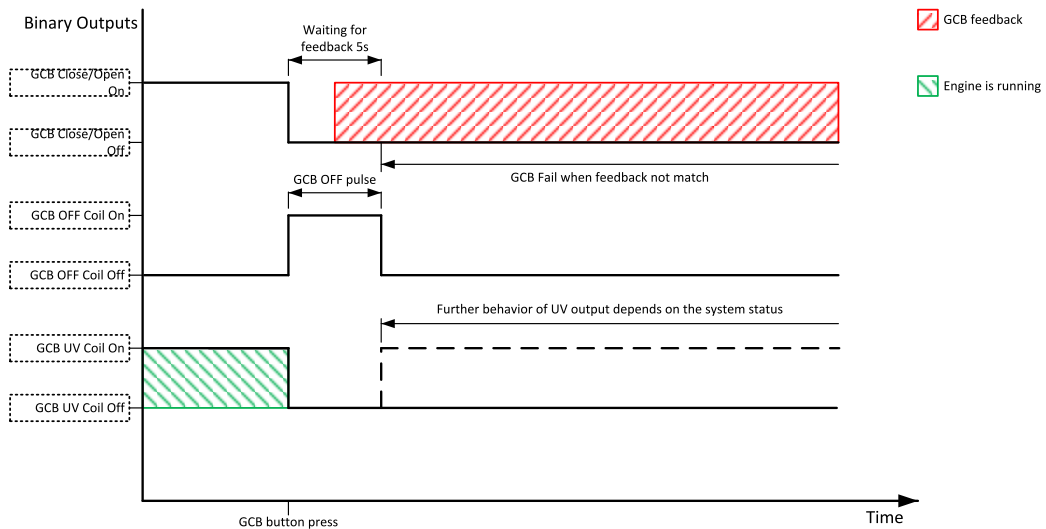


Image 9.179 GCB UV Coil open command

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## GeneratorBus Healthy

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 77    |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>This output is active when the generatorbus voltage, frequency and voltage unbalance is within limits. It is deactivated:</p> <ul style="list-style-type: none"> <li>▶ immediately when the voltage/frequency/voltage unbalance gets out of limits (when GCB is not closed)</li> <li>or</li> <li>▶ with an appropriate delay after the voltage/frequency/voltage unbalance has got out of limits (when GCB is closed)</li> </ul> |       |                             |            |

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## Glow Plugs

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1252  |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>This output is dedicated for diesel engine only. This output will close for exact time pre-set by setpoint <b>Glow Plugs Time</b> (page 275) before every starting attempt. The output opens in same time as the <b>STARTER</b> (PAGE 737) output closes (100 ms after <b>PRESTART</b> (PAGE 732) output opens).</p>   |       |                             |            |
| <p>The diagram illustrates the timing sequence for engine starting. It shows six binary outputs: Glow Plugs On, Glow Plugs Off, Starter On, Starter Off, Prestart On, and Prestart Off. A shaded area represents Engine RPM, which begins to rise after the Prestart signal is active. Key time intervals are marked: Prestart Time (from Prestart On to Prestart Off), a 100 ms delay after Prestart Off before Starter On, a 100 ms delay after Starter Off before Glow Plugs On, and Glow Plugs Time (the duration the Glow Plugs On signal is active). The engine starts running after the Glow Plugs turn off. A vertical line marks the 'Starting RPM' level.</p> |       |                             |            |
| Image 9.180 Glow Plugs  |       |                             |            |

When the Glow Plugs Time (page 275) is longer than Cranking Fail Pause (page 272) then the Glow Plugs Time (page 275) in Cranking Fail Pause (page 272) is long as Cranking Fail Pause (page 272).

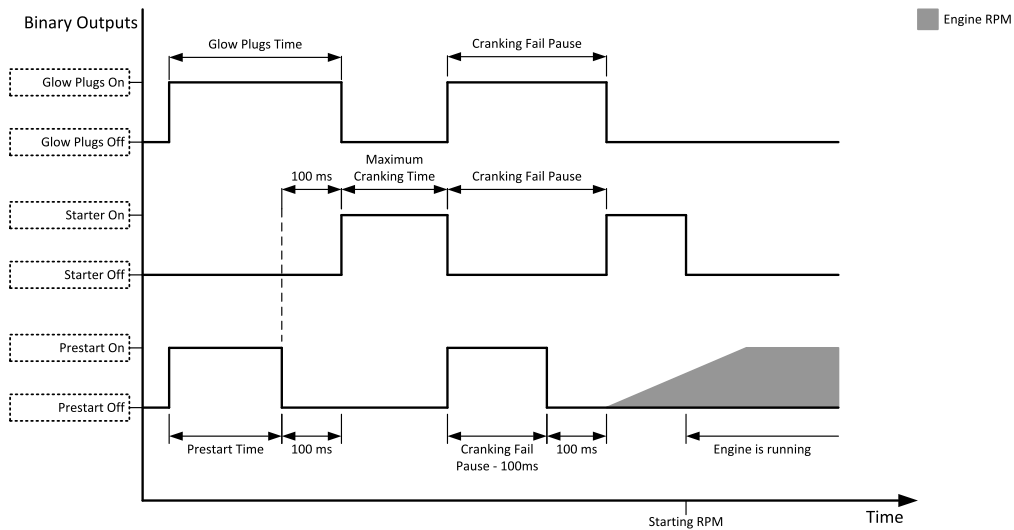


Image 9.181 Glow Plugs in Cranking Fail Pause 1

When the Glow Plugs Time (page 275) is shorter than Cranking Fail Pause (page 272) then the Glow Plugs Time (page 275) in Cranking Fail Pause (page 272) is long as normal Glow Plugs Time (page 275).

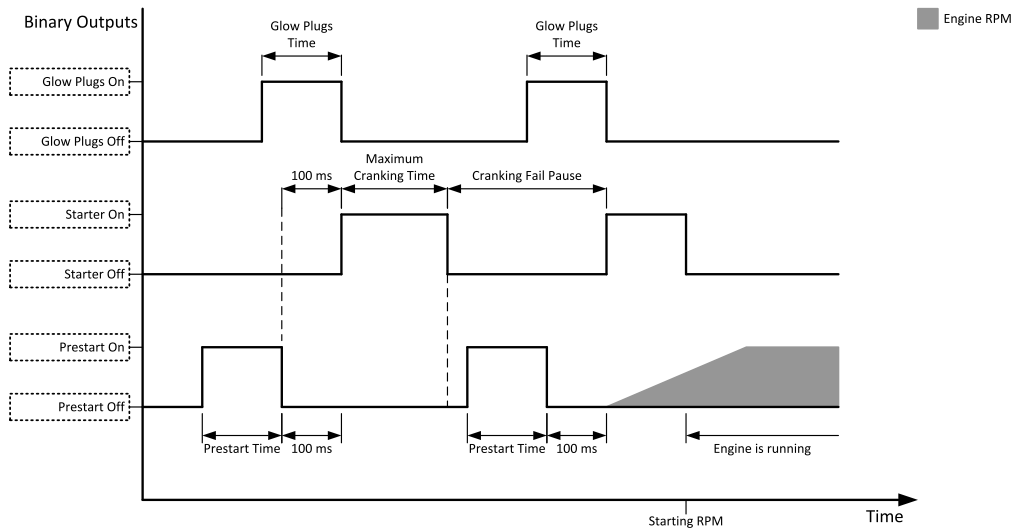


Image 9.182 Glow Plugs in Cranking Fail Pause 2

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## LBO: H

### Heartbeat

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 81    |                             |            |
| <b>Description</b>  |       |                             |            |
| This output toggles on/off in a period of 500 ms whenever the controller is switched on and functional. |       |                             |            |



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### HEST Lamp

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1373  |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is closed if ECU send signal HEST Lamp. If ECU stop send HEST LAMP signal binary input will be opened without no matter if alarms in alarmlist are confirmed or not. |       |                             |            |

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### Horn

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1     |                             |            |
| <b>Description</b>   |       |                             |            |
| The output designed to be used for acoustic indication of a newly appeared alarm. The output is activated each time a new alarm has appeared and remains active until one of the following events occurs:  |       |                             |            |
| <ul style="list-style-type: none"> <li>▶ Fault reset  is pressed</li> <li>▶ Horn reset  is pressed</li> <li>▶ Horn Timeout (page 251) has elapsed</li> </ul> |       |                             |            |

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## LBO: I

### Idle/Nominal

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 39    |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This output is used for switching between idle speed and nominal speed of the engine during the startup phase, if this feature (input) is available on the particular engine. In the case of some EFI engines, the idle/nominal switching is performed over the communication bus.</p> <p>The output Idle/Nominal closes after the timer <b>Idle Time (page 276)</b> elapses. The <b>Idle Time (page 276)</b> starts to countdown when <b>Starting RPM (page 273)</b> reached. The underspeed protection is not evaluated during fixed 5 seconds period after reaching <b>Starting RPM (page 273)</b>. A Start Fail protection occurs if the RPM drop below 2RPM during idle.</p> |       |                             |            |
|  |       |                             |            |
| Image 9.183 Idle/Nominal   |       |                             |            |
| <p><b>Note:</b> Connect binary output Idle/Nominal to speed governor to switch the speed:<br/> <i>opened = Idle</i><br/> <i>closed = Nominal</i><br/> <i>(for normally open contact type)</i></p>  |       |                             |            |

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### Ignition

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 37    |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This output is dedicated to controlling the ignition at a gas engine. The output is closed together with binary output <b>FUEL SOLENOID (PAGE 715)</b> in the moment when the timer <b>Sd Ventilation Time (page 280)</b> elapsed and the gen-set reaches at least 30 RPM during cranking. The timer <b>Sd Ventilation Time (page 280)</b> become active when the gen-set has been stopped for any Sd protection or the controller has been turned on only before first cranking attempt. The output is opened 500ms after all Additional running engine indication <b>Additional running engine indications (page 132)</b> will be inactive. The output is opened when the gen-set has to be stopped or in pause during repeated starts.</p> |       |                             |            |

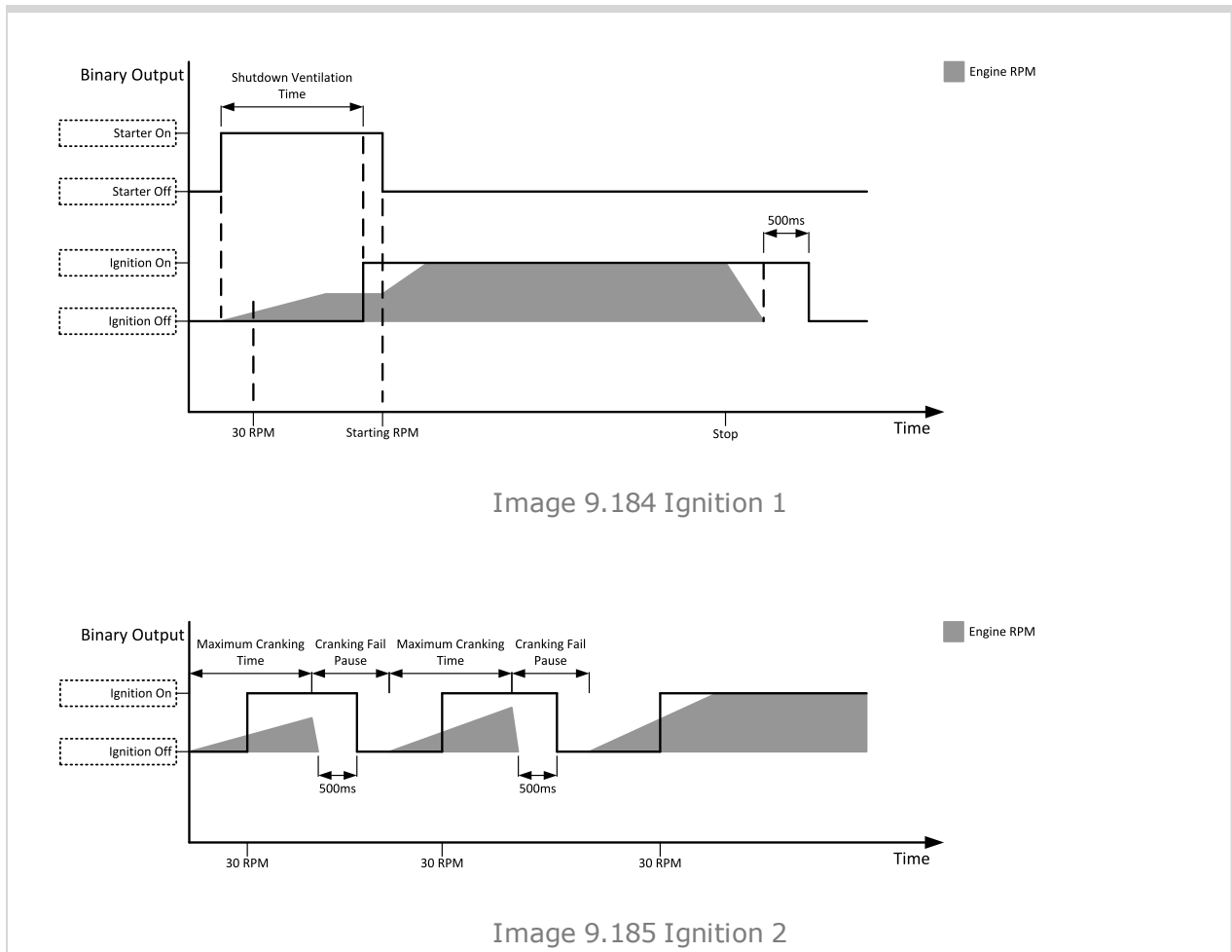


Image 9.184 Ignition 1

Image 9.185 Ignition 2

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### Ignition On

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1257  |                             |            |
| <b>Description</b>  |       |                             |            |
| This input is on since start button is pressed till the unit is completely stopped (or the engine doesn't start or Sd or E-Stop becomes active) |       |                             |            |
| <b>Note:</b> This function is the same as <i>ECU POWER RELAY (PAGE 712)</i> . Ignition ON stays there from historical reasons.                  |       |                             |            |

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## LBO: L

### Load Shedding Stage 1

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 51    |                             |            |
| <b>Description</b>   |       |                             |            |
| Particular instances of the load shedding functionality  |       |                             |            |
| The load shedding outputs are activated (load is being shedd) in the order 1, 2, 3.                        |       |                             |            |
| The load shedding outputs are deactivated (load is being reconnected) in the order 3, 2, 1.                |       |                             |            |
| The load disconnected by the LBO Nr. 1 is the less essential load of these three possible loads instances. |       |                             |            |

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### Load Shedding Stage 2

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 52    |                             |            |
| <b>Description</b>   |       |                             |            |
| Particular instances of the load shedding functionality  |       |                             |            |
| The load shedding outputs are activated (load is being shedd) in the order 1, 2, 3.                        |       |                             |            |
| The load shedding outputs are deactivated (load is being reconnected) in the order 3, 2, 1.                |       |                             |            |
| The load disconnected by the LBO Nr. 1 is the less essential load of these three possible loads instances. |       |                             |            |

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### Load Shedding Stage 3

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 53    |                             |            |
| <b>Description</b>   |       |                             |            |
| Particular instances of the load shedding functionality  |       |                             |            |
| The load shedding outputs are activated (load is being shedd) in the order 1, 2, 3.                        |       |                             |            |
| The load shedding outputs are deactivated (load is being reconnected) in the order 3, 2, 1.                |       |                             |            |
| The load disconnected by the LBO Nr. 1 is the less essential load of these three possible loads instances. |       |                             |            |

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## LBO: M

### Mains Healthy

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 78    |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active while mains failure is not detected and mains voltage and frequency is within limits. |       |                             |            |

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## Manual Ready

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPTM |
| <b>Comm object</b>  | 1258  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when controller is in MAN mode and the engine is stopped and it is possible to start it i.e. no red alarm is activated or <b>SD OVERRIDE (PAGE 680)</b> is active (Output <b>READY (PAGE 734)</b> is active). |       |                             |            |

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## MCB Close/Open

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPTM |
| <b>Comm object</b> | 45    |                             |            |

### Description

The output controls the mains circuit breaker. Its state represents the breaker position requested by the controller. The breaker must react within 5 seconds to a close or open command, otherwise an alarm is issued.

**Note:** *InteliGen 500 controllers can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*

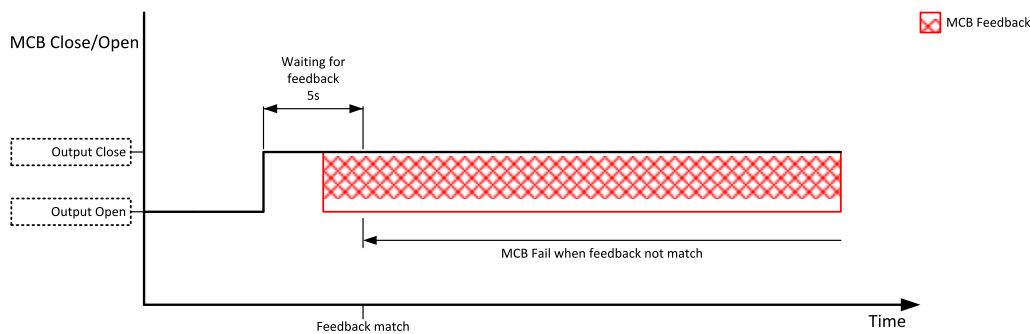


Image 9.186 MCB Close command

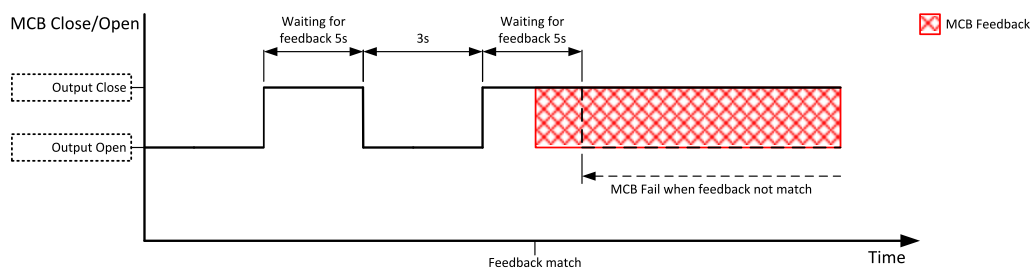
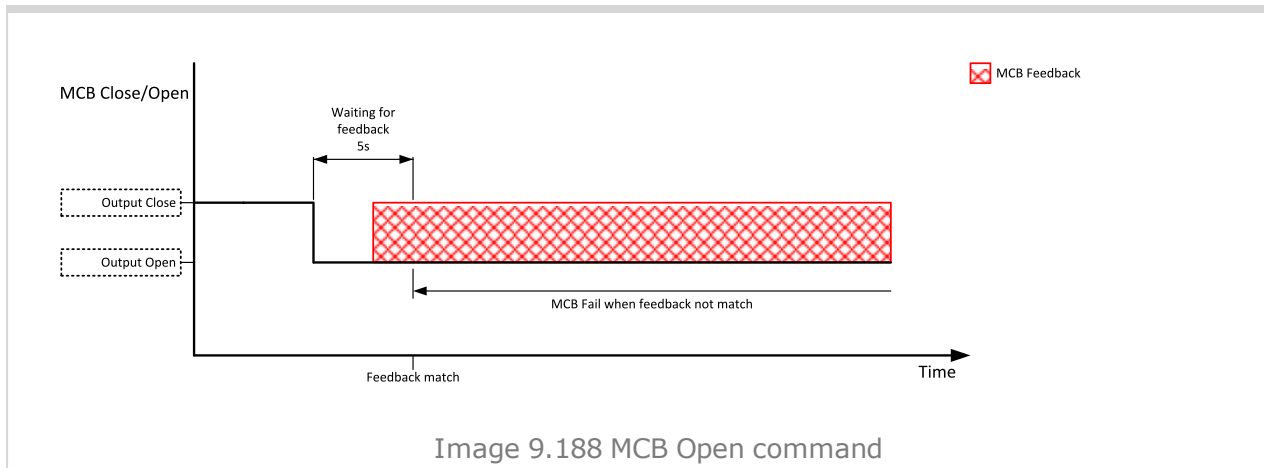


Image 9.187 Repeated MCB Close command



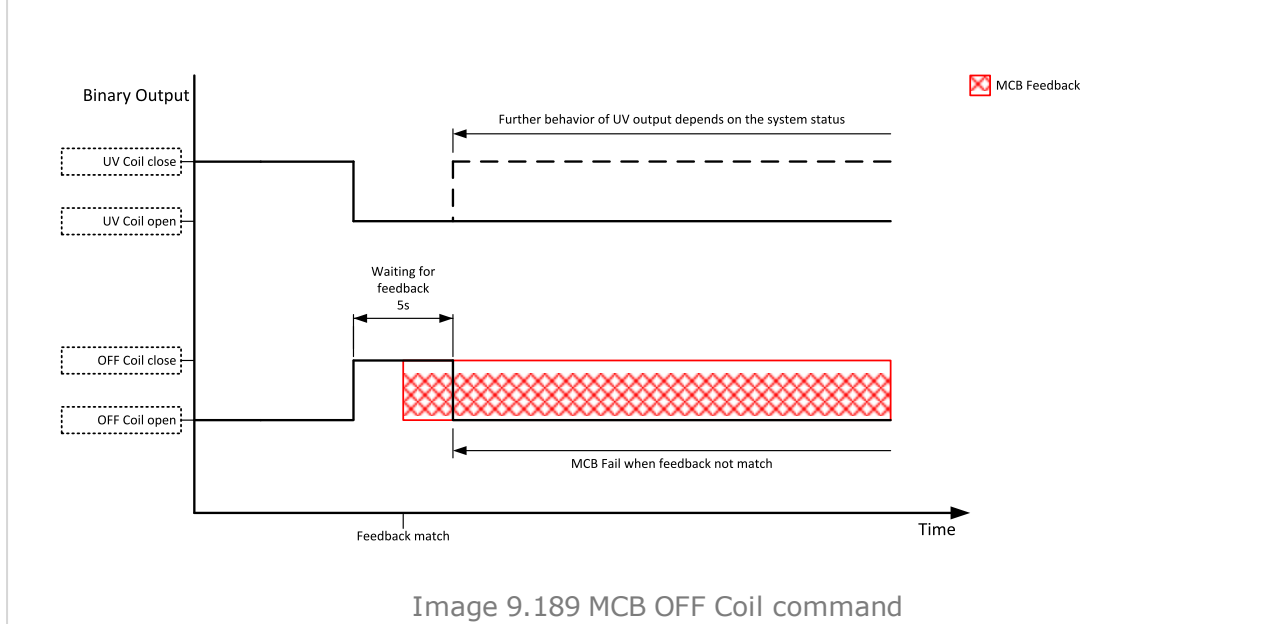
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**MCB OFF Coil**

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 47    |                             |            |

**Description**

The output is intended for control of open coil of mains circuit breaker. The output gives a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 5 seconds.



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## MCB ON Coil

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 46    |                             |            |

### Description

The output is intended for control of close coil of mains circuit breaker. The output gives at least 5 second pulse in the moment the breaker has to be closed.

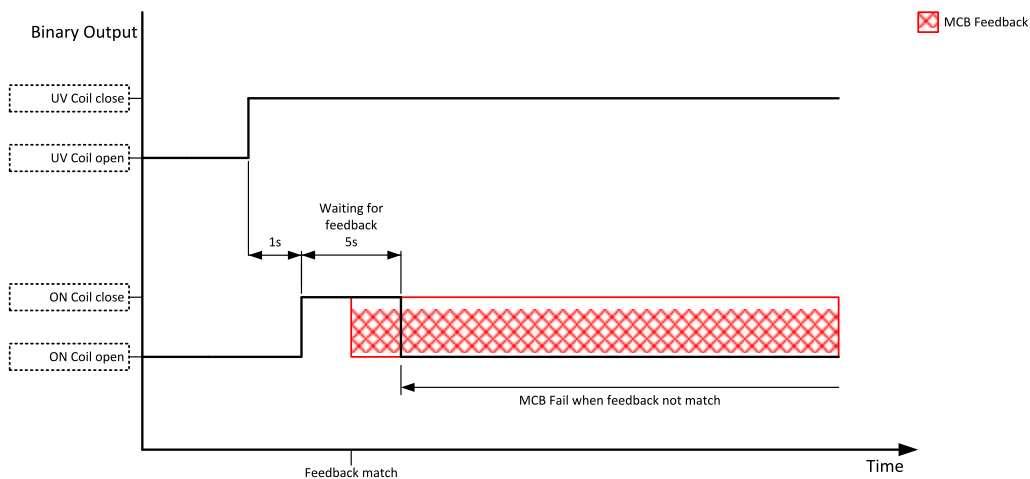


Image 9.190 MCB ON Coil close command

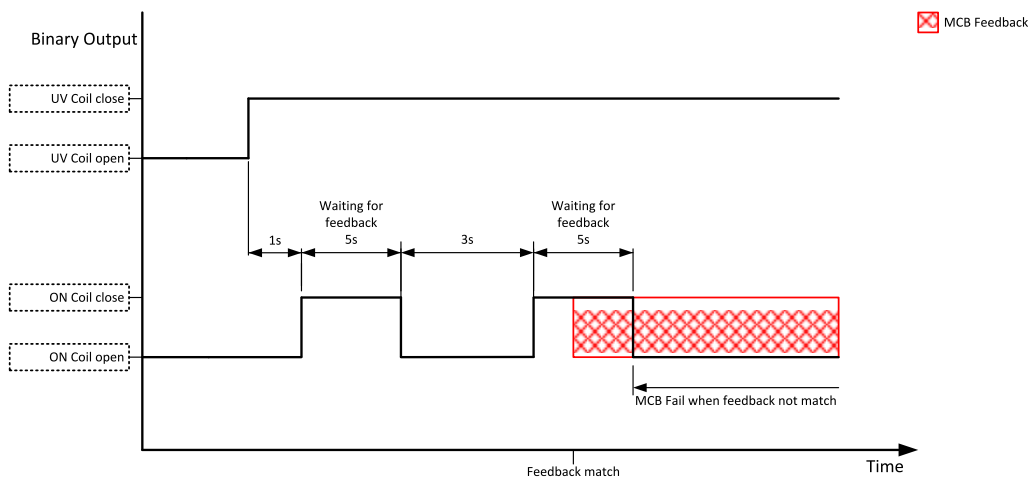


Image 9.191 Repeated MCB ON coil close command

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## MCB UV Coil

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 48    |                             |            |

### Description

The output is intended for control of undervoltage coil of mains circuit breaker. The output is active the whole time when the controller is switched on. The output is deactivated for at least 5 seconds in the moment the breaker has to be switched off.

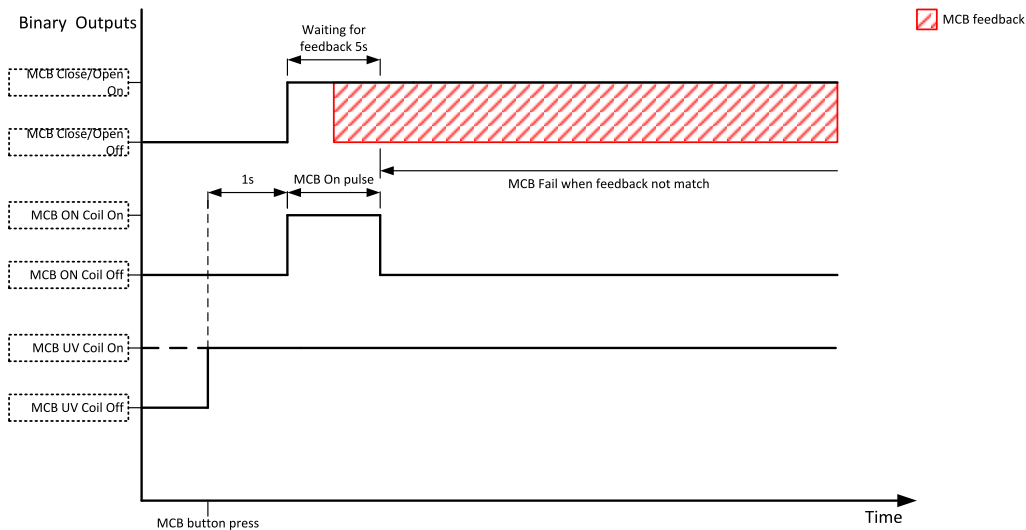


Image 9.192 MCB UV Coil close command

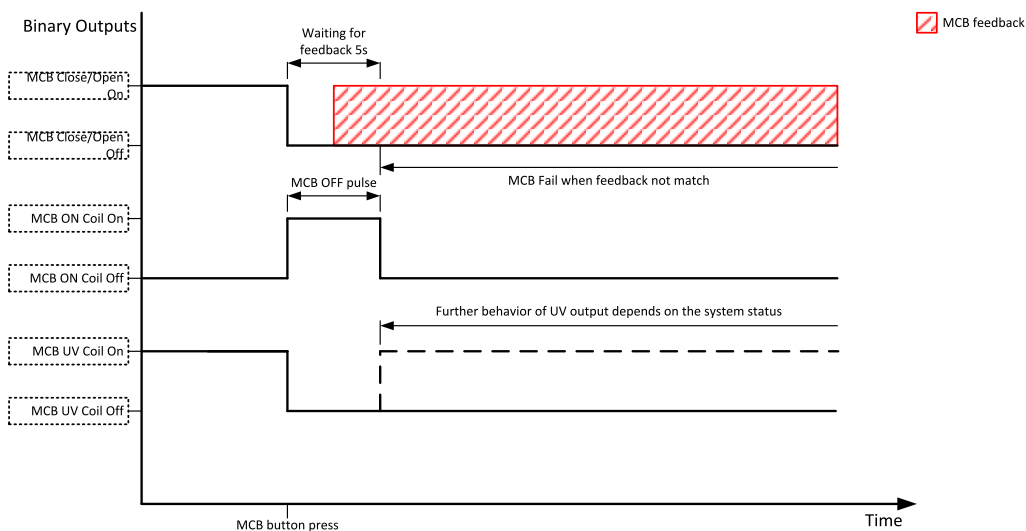


Image 9.193 MCB UV Coil open command

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### Mode AUTO

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 19    |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active whenever the controller is in AUTO mode. |       |                             |            |

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### Mode MAN

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 18    |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active whenever the controller is in MAN mode. |       |                             |            |

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### Mode OFF

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 17    |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active whenever the controller is in OFF mode. |       |                             |            |

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### Mode TEST

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 20    |                             |            |
| <b>Description</b>   |       |                             |            |
| This output is active whenever the controller is in TEST mode. |       |                             |            |

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## LBO: N

### NCB Close/Open

|   |       |                             |      |
|---|-------|-----------------------------|------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT |
| <b>Comm object</b>  | 50    |                             |      |
| <b>Description</b>  |       |                             |      |
| Neutral circuit breaker Close/Open output controls the generator neutral circuit breaker. It is intended for contactors – provides a continual active signal if NCB should be closed. |       |                             |      |

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### Not In AUTO

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 1248  |                             |            |
| <b>Description</b>  |       |                             |            |
| This output is active when controller isn't in AUTO mode. |       |                             |            |

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### Not Used

|                         |       |                             |            |
|-------------------------|-------|-----------------------------|------------|
| <b>Related FW</b>       | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>      | 286   |                             |            |
| <b>Description</b>      |       |                             |            |
| Output has no function. |       |                             |            |

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### LBO: P

#### Peak Shaving Active

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 2118  |                             |            |
| <b>Description</b>  |       |                             |            |
| Active anytime, when the peak shaving start condition is fulfilled. |       |                             |            |

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## Power Switch

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 290   |                             |            |

**Description**

This is an output from the Power switch function. The behavior of the switch depends on the adjustment of the setpoints **Power Switch On** (page 282) and **Power Switch Off** (page 283). When the dummy load function is used the switching ON of Power switch is block when the engine isn't running and is allowed 30 s after start of the engine.

Image 9.194 Power Switch

**Note:** Setpoints **Power Switch On** (page 282) and **Power Switch Off** (page 283) are invisible until configuration of this LBO.

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## Prestart

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 36    |                             |            |

**Description**

This output can be used for control of any device, which has to be activated just before start. The output is closed for time period of **Prestart Time** (page 273). The output opens 100 ms before the **STARTER** (PAGE 737) output closes.

Image 9.195 Engine start

When the **Prestart Time** (page 273) is longer than **Cranking Fail Pause** (page 272) then the **Prestart Time** (page 273) in **Cranking Fail Pause** (page 272) is long as **Cranking Fail Pause** (page 272) minus 100ms.

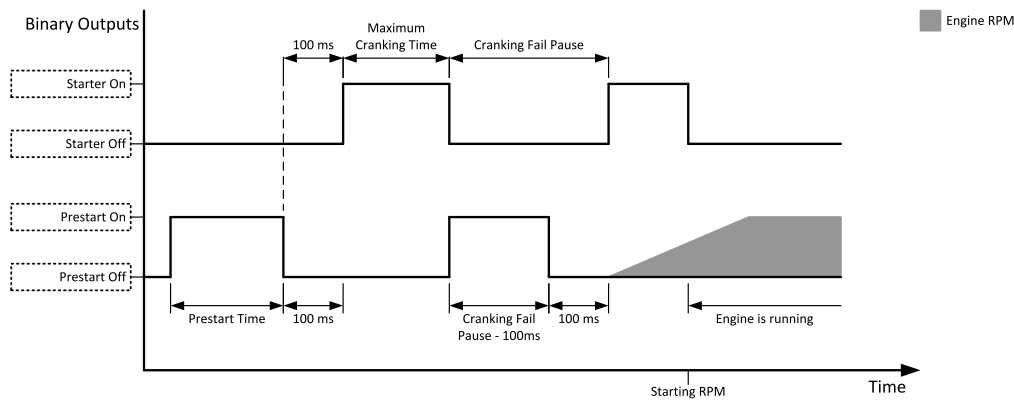


Image 9.196 Prestart in Cranking Fail Pause 1

When the **Prestart Time** (page 273) is shorter than **Cranking Fail Pause** (page 272) then the **Prestart Time** (page 273) in **Cranking Fail Pause** (page 272) is long as normal **Prestart Time** (page 273).

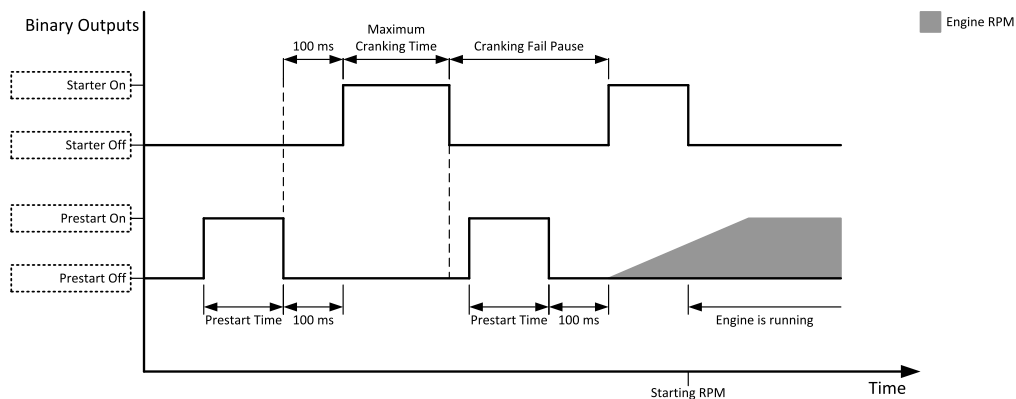


Image 9.197 Prestart in Cranking Fail Pause 2

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## LBO: R

### Ready To AMF

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 324   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>The output is closed if the gen-set is ready to start automatically and take the load if the mains fails, i.e.:</p> <ul style="list-style-type: none"> <li>▶ the controller is in AMF operating mode</li> <li>▶ the controller is in AUTO controller mode and</li> <li>▶ no red alarm is present in the alarmlist</li> <li>▶ when the red alarm is confirmed during Stop Valve and other requirements are fulfilled then the LBO is still inactive until the state ready</li> </ul> |       |                             |            |

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### Ready To Load

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 58    |                             |            |
| <b>Description</b>  |       |                             |            |
| <p>The output is closed whenever the GCB is closed or can be closed i.e. the stabilization phase is finished, the gen-set is running and the <b>Minimal Stabilization Time (page 278)</b> timer has elapsed. and the gen-set voltage and frequency are within limits.</p> <p>If GCB is open then gen-set voltage and frequency must be in limits.</p> <p>If GCB is close then gen-set voltage and frequency can be out of limits, but protection delay can't be count down. If gen-set voltage and frequency will return into limits until delay is count down then output is still closed.</p> |       |                             |            |

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### Ready

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 62    |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>The binary output is closed, when the engine is stopped and it is possible to start it i.e. no red alarm is activated or <b>SD OVERRIDE (PAGE 680)</b> is active.</p> <p>The binary output is switch on when the Ready state occurs.</p> <p>The binary output is switch off when the Prestart or the Not Ready or the Stop state occurs i.e. always except Ready state.</p> |       |                             |            |

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## RegenerationNeededRegen Needed

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>                                       | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>                                      | 1372  |                             |            |
| <b>Description</b>                                      |       |                             |            |
| This output is closed when DPF lamp from ECU is active. |       |                             |            |

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## Running

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 67    |                             |            |
| <b>Description</b>   |       |                             |            |
| The output is designed to be used as an indication that the gen-set is running. The output closes if <b>FUEL SOLENOID (PAGE 715)</b> is closed and <b>STARTER (PAGE 737)</b> and <b>PRESTART (PAGE 732)</b> are open. The out remains close until engine stop and cooling period elapses.                                  |       |                             |            |
| <p>The diagram illustrates the timing sequence for the Running output. It shows the state of the Starter Output, Fuel Solenoid, and Running status over time. Key events include Starter On, Cranking Time (1s), Prestart Time, Fuel Solenoid On, and Running On. A green shaded area indicates the engine is running.</p> |       |                             |            |
| Image 9.198 Running  |       |                             |            |

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## LBO: S

### Sd Override

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 962   |                             |            |
| <b>Description</b>   |       |                             |            |
| The output is closed if <b>SD OVERRIDE (PAGE 680)</b> input is active and open if <b>SD OVERRIDE (PAGE 680)</b> input is inactive. This output is usually used to send information about <b>SD OVERRIDE (PAGE 680)</b> input into ECU. |       |                             |            |

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## Speed Down

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 57    |                             |            |
| <b>Description</b>   |       |                             |            |
| This output together with the complementary output <b>SPEED UP (PAGE 736)</b> are designed for speed and power control at gen-sets where the speed governor does not support analogue control. |       |                             |            |

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## Speed Up

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 56    |                             |            |
| <b>Description</b>   |       |                             |            |
| This output together with the complementary output <b>SPEED DOWN (PAGE 736)</b> are designed for speed and power control at gen-sets where the speed governor does not support analogue control. |       |                             |            |

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## Starter

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 24    |                             |            |

### Description

This output is dedicated for starter motor control. The number of cranking attempts is adjusted by setpoint **Cranking Attempts** (page 271) in Engine Settings group. Cranking fail pause is adjusted by setpoint **Cranking Fail Pause** (page 272).

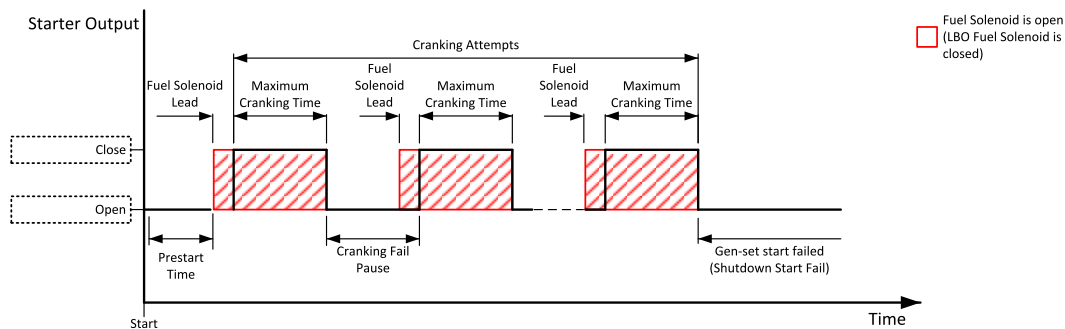


Image 9.199 Starter

The starter output opens when:

- ▶ the “firing” speed is reached
- ▶ maximum time of cranking is exceeded
- ▶ request to stop comes up
- ▶ D+ value is higher than 80%
- ▶ Oil pressure value is higher than **Starting Oil Pressure** (page 274)
- ▶ Generator voltage > 25% of **Nominal Voltage Ph-N** (page 246) or **Nominal Voltage Ph-Ph** (page 246) (any phase)

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## Still Log 0

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 26    |                             |            |

### Description

Logical binary output which is still in logical 0.

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## Still Log 1

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 27    |                             |            |

### Description

Logical binary output which is still in logical 1.

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## Stop Pulse

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 25    |                             |            |

**Description**

Output is active for 1 second after **STOP SOLENOID (PAGE 738)** output activation. This signal is sent to ECU in case of engine stop request.

Image 9.200 Stop Pulse

🔍 back to Logical binary outputs alphabetically

## Stop Solenoid

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 23    |                             |            |

**Description**

This output is dedicated to control the stop solenoid (valve). The output closes when an engine stop command is received and is deactivated 12 s after last running engine indication went off, i.e. engine is stopped.

Image 9.201 Stop Solenoid 1



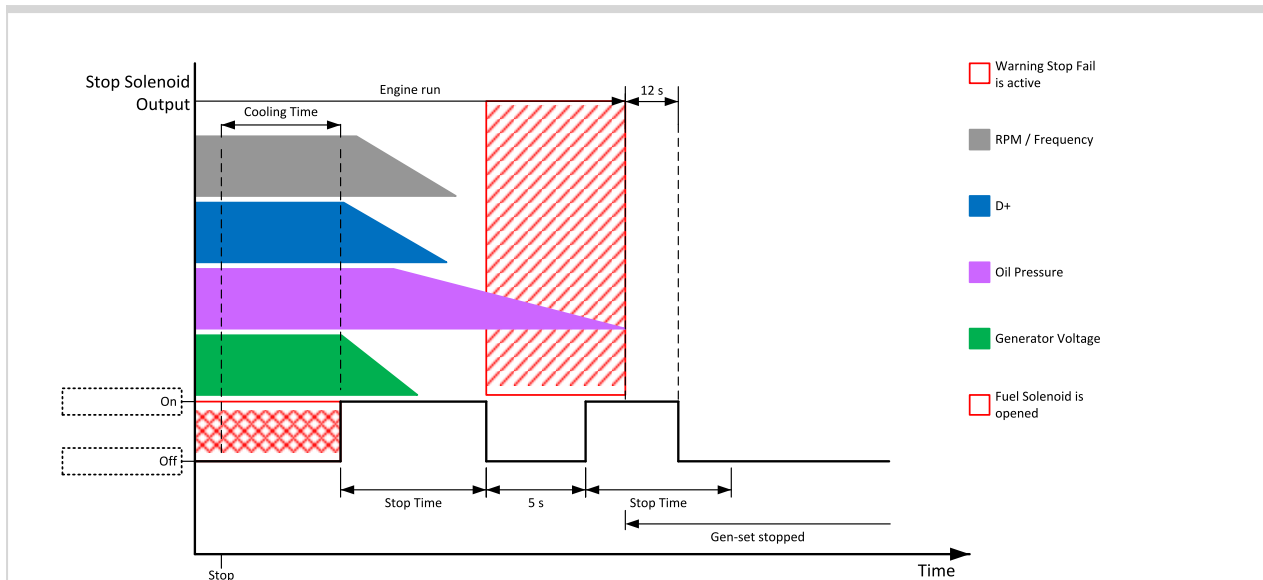


Image 9.202 Stop Solenoid 2

**Note:** If Additional running engine indications (page 132) went off during 5 s pause than Stop Solenoid is not activated again otherwise stop solenoid is activated again.

🔍 Logical binary outputs alphabetically (page 682)

### Supplying Load

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 1249  |                             |            |
| <b>Description</b>   |       |                             |            |
| The binary output depends on measured generator active power. Power is compared with generator nominal active power with use of hysteresis and with delay of switch 1 s. |       |                             |            |
| When the measured active power is equal or bigger than 5 % of <b>Nominal Power (page 242)</b> for 1 s than the binary output is closed.                                  |       |                             |            |
| When the measured active power is equal or lower than 3 % of <b>Nominal Power (page 242)</b> for 1 s than the binary output is opened.                                   |       |                             |            |

🔍 back to Logical binary outputs alphabetically

### System Reserve OK

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 87    |                             |            |
| <b>Description</b>   |       |                             |            |
| This LBO is active when System Reserve is higher than the actual reserve for start of next gen-sets. |       |                             |            |

🔍 back to Logical binary outputs alphabetically

## LBO: T

### Temperature Switch

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 563   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>This is an output from the Temperature switch function. The behavior of the switch depends on the adjustment of the setpoints <b>Temperature Switch On</b> (page 294) and <b>Temperature Switch Off</b> (page 295).</p> |       |                             |            |
|  |       |                             |            |
| Image 9.203 Temperature Switch   |       |                             |            |
| <p><b>Note:</b> Setpoints <i>Temperature Switch On</i> (page 294) and <i>Temperature Switch Off</i> (page 295) are invisible until configuration of this LBO.</p>  |       |                             |            |

🔍 back to Logical binary outputs alphabetically

## 9.1.5 Logical analog inputs

### What Logical analog inputs are:

Logical analog inputs are inputs for analog values.

### Alphabetical groups of Logical analog inputs

|              |     |
|--------------|-----|
| LAI: A ..... | 743 |
| LAI: C ..... | 771 |
| LAI: D ..... | 772 |
| LAI: F ..... | 772 |
| LAI: M ..... | 773 |
| LAI: N ..... | 773 |
| LAI: O ..... | 774 |

For full list of Logical analog inputs go to the chapter **Logical analog inputs alphabetically (page 742)**.

## Logical analog inputs alphabetically

|                     |     |                          |     |
|---------------------|-----|--------------------------|-----|
| AIN Prot01 .....    | 744 | AIN Switch 18 .....      | 769 |
| AIN Prot02 .....    | 745 | AIN Switch 19 .....      | 770 |
| AIN Prot03 .....    | 746 | AIN Switch 20 .....      | 770 |
| AIN Prot04 .....    | 747 | Coolant Temp .....       | 771 |
| AIN Prot05 .....    | 748 | Display Brightness ..... | 772 |
| AIN Prot06 .....    | 749 | Fuel Level .....         | 772 |
| AIN Prot07 .....    | 750 | Mains Import             |     |
| AIN Prot08 .....    | 751 | Measurement .....        | 773 |
| AIN Prot09 .....    | 752 | Not Used .....           | 773 |
| AIN Prot10 .....    | 753 | Oil Pressure .....       | 774 |
| AIN Prot11 .....    | 754 | Oil Temp .....           | 775 |
| AIN Prot12 .....    | 755 |                          |     |
| AIN Prot13 .....    | 756 |                          |     |
| AIN Prot14 .....    | 757 |                          |     |
| AIN Prot15 .....    | 758 |                          |     |
| AIN Prot16 .....    | 759 |                          |     |
| AIN Prot17 .....    | 760 |                          |     |
| AIN Prot18 .....    | 761 |                          |     |
| AIN Prot19 .....    | 762 |                          |     |
| AIN Prot20 .....    | 763 |                          |     |
| AIN Switch 01 ..... | 764 |                          |     |
| AIN Switch 02 ..... | 764 |                          |     |
| AIN Switch 03 ..... | 764 |                          |     |
| AIN Switch 04 ..... | 765 |                          |     |
| AIN Switch 05 ..... | 765 |                          |     |
| AIN Switch 06 ..... | 765 |                          |     |
| AIN Switch 07 ..... | 766 |                          |     |
| AIN Switch 08 ..... | 766 |                          |     |
| AIN Switch 09 ..... | 766 |                          |     |
| AIN Switch 10 ..... | 767 |                          |     |
| AIN Switch 11 ..... | 767 |                          |     |
| AIN Switch 12 ..... | 767 |                          |     |
| AIN Switch 13 ..... | 768 |                          |     |
| AIN Switch 14 ..... | 768 |                          |     |
| AIN Switch 15 ..... | 768 |                          |     |
| AIN Switch 16 ..... | 769 |                          |     |
| AIN Switch 17 ..... | 769 |                          |     |

LAI: A

## AIN Prot01

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9999  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 1 Wrn (page 366)** and **Analog Protection 1 Sd (page 366)**. Delay is adjusted by setpoint **Analog Protection 1 Delay (page 367)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

 [back to Logical analog inputs alphabetically](#)

## AIN Prot02

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9998  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 2 Wrn (page 368)** and **Analog Protection 2 Sd (page 369)**. Delay is adjusted by setpoint **Analog Protection 2 Delay (page 369)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

 [back to Logical analog inputs alphabetically](#)

## AIN Prot03

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9997  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 3 Wrn (page 371)** and **Analog Protection 3 Sd (page 372)**. Delay is adjusted by setpoint **Analog Protection 3 Delay (page 372)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

 [back to Logical analog inputs alphabetically](#)



## AIN Prot04

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9996  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 4 Wrn (page 374)** and **Analog Protection 4 Sd (page 375)**. Delay is adjusted by setpoint **Analog Protection 4 Delay (page 375)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

 [back to Logical analog inputs alphabetically](#)

## AIN Prot05

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9995  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 5 Wrn (page 377)** and **Analog Protection 5 Sd (page 378)**. Delay is adjusted by setpoint **Analog Protection 5 Delay (page 378)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

 [back to Logical analog inputs alphabetically](#)

## AIN Prot06

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9994  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 6 Wrn (page 380)** and **Analog Protection 6 Sd (page 381)**. Delay is adjusted by setpoint **Analog Protection 6 Delay (page 381)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

 [back to Logical analog inputs alphabetically](#)

## AIN Prot07

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9993  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 7 Wrn (page 383)** and **Analog Protection 7 Sd (page 384)**. Delay is adjusted by setpoint **Analog Protection 7 Delay (page 384)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

 [back to Logical analog inputs alphabetically](#)

## AIN Prot08

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9992  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 8 Wrn (page 386)** and **Analog Protection 8 Sd (page 387)**. Delay is adjusted by setpoint **Analog Protection 8 Delay (page 387)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

 [back to Logical analog inputs alphabetically](#)

## AIN Prot09

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9991  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 9 Wrn (page 389)** and **Analog Protection 9 Sd (page 390)**. Delay is adjusted by setpoint **Analog Protection 9 Delay (page 390)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot10

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9990  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 10 Wrn (page 392)** and **Analog Protection 10 Sd (page 393)**. Delay is adjusted by setpoint **Analog Protection 10 Delay (page 393)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot11

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9989  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 11 Wrn (page 395)** and **Analog Protection 11 Sd (page 396)**. Delay is adjusted by setpoint **Analog Protection 11 Delay (page 396)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot12

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9988  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 12 Wrn (page 398)** and **Analog Protection 12 Sd (page 399)**. Delay is adjusted by setpoint **Analog Protection 12 Delay (page 399)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot13

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9987  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 13 Wrn (page 401)** and **Analog Protection 13 Sd (page 402)**. Delay is adjusted by setpoint **Analog Protection 13 Delay (page 402)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot14

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9986  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 14 Wrn (page 404)** and **Analog Protection 14 Sd (page 405)**. Delay is adjusted by setpoint **Analog Protection 14 Delay (page 405)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot15

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9985  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 15 Wrn (page 407)** and **Analog Protection 15 Sd (page 408)**. Delay is adjusted by setpoint **Analog Protection 15 Delay (page 408)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot16

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9984  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 16 Wrn (page 410)** and **Analog Protection 16 Sd (page 411)**. Delay is adjusted by setpoint **Analog Protection 16 Delay (page 411)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot17

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9983  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 17 Wrn (page 413)** and **Analog Protection 17 Sd (page 414)**. Delay is adjusted by setpoint **Analog Protection 17 Delay (page 414)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot18

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9982  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 18 Wrn (page 416)** and **Analog Protection 18 Sd (page 417)**. Delay is adjusted by setpoint **Analog Protection 18 Delay (page 417)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot19

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9981  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 19 Wrn (page 419)** and **Analog Protection 19 Sd (page 420)**. Delay is adjusted by setpoint **Analog Protection 19 Delay (page 420)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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## AIN Prot20

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 9980  |                             |            |

### Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Analog Protection 20 Wrn (page 422)** and **Analog Protection 20 Sd (page 423)**. Delay is adjusted by setpoint **Analog Protection 20 Delay (page 423)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic   | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.                                     |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn+BOR    | Analog value is used for warning and breaker open protection   |
| BOR        | Analog value is used for breaker open protection   |
| Wrn+MPR    | Analog value is used for warning and mains protection  |
| MPR        | Analog value is used for mains protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

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### AIN Switch 01

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 209   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH01 (PAGE 696)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 1 On (page 367)</b> and <b>Analog Switch 1 Off (page 368)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 02

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 210   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH02 (PAGE 696)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 2 On (page 370)</b> and <b>Analog Switch 2 Off (page 371)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 03

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 211   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH03 (PAGE 697)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 3 On (page 373)</b> and <b>Analog Switch 3 Off (page 374)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 04

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 212   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH04 (PAGE 697)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 4 On (page 376)</b> and <b>Analog Switch 4 Off (page 377)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 05

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 278   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH05 (PAGE 698)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 5 On (page 379)</b> and <b>Analog Switch 5 Off (page 380)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 06

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 279   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH06 (PAGE 698)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 6 On (page 382)</b> and <b>Analog Switch 6 Off (page 383)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 07

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 280   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH07 (PAGE 699)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 7 On (page 385)</b> and <b>Analog Switch 7 Off (page 386)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 08

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 281   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH08 (PAGE 699)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 8 On (page 388)</b> and <b>Analog Switch 8 Off (page 389)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 09

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 282   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH09 (PAGE 700)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 9 On (page 391)</b> and <b>Analog Switch 9 Off (page 392)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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## AIN Switch 10

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 283   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH10 (PAGE 700)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 10 On (page 394)</b> and <b>Analog Switch 10 Off (page 395)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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## AIN Switch 11

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 284   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH11 (PAGE 701)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 11 On (page 397)</b> and <b>Analog Switch 11 Off (page 398)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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## AIN Switch 12

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 285   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH12 (PAGE 701)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 12 On (page 400)</b> and <b>Analog Switch 12 Off (page 401)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 13

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 286   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH13 (PAGE 702)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 13 On (page 403)</b> and <b>Analog Switch 13 Off (page 404)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 14

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 287   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH14 (PAGE 702)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 14 On (page 406)</b> and <b>Analog Switch 14 Off (page 407)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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### AIN Switch 15

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 288   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH15 (PAGE 703)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 15 On (page 409)</b> and <b>Analog Switch 15 Off (page 410)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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## AIN Switch 16

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 289   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH16 (PAGE 703)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 16 On (page 412)</b> and <b>Analog Switch 16 Off (page 413)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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## AIN Switch 17

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 290   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH17 (PAGE 704)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 17 On (page 415)</b> and <b>Analog Switch 17 Off (page 416)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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## AIN Switch 18

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 291   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH18 (PAGE 704)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 18 On (page 418)</b> and <b>Analog Switch 18 Off (page 419)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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## AIN Switch 19

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 292   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH19 (PAGE 705)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 19 On (page 421)</b> and <b>Analog Switch 19 Off (page 422)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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## AIN Switch 20

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 293   |                             |            |
| <b>Description</b>   |       |                             |            |
| <p>Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. This analog input controls logical binary output <b>AIN SWITCH20 (PAGE 705)</b>. The behavior of the switch depends on the adjustment of the setpoints <b>Analog Switch 20 On (page 424)</b> and <b>Analog Switch 20 Off (page 425)</b>.</p> <p><i>Note: This function is not suitable for tristate or binary analog sensors.</i></p> <p><b>IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.</b></p> |       |                             |            |

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## LAI: C

### Coolant Temp

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0  | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 67   |                             |            |
| <b>Description</b>  |  |                             |            |
| <p>Logical analog input designed for coolant temperature value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. Limits for this protection are adjusted by setpoints <b>Coolant Temperature Wrn (page 289)</b> and <b>Coolant Temperature Sd (page 290)</b>. Delay is adjusted by setpoint <b>Coolant Temperature Delay (page 290)</b>.</p> |  |                             |            |
| <b>Protection types</b>   |  |                             |            |
| Monitoring  | Analog value is only measured and displayed on the LCD screen but not used for protection.   |                             |            |
| HistRecOnl  | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.         |                             |            |
| Wrn   | Analog value is used for warning protection only.  |                             |            |
| Wrn+Stp   | Analog value is used for warning and slow stop protection  |                             |            |
| Stp   | Analog value is used for slow stop protection  |                             |            |
| Wrn + BOC   | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |                             |            |
| BOC   | Analog value is used for BOC (Breaker Open and Cooling) protection.  |                             |            |
| Wrn + Sd  | Analog value is used for warning and shutdown protection.  |                             |            |
| Sd  | Analog value is used for shutdown protection.  |                             |            |
| <b>Note:</b> This parameter has to be adjusted via <i>InteliConfig</i> .  |  |                             |            |
| <b>Alarm</b>  |  |                             |            |
| Under limit   | Alarm is activated when value of analog input is under adjusted limits   |                             |            |
| Over limit  | Alarm is activated when value of analog input is over adjusted limits  |                             |            |
| Under limit + fls   | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |                             |            |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |                             |            |
| <p><b>Example:</b> Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.</p>   |  |                             |            |
| <b>Note:</b> This parameter has to be adjusted via <i>InteliConfig</i> .  |  |                             |            |
| <b>Note:</b> This analog function can by also configured on binary input as binary function. In this case chose <b>COOLANT TEMP (PAGE 664)</b> binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.  |  |                             |            |
| <b>IMPORTANT: Value from analog input has higher priority than value from ECU.</b>  |  |                             |            |

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## LAI: D

### Display Brightness

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  |       |                             |            |
| <b>Description</b>  |       |                             |            |
| Use this function to adjust display brightness. It is necessary to set Brightness control to External to use the function <b>Display brightness settings (page 192)</b> |       |                             |            |

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## LAI: F

### Fuel Level

|   |       |                             |            |
|---|-------|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 78    |                             |            |
| <b>Description</b>  |       |                             |            |
| Logical analog input designed for fuel level value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b> . Limits for this protection are adjusted by setpoints <b>Fuel Level Wrn (page 296)</b> and <b>Fuel Level Sd (page 296)</b> . Delay is adjusted by setpoint <b>Fuel Level Delay (page 297)</b> . |       |                             |            |

#### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

#### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via IntelliConfig.

**IMPORTANT:** For right behavior of this function, curve for analog input has to be in percentage.

**Note:** This analog function can be also configured on binary input as binary function. In this case choose **FUEL LEVEL (PAGE 667)** binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.

**IMPORTANT:** Value from analog input has higher priority than value from ECU.

⬆️ back to Logical analog inputs alphabetically

## LAI: M

### Mains Import Measurement

|  |       |                             |            |
|--|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>   | 5     |                             |            |
| <b>Description</b>   |       |                             |            |
| Logical analog input designed for <b>Mains import measurement (page 154)</b> . Value from this input is used in load transfer from mains to generator. Load transfer is considered to be finished when this value is lower than <b>Mains Unload MCB Open Window (page 353)</b> |       |                             |            |

⬆️ back to Logical analog inputs alphabetically

## LAI: N

### Not Used

|                        |       |                             |            |
|------------------------|-------|-----------------------------|------------|
| <b>Related FW</b>      | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>     | 230   |                             |            |
| <b>Description</b>     |       |                             |            |
| Input has no function. |       |                             |            |

⬆️ back to Logical analog inputs alphabetically

## LAI: O

### Oil Pressure

|   |  |                             |            |
|---|--|-----------------------------|------------|
| <b>Related FW</b>   | 1.0.0  | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b>  | 9  |                             |            |
| <b>Description</b>  |  |                             |            |
| <p>Logical analog input designed for oil pressure value received from analog sensor. For more information about wiring of analog inputs <b>see Analog inputs on page 41</b>. Limits for this protection are adjusted by setpoints <b>Oil Pressure Wrn (page 287)</b> and <b>Oil Pressure Sd (page 288)</b>. Delay is adjusted by setpoint <b>Oil Pressure Delay (page 288)</b>.</p> |  |                             |            |
| <b>Protection types</b>   |  |                             |            |
| Monitoring  | Analog value is only measured and displayed on the LCD screen but not used for protection.   |                             |            |
| HistRecOnl  | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.         |                             |            |
| Wrn   | Analog value is used for warning protection only.  |                             |            |
| Wrn + Sd  | Analog value is used for warning and Sd protection.  |                             |            |
| Sd  | Analog value is used for Sd protection.  |                             |            |
| <b>Note:</b> This parameter has to be adjusted via <i>InteliConfig</i> .  |  |                             |            |
| <b>Alarm</b>  |  |                             |            |
| Under limit   | Alarm is activated when value of analog input is under adjusted limits   |                             |            |
| Over limit  | Alarm is activated when value of analog input is over adjusted limits  |                             |            |
| Under limit + fls   | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |                             |            |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |                             |            |
| <p><b>Example:</b> Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.</p>   |  |                             |            |
| <b>Note:</b> This parameter has to be adjusted via <i>InteliConfig</i> .  |  |                             |            |
| <p><b>Note:</b> This analog function can by also configured on binary input as binary function. In this case chose <b>OIL PRESSURE (PAGE 674)</b> binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.</p>   |  |                             |            |
| <b>IMPORTANT: Value from analog input has higher priority than value from ECU.</b>  |  |                             |            |

🔍 back to Logical analog inputs alphabetically

## Oil Temp

|                    |       |                             |            |
|--------------------|-------|-----------------------------|------------|
| <b>Related FW</b>  | 1.0.0 | <b>Related applications</b> | MINT, SPtM |
| <b>Comm object</b> | 77    |                             |            |

### Description

Logical analog input designed for oil temperature value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 41**. Limits for this protection are adjusted by setpoints **Oil Temp Wrn (page 291)** and **Oil Temp Sd (page 292)**. Delay is adjusted by setpoint **Oil Temp Delay (page 292)**.

### Protection types

|            |  |
|------------|--|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection.   |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| Wrn        | Analog value is used for warning protection only.  |
| Wrn+Stp    | Analog value is used for warning and slow stop protection  |
| Stp        | Analog value is used for slow stop protection  |
| Wrn + BOC  | Analog value is used for warning and BOC (Breaker Open and Cooling) protection.  |
| BOC        | Analog value is used for BOC (Breaker Open and Cooling) protection.  |
| Wrn + Sd   | Analog value is used for warning and shutdown protection.  |
| Sd         | Analog value is used for shutdown protection.  |

**Note:** This parameter has to be adjusted via *InteliConfig*.

### Alarm

|                   |  |
|-------------------|--|
| Under limit       | Alarm is activated when value of analog input is under adjusted limits   |
| Over limit        | Alarm is activated when value of analog input is over adjusted limits  |
| Under limit + fls | Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well. |
| Over limit + fls  | Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.  |

**Example:** Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

**Note:** This parameter has to be adjusted via *InteliConfig*.

**IMPORTANT:** Value from analog input has higher priority than value from ECU.

🔍 back to Logical analog inputs alphabetically

## 9.1.6 PLC

### List of PLC groups

|  |     |
|--|-----|
| Group: Basic Logical functions .....     | 778 |
| Group: Comparison of analog inputs ..... | 781 |
| Group: Time functions .....              | 783 |
| Group: Other functions .....             | 787 |

For full list of PLC blocks go to the chapter **List of PLC blocks (page 777)**.

## List of PLC blocks

### Group: Basic logical functions

|              |     |
|--------------|-----|
| OR/AND ..... | 778 |
| XOR/RS ..... | 780 |

### Group: Comparison of analog inputs

|                                  |     |
|----------------------------------|-----|
| Comparator With Hysteresis ..... | 781 |
| Comparator With Delay ...        | 782 |

### Group: Time functions

|             |     |
|-------------|-----|
| Timer ..... | 783 |
| Delay ..... | 785 |

## Group: Basic Logical functions

### OR/AND

|                             |                         |   |
|-----------------------------|-------------------------|---|
| <b>PLC group</b>            | Basic logical functions |  |
| <b>Related FW</b>           | 1.0.0                   |   |
| <b>Related applications</b> | MINT, SPtM              |   |
| <b>Comm object</b>          | 1                       |   |

#### Inputs

| Input      | Type   | Negation | Range | Function    |
|------------|--------|----------|-------|-------------|
| Input 1..8 | Binary | Yes      | 0/1   | Inputs 1..8 |

#### Outputs

| Output | Type   | Negation | Range | Function                        |
|--------|--------|----------|-------|---------------------------------|
| Output | Binary | Yes      | 0/1   | Result of the logical operation |

#### Description

The block performs logical operation OR / AND of 2 - 8 binary operands. The inputs as well as the output can be inverted.

#### Function OR

| Input 1 | Input 2 | Output |
|---------|---------|--------|
| 0       | 0       | 0      |
| 0       | 1       | 1      |
| 1       | 0       | 1      |
| 1       | 1       | 1      |

#### Function AND

| Input 1 | Input 2 | Output |
|---------|---------|--------|
| 0       | 0       | 0      |
| 0       | 1       | 0      |
| 1       | 0       | 0      |
| 1       | 1       | 1      |

There have to be at least 2 inputs every time. There may be up to 8 inputs configured.



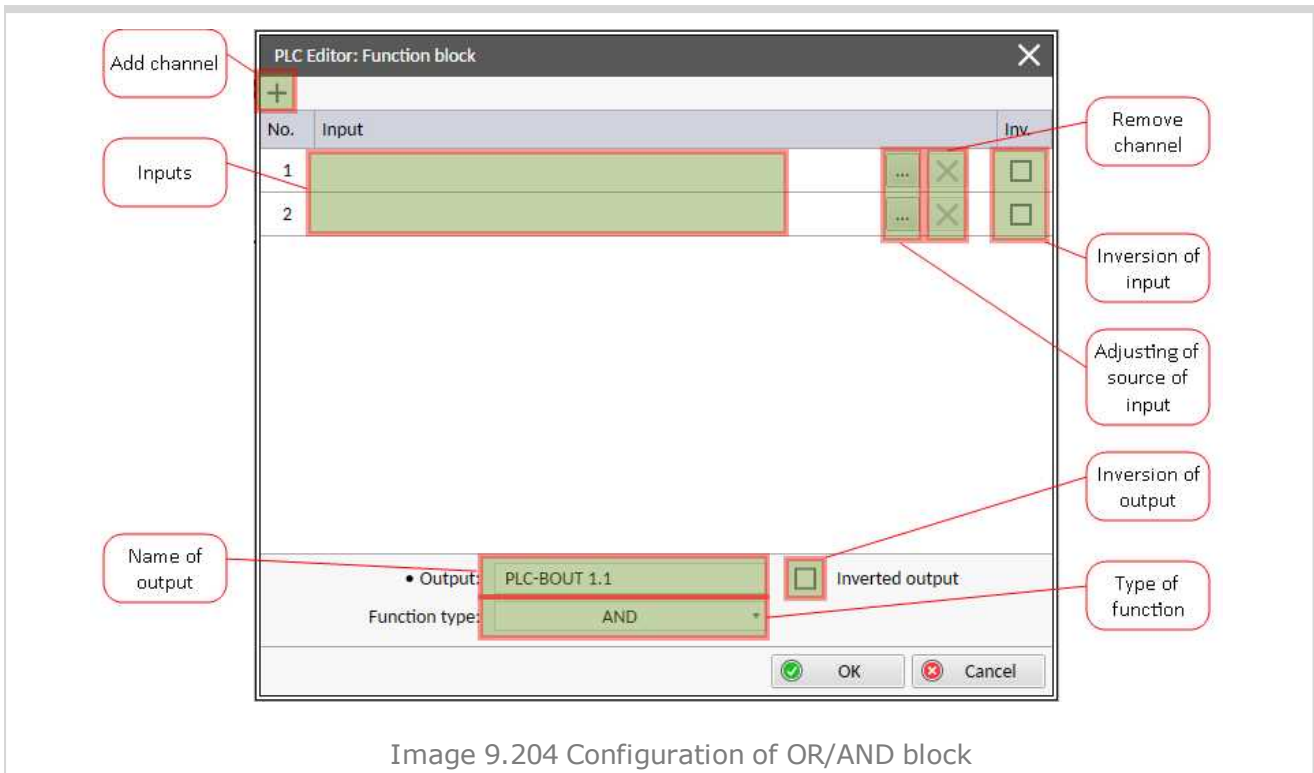



Image 9.204 Configuration of OR/AND block

 back to List of PLC blocks

**XOR/RS**

|                             |                         |   |
|-----------------------------|-------------------------|---|
| <b>PLC group</b>            | Basic logical functions |  |
| <b>Related FW</b>           | 1.0.0                   |   |
| <b>Related applications</b> | MINT, SPtM              |   |
| <b>Comm object</b>          | 2                       |   |

**Inputs**

| Input      | Type   | Negation | Range | Function    |
|------------|--------|----------|-------|-------------|
| Input 1..2 | Binary | Yes      | 0/1   | Inputs 1..2 |

**Outputs**

| Output | Type   | Negation | Range | Function                        |
|--------|--------|----------|-------|---------------------------------|
| Output | Binary | Yes      | 0/1   | Result of the logical operation |

**Description**

The block provides logical function of two values - XOR or RS flip-flop. Both inputs and output can be inverted.

**Function XOR**

| Input 1 | Input 2 | Output |
|---------|---------|--------|
| 0       | 0       | 0      |
| 0       | 1       | 1      |
| 1       | 0       | 1      |
| 1       | 1       | 0      |

**Function RS**

| R | S | Q <sub>n+1</sub> |
|---|---|------------------|
| 0 | 0 | Q <sub>n</sub>   |
| 0 | 1 | 1                |
| 1 | 0 | 0                |
| 1 | 1 | 0                |

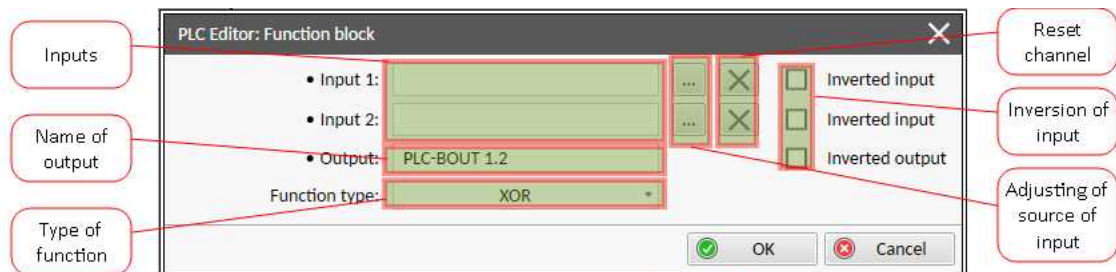



Image 9.205 Configuration of XOR/RS block

 [back to List of PLC blocks](#)

## Group: Comparison of analog inputs

### Comparator With Hysteresis

|                             |                             |   |
|-----------------------------|-----------------------------|---|
| <b>PLC group</b>            | Comparison of analog inputs |  |
| <b>Related FW</b>           | 1.0.0                       |   |
| <b>Related applications</b> | MINT, SPtM                  |   |
| <b>Comm object</b>          | 3                           |   |

| Inputs    |        |          |               |                                     |
|-----------|--------|----------|---------------|-------------------------------------|
| Input     | Type   | Negation | Range         | Function                            |
| Input     | Analog | No       | Any           | Compared value                      |
| Input ON  | Analog | No       | Same as Input | Comparative level for switching on  |
| Input OFF | Analog | No       | Same as Input | Comparative level for switching off |

| Outputs |        |          |       |                   |
|---------|--------|----------|-------|-------------------|
| Output  | Type   | Negation | Range | Function          |
| Output  | Binary | No       | 0/1   | Comparator output |

**Description**

The block compares the input value with the comparative levels. The behavior depends on whether the ON level is higher than OFF level or vice versa.

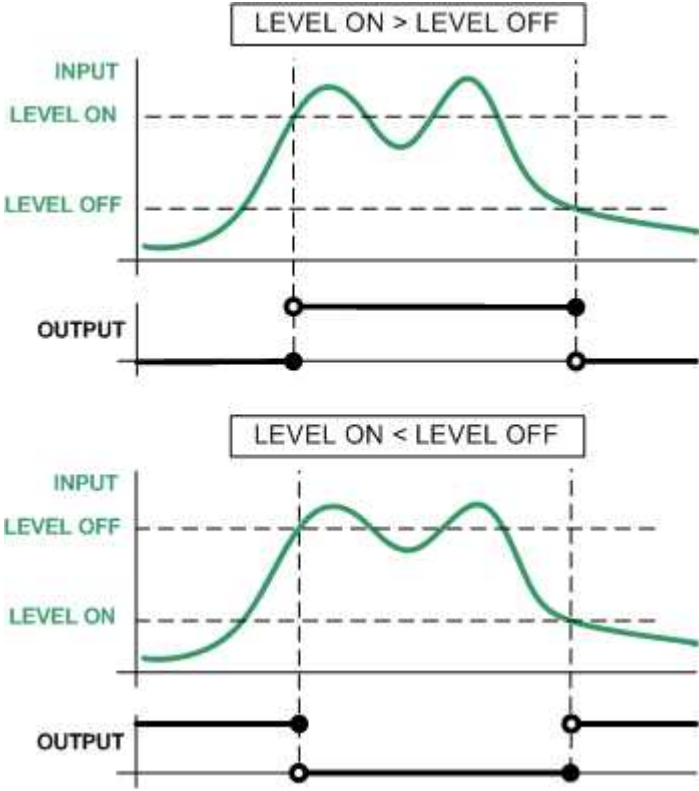


Image 9.206 Different On and Off levels

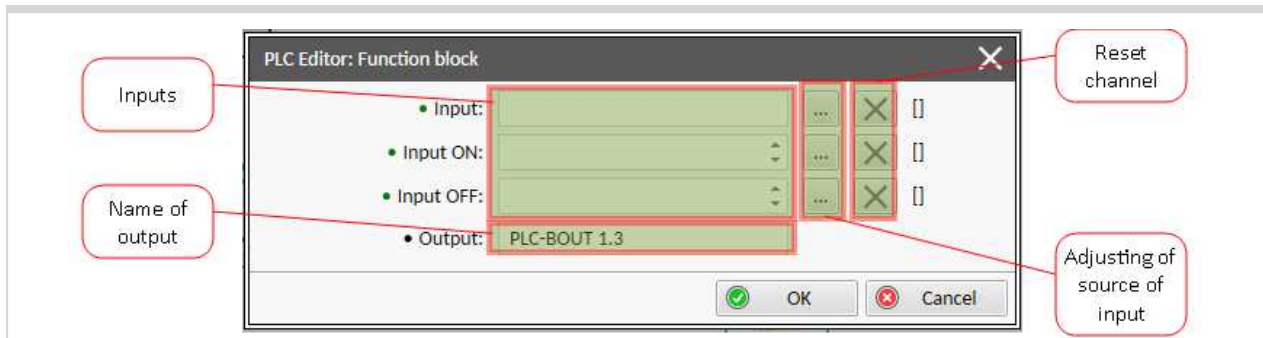



Image 9.207 Configuration of Comp Hyst block

**Note:** Level On and Level Off can be constants or values from controller.

**IMPORTANT:** In case that values on inputs have different decimal numbers than the values are converted and the name of block is red. It is strongly recommended to use values with the same decimal numbers.

 back to List of PLC blocks

### Comparator With Delay

|   |                             |  |                 |                   |
|---|-----------------------------|--|-----------------|-------------------|
| <b>PLC group</b>  | Comparison of analog inputs |  |                 |                   |
| <b>Related FW</b>   | 1.0.0                       |  |                 |                   |
| <b>Related applications</b>   | MINT, SPtM                  |  |                 |                   |
| <b>Comm object</b>  | 4                           |  |                 |                   |
| <b>Inputs</b>   |                             |  |                 |                   |
| <b>Input</b>  | <b>Type</b>                 | <b>Negation</b>  | <b>Range</b>    | <b>Function</b>   |
| Input 1   | Analog                      | No   | Any             | Compared value    |
| Input 2   | Analog                      | No   | Same as Input 1 | Comparative level |
| Delay   | Analog                      | No   | 0.0..3000,0 [s] | Comparative delay |
| <b>Outputs</b>  |                             |  |                 |                   |
| <b>Output</b>   | <b>Type</b>                 | <b>Negation</b>  | <b>Range</b>    | <b>Function</b>   |
| Output  | Binary                      | No   | 0/1             | Comparator output |
| <b>Description</b>  |                             |  |                 |                   |
| The block works as an analog switch. It compares the input value with the comparative level. The output will switch on if the input is equal or higher than the comparative level for time longer than the delay. |                             |  |                 |                   |

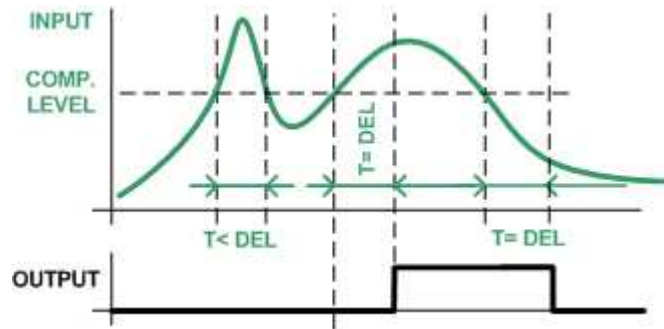


Image 9.208 Principle of delay

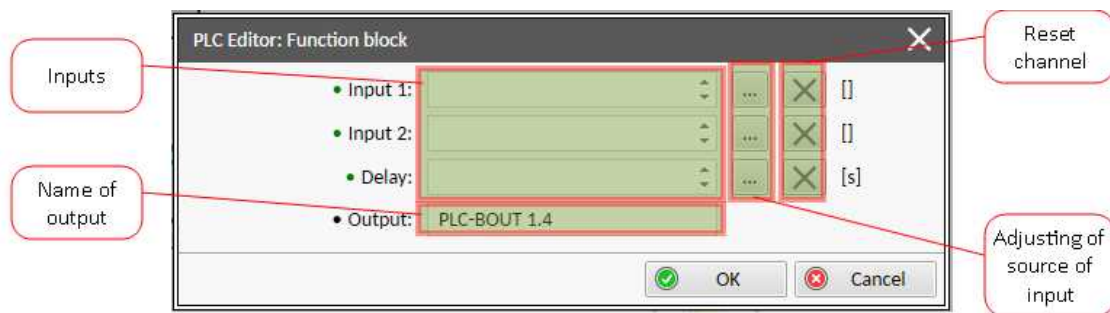



Image 9.209 Configuration of Comp Time block

**Note:** Input 2 and Delay can be constants or values from controller.

◀ back to List of PLC blocks

## Group: Time functions

### Timer

|                             |                |                 |                 |   |
|-----------------------------|----------------|-----------------|-----------------|---|
| <b>PLC group</b>            | Time functions |                 |                 |  |
| <b>Related FW</b>           | 1.0.0          |                 |                 |   |
| <b>Related applications</b> | MINT, SPtM     |                 |                 |   |
| <b>Comm object</b>          | 14             |                 |                 |   |
| <b>Inputs</b>               |                |                 |                 |   |
| <b>Input</b>                | <b>Type</b>    | <b>Negation</b> | <b>Range</b>    | <b>Function</b>   |
| Run                         | Binary         | No              | 0/1             | The timer runs only if this input is active or not connected                          |
| Reload                      | Binary         | No              | 0/1             | This input reloads the timer to the initial value                                     |
| Reload value                | Analog         | No              | 0,0..3276,7 [s] | Initial value of the timer  |
| <b>Outputs</b>              |                |                 |                 |   |

| Output | Type   | Negation | Range | Function     |
|--------|--------|----------|-------|--------------|
| Output | Binary | No       | 0/1   | Timer output |

**Description**

The block works as a countdown timer which is decreased by 1 every PLC cycle. The timer initial value is adjustable by the "Reload value" input. The timer is automatically reloaded with the initial value when it reaches zero or it can be reloaded in any other moment using the "reload" input. The timer is held at reload value until the reload input is deactivated. The timer output is inverted always when the timer is reloaded.

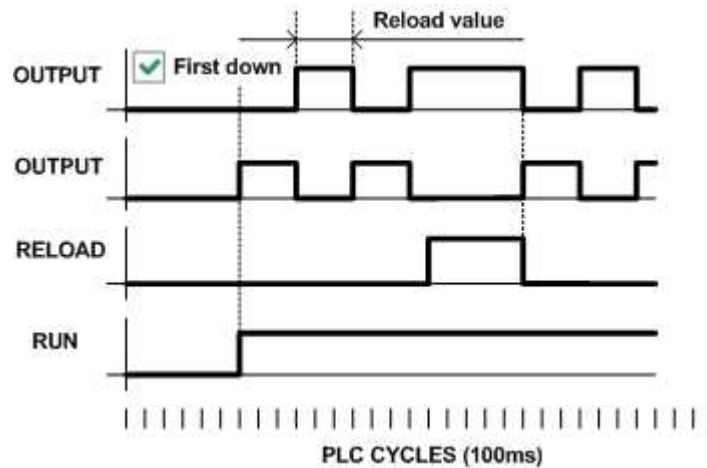


Image 9.210 Principle of timer

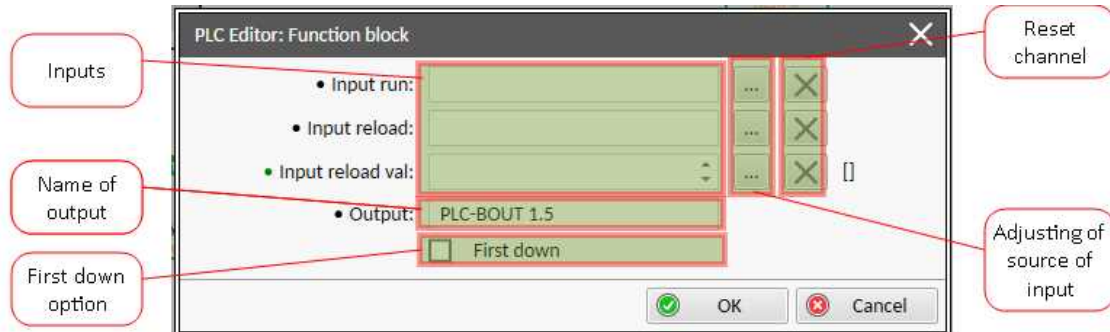


Image 9.211 Configuration of Timer block


**Note:** Input reload value can be constant or value from controller.

**Note:** If you want the output to start at logical 0, tick First down option. Otherwise the output will start at logical 1.

**IMPORTANT:** In case that inputs are not connected and First down option isn't tick, than output is active.

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## Delay

|  |                |   |                           |  |
|--|----------------|---|---------------------------|--|
| <b>PLC group</b>   | Time functions |  |                           |  |
| <b>Related FW</b>  | 1.0.0          |   |                           |  |
| <b>Related applications</b>  | MINT, SPtM     |   |                           |  |
| <b>Comm object</b>   | 33             |   |                           |  |
| <b>Inputs</b>  |                |   |                           |  |
| <b>Input</b>   | <b>Type</b>    | <b>Negation</b>   | <b>Range</b>              | <b>Function</b>  |
| Input  | Binary         | No  | 0/1                       | Input signal to be delayed   |
| Input time up  | Analog         | No  | -3200,0..3200,0 [s, m, h] | Delay of the rising edge resp. pulse length generated by rising edge of the input  |
| Input time down  | Analog         | No  | -3200,0..3200,0 [s, m, h] | Delay of the falling edge resp. pulse length generated by falling edge of the input  |
| Input reset  | Binary         | No  | 0/1                       | Resets the output to logical 0. The output remains in logical 0 until new rising edge appears on Input (when Input reset is deactivated already) |
| <b>Outputs</b>   |                |   |                           |  |
| <b>Output</b>  | <b>Type</b>    | <b>Negation</b>   | <b>Range</b>              | <b>Function</b>  |
| Output   | Binary         | No  | 0/1                       | Output signal  |
| <b>Description</b>   |                |   |                           |  |
| <p>This block can work in two modes of operation:</p> <ul style="list-style-type: none"> <li>▶ Delay mode - the rising edge at the output is generated with delay of "input time up" when a rising edge at the input is detected. The falling edge at the output is generated with delay of "input time down" when a falling edge at the input is detected. If the delayed falling edge at the output came earlier than the delayed rising edge, then no pulse would be generated at the output.</li> <li>▶ Pulse mode - a pulse of "input time up" length is generated at the output when a rising edge is detected, a pulse of "input time down" length is generated at the output when a falling edge is detected.</li> </ul> |                |   |                           |  |

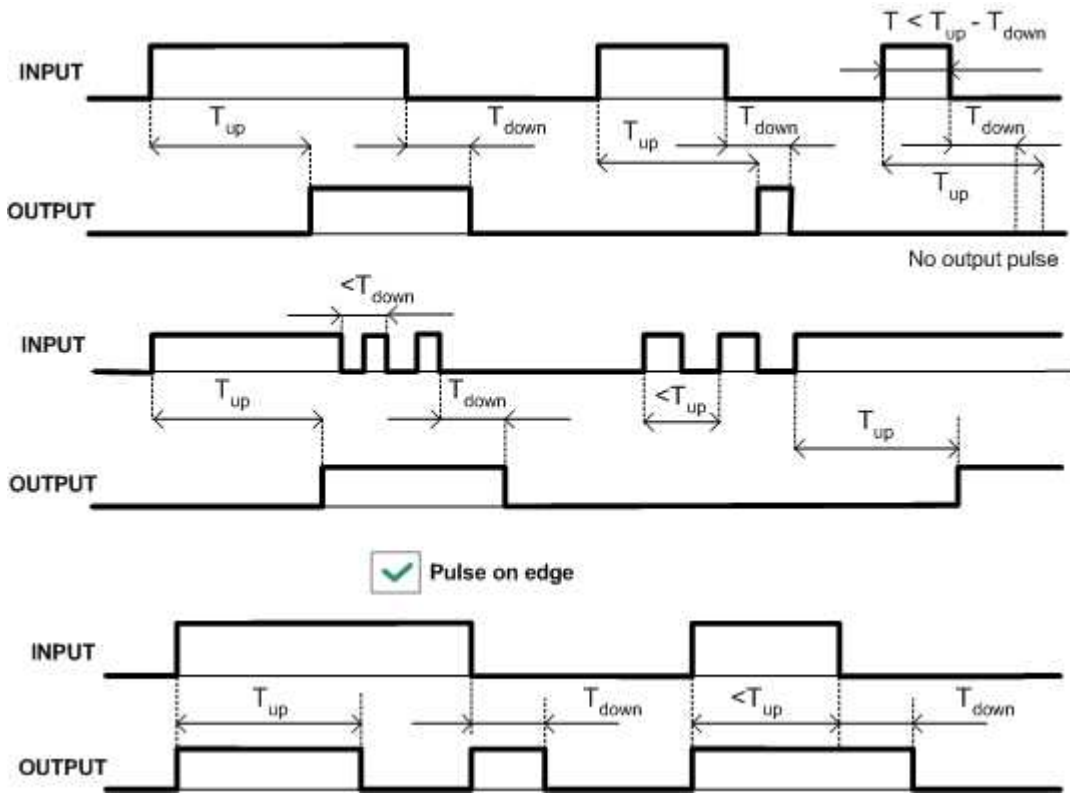


Image 9.212 Delay modes principles

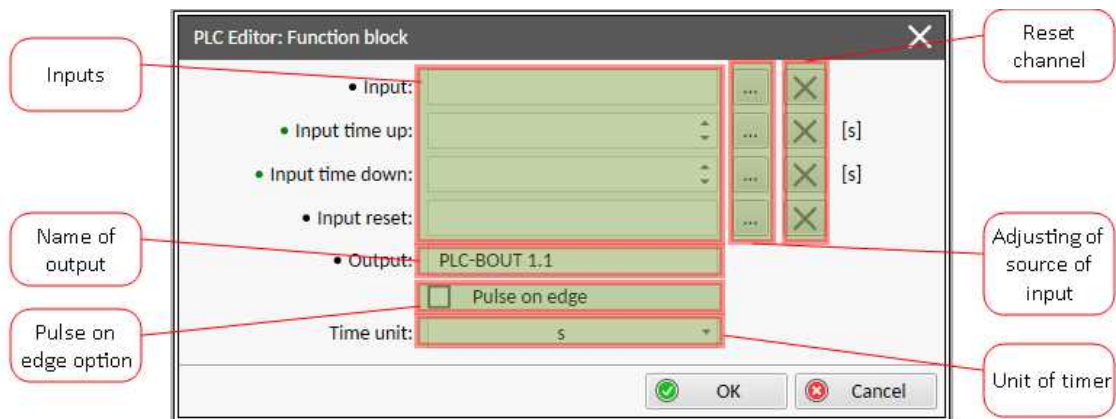


Image 9.213 Configuration of Delay block

**Note:** If Input time up or Input time down value is <0, this input is internally set to zero.

**Note:** Input time up and Input time down values can be constants or values from controller.


**Note:** Use Pulse on edge option to choose between delay and pulse mode.

🔍 back to List of PLC blocks



## Group: Other functions

### Force History Record

|                             |                 |   |
|-----------------------------|-----------------|---|
| <b>PLC group</b>            | Other functions |  |
| <b>Related FW</b>           | 1.0.0           |   |
| <b>Related applications</b> | MINT, SPtM      |   |
| <b>Comm object</b>          | 9               |   |

**Inputs**

| Input | Type   | Negation | Range | Function   |
|-------|--------|----------|-------|--|
| Input | Binary | No       | 0/1   | A record with configured text is recorded into the controller history when the input is activated. |

**Outputs**

No outputs.

**Description**

This block writes a record with defined text into the history when the input is activated.

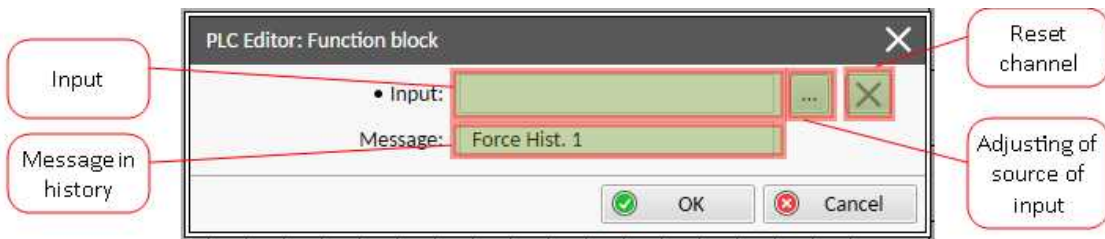



Image 9.214 Configuration of Force Hist block

**Note:** Maximal number of characters for history message is 15.

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### Force Protection

|                             |                 |   |
|-----------------------------|-----------------|---|
| <b>PLC group</b>            | Other functions |  |
| <b>Related FW</b>           | 1.0.0           |   |
| <b>Related applications</b> | MINT, SPtM      |   |
| <b>Comm object</b>          | 10              |   |

**Inputs**

| Input | Type   | Negation | Range | Function   |
|-------|--------|----------|-------|--|
| Lvl 1 | Binary | No       | 0/1   | The input activates yellow level of the configured protection if it is configured                  |
| Lvl 2 | Binary | No       | 0/1   | The input activates red level of the configured protection if a red level protection is configured |
| FIs   | Binary | No       | 0/1   | The input activates sensor fail if a fIs protection is configured                                  |

**Outputs**

No outputs.

**Description**

This block issues alarms of configured type and text when appropriate binary input is activated.

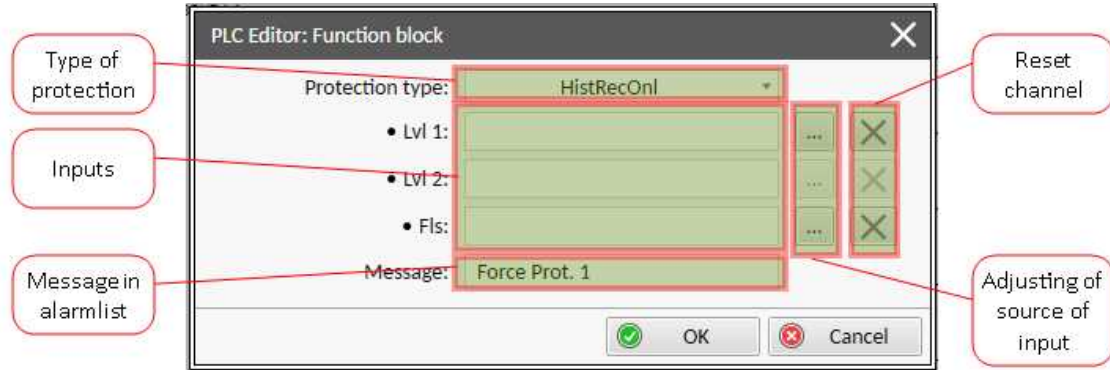


Image 9.215 Configuration of Force Prot block

Available protections are:

- ▶ Monitoring
- ▶ HistRecOnI
- ▶ AL Indic
- ▶ Wm
- ▶ Wm+BOC
- ▶ BOC
- ▶ Wm+Sd
- ▶ Sd

**Note:** Maximal number of characters for alarmlist message is 15.

**Note:** Prefix of protection (e.g. Wm, Sd, BOC) is added automatically into alarmlist message.

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## Counter

|                      |                 |  |
|----------------------|-----------------|--|
| PLC group            | Other functions |  |
| Related FW           | 1.0.0           |  |
| Related applications | MINT, SPtM      |  |
| Comm object          | 11              |  |

### Inputs

| Input              | Type   | Negation | Range        | Function   |
|--------------------|--------|----------|--------------|--|
| Input Count Up     | Binary | No       | 0/1          | Input at which the edges are counted             |
| Input Preset Limit | Analog | No       | 0..32767 [-] | Counter value limit for activation of the output |
| Input Clear        | Binary | No       | 0/1          | Reset input                                      |

### Outputs

| Output | Type   | Negation | Range | Function   |
|--------|--------|----------|-------|--|
| Output | Binary | No       | 0/1   | Output is activated when the counter value exceeds the limit |

### Description

The block works as a counter of edges (selectable rising, falling or both) with reset input and adjustable counting limit. The maximal counter value is 32767. The counter value is lost when the controller is switched off. The output is activated when the counter value is equal or higher than Input Preset Limit and stays active until the block reset is done using Input Clear. Activating of the Input Clear resets the counter value to 0 and deactivates the output. Holding the Input Clear active blocks the counting.

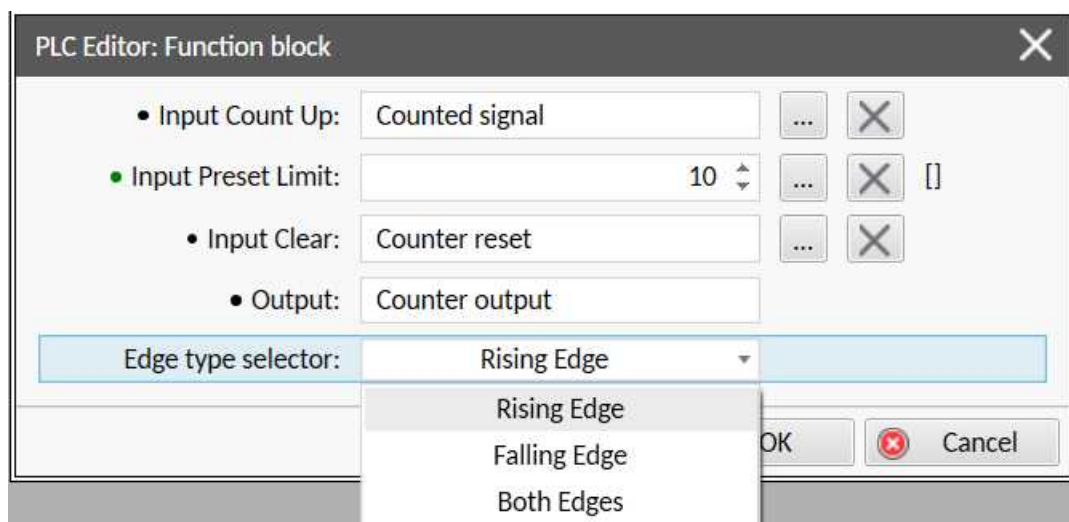


Image 9.216 Configuration of the Counter block

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## 9.2 Alarms

|   |     |
|---|-----|
| 9.2.1 Alarms level 1 .....              | 790 |
| 9.2.2 Alarms level 2 .....              | 818 |
| 9.2.3 Fail sensor and other types ..... | 837 |

### What alarms are:

The controller evaluates two levels of alarms. For more information see **Alarm management on page 111**.

### 9.2.1 Alarms level 1

|                  |     |
|------------------|-----|
| Warnings .....   | 793 |
| Other type ..... | 811 |

For full list of Alarms level 1 go to **List of alarms level 1 (page 791)**.

### What alarms level 1 are:

The level 1 alarm indicates that a value or parameter is out of normal limits, but has still not reached critical level. For more information see **Alarm types - Level 1 on page 113**.

## List of alarms level 1

|                             |     |                         |     |                            |     |
|-----------------------------|-----|-------------------------|-----|----------------------------|-----|
| Alarm Email 1 Fail .....    | 793 | Wrn Coolant Temp .....  | 801 | Wrn Check DPF Status ..    | 808 |
| Alarm Email 2 Fail .....    | 793 | Wrn Coolant Temperature |     | Wrn Maintenance 1 .....    | 808 |
| Alarm Email 3 Fail .....    | 793 | Low .....               | 801 | Wrn Maintenance 2 .....    | 808 |
| Alarm Email 4 Fail .....    | 793 | Wrn ECU Communication   |     | Wrn Maintenance 3 .....    | 809 |
| Alarm SMS 1 Fail .....      | 794 | Fail .....              | 802 | Wrn MCB Fail .....         | 809 |
| Alarm SMS 2 Fail .....      | 794 | ECU Red Lamp .....      | 802 | Wrn Oil Pressure .....     | 809 |
| Alarm SMS 3 Fail .....      | 794 | ECU Yellow Lamp .....   | 802 | Wrn Overload .....         | 810 |
| Alarm SMS 4 Fail .....      | 794 | Wrn Fence 1 Alarm ..... | 802 | Wrn Override All Sd .....  | 810 |
| Battery Charger Fail .....  | 795 | Wrn Fence 2 Alarm ..... | 803 | Wrn Rental Timer 1 .....   | 810 |
| Wrn Battery Voltage .....   | 795 | Wrn Fuel Level .....    | 803 | Wrn Rental Timer 2 .....   | 810 |
| Bus CCW Rotation .....      | 795 | Wrn Fuel Theft .....    | 803 | Wrn Reverse Synchro Fail   | 810 |
| Default Credentials .....   | 795 | Wrn GCB Fail .....      | 803 | Wrn Stop Fail .....        | 811 |
| ECU Wait To Start .....     | 796 | Wrn Generator L1 >      |     | ATT Filter Lamp .....      | 811 |
| Wrn Emergency Droop         |     | Voltage .....           | 804 | ATT HEST Lamp .....        | 812 |
| Active .....                | 796 | Wrn Generator L1 <      |     | ATT SCR Error Lamp ....    | 812 |
| Event Email 1 Fail .....    | 796 | Voltage .....           | 804 | ATT DEF Level Lamp ....    | 812 |
| Event Email 2 Fail .....    | 796 | Wrn Generator L1L2 >    |     | ATT Inhibited Lamp .....   | 812 |
| Event Email 3 Fail .....    | 796 | Voltage .....           | 804 | Dead Bus GCB Blocked ..    | 812 |
| Event Email 4 Fail .....    | 797 | Wrn Generator L1L2 <    |     | EM(A) - a message lost ..  | 813 |
| Event SMS 1 Fail .....      | 797 | Voltage .....           | 805 | EM(A) - configuration      |     |
| Event SMS 2 Fail .....      | 797 | Wrn Generator L2 >      |     | mistake .....              | 813 |
| Event SMS 3 Fail .....      | 797 | Voltage .....           | 805 | EM(A) - insufficient ..... | 813 |
| Event SMS 4 Fail .....      | 798 | Wrn Generator L2 <      |     | EM(A) - missing or         |     |
| Generator CCW Rotation ..   | 798 | Voltage .....           | 805 | damaged .....              | 813 |
| Mains CCW Rotation .....    | 798 | Wrn Generator L2L3 >    |     | EM(B) - a message lost ..  | 814 |
| Rental Timer 1 Elapsed ...  | 798 | Voltage .....           | 805 | EM(B) - configuration      |     |
| Rental Timer 2 Elapsed ...  | 799 | Wrn Generator L2L3 <    |     | mistake .....              | 814 |
| Rental Timer Block Start .  | 799 | Voltage .....           | 806 | EM(B) - insufficient ..... | 814 |
| Soft Transfer Fail .....    | 799 | Wrn Generator L3 >      |     | EM(B) - missing or         |     |
| Speed Regulation Limit ...  | 799 | Voltage .....           | 806 | damaged .....              | 814 |
| Voltage Regulation Limit .. | 799 | Wrn Generator L3 <      |     | Generator CCW Rotation ..  | 814 |
| Wrn AIN Prot .....          | 800 | Voltage .....           | 806 | Mains CCW Rotation .....   | 815 |
| Wrn Charging Alternator     |     | Wrn Generator L3L1 >    |     | Manual Restore .....       | 815 |
| Fail .....                  | 800 | Voltage .....           | 807 | Module(slotA) - comm.      |     |
| Wrn BadPwrCfg .....         | 800 | Wrn Generator L3L1 <    |     | outage .....               | 815 |
| Wrn Battery > Voltage ...   | 800 | Voltage .....           | 807 | Module(slotA) - false      |     |
| Wrn Battery < Voltage ...   | 801 | Wrn Generator >         |     | module .....               | 816 |
| Wrn BIN Protection .....    | 801 | Frequency .....         | 807 | Module(slotA) -            | 816 |
|                             |     | Wrn Generator <         |     |                            |     |
|                             |     | Frequency .....         | 807 |                            |     |

|                           |     |
|---------------------------|-----|
| unattended .....          |     |
| Module(slotA) -           |     |
| unexpected .....          | 816 |
| Module(slotA) - unknown   |     |
| module .....              | 816 |
| Module(slotB) - comm.     |     |
| outage .....              | 817 |
| Module(slotB) - false     |     |
| module .....              | 817 |
| Module(slotB) -           |     |
| unattended .....          | 817 |
| Module(slotB) -           |     |
| unexpected .....          | 817 |
| Module(slotB) - unknown   |     |
| module .....              | 818 |
| Default Credentials ..... | 820 |
| Default Credentials ..... | 822 |

## Warnings

### Alarm Email 1 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Alarm Email 1 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint <b>Email Address 1 (page 481)</b> and email wasn't send. |

[⬅ back to List of alarms level 1](#)

### Alarm Email 2 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Alarm Email 2 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint <b>Email Address 2 (page 481)</b> and email wasn't send. |

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### Alarm Email 3 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Alarm Email 3 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint <b>Email Address 3 (page 481)</b> and email wasn't send. |

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### Alarm Email 4 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Alarm Email 4 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint <b>Email Address 4 (page 482)</b> and email wasn't send. |

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### Alarm SMS 1 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Alarm SMS 1 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint <b>Telephone Number 1 (page 486)</b> and SMS wasn't send. |

🔍 back to List of alarms level 1

### Alarm SMS 2 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Alarm SMS 2 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint <b>Telephone Number 2 (page 487)</b> and SMS wasn't send. |

🔍 back to List of alarms level 1

### Alarm SMS 3 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Alarm SMS 3 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint <b>Telephone Number 3 (page 487)</b> and SMS wasn't send. |

🔍 back to List of alarms level 1

### Alarm SMS 4 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Alarm SMS 4 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint <b>Telephone Number 4 (page 488)</b> and SMS wasn't send. |

🔍 back to List of alarms level 1



## Battery Charger Fail

|                      |  |
|----------------------|--|
| Alarm Type           | Warning  |
| Alarmlist message    | Battery Charge Fail  |
| Alarm evaluated      | Mains is OK  |
| Related applications | MINT, SPtM   |
| Description          | This alarm is activated when logical binary input <b>BATTERY CHARGER (PAGE 616)</b> is active. |

⬅ back to List of alarms level 1

## Wrn Battery Voltage

|                      |  |
|----------------------|--|
| Alarm Type           | Warning  |
| Alarmlist message    | Wrn Battery Voltage  |
| Alarm evaluated      | All the time   |
| Related applications | MINT, SPtM   |
| Description          | <p>This alarm informs the operator that the controller supply voltage is out of limits. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Battery Undervoltage (page 301)</b></li> <li>▶ <b>Battery Overvoltage (page 301)</b></li> <li>▶ <b>Battery &lt;&gt; Voltage Delay (page 302)</b></li> </ul> |

⬅ back to List of alarms level 1

## Bus CCW Rotation

|                      |   |
|----------------------|---|
| Alarm Type           | Warning   |
| Alarmlist message    | Bus CCW Rotation  |
| Alarm evaluated      | All the time  |
| Related applications | MINT  |
| Description          | The controller detects phase sequence on bus voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. |

⬅ back to List of alarms level 1

## Default Credentials

|                      |   |
|----------------------|---|
| Alarm Type           | Warning   |
| Alarmlist message    | Default Credentials   |
| Alarm evaluated      | Default password / access code are used   |
| Related applications | MINT, SPtM  |
| Description          | <p>The alarm is issued, if the factory default password and/or access code are used and engine is running. Factory default password and access code are "0".</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>IMPORTANT: Change password and/or access code to be able to operate a genset! Sd Default Credentials alarm is issued, if the default credentials are used and engine is not running!</b></p> </div> |

⬅ back to List of alarms level 1

### ECU Wait To Start

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | ECU Wait To Start   |
| <b>Alarm evaluated</b>      | Only when ECU is connected  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm is activated when ECU send information that ECU Wait To Start lamp is activated. LBO ALARM (PAGE 695) is not activated, after deactivation of lamp, alarm automatically disappear. |

⬅ back to List of alarms level 1

### Wrn Emergency Droop Active

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Emergency Droop Active                                      |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm is issued when Emergency Droop regulation as active. |

⬅ back to List of alarms level 1

### Event Email 1 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Event Email 1 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint <b>Email Address 1 (page 481)</b> and email wasn't send. |

⬅ back to List of alarms level 1

### Event Email 2 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Event Email 2 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint <b>Email Address 2 (page 481)</b> and email wasn't send. |

⬅ back to List of alarms level 1

### Event Email 3 Fail

|                          |                    |
|--------------------------|--------------------|
| <b>Alarm Type</b>        | Other              |
| <b>Alarmlist message</b> | Event Email 2 Fail |
| <b>Alarm evaluated</b>   | All the time       |

|                             |   |
|-----------------------------|---|
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint <b>Email Address 3 (page 481)</b> and email wasn't send. |

⬅ back to List of alarms level 1

### Event Email 4 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Event Email 4 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint <b>Email Address 4 (page 482)</b> and email wasn't send. |

⬅ back to List of alarms level 1

### Event SMS 1 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Event SMS 1 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint <b>Telephone Number 1 (page 486)</b> and SMS wasn't send. |

⬅ back to List of alarms level 1

### Event SMS 2 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Event SMS 2 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint <b>Telephone Number 2 (page 487)</b> and SMS wasn't send. |

⬅ back to List of alarms level 1

### Event SMS 3 Fail

|                          |                  |
|--------------------------|------------------|
| <b>Alarm Type</b>        | Other            |
| <b>Alarmlist message</b> | Event SMS 3 Fail |
| <b>Alarm evaluated</b>   | All the time     |

|                             |   |
|-----------------------------|---|
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint <b>Telephone Number 3 (page 487)</b> and SMS wasn't send. |

🔍 back to List of alarms level 1

### Event SMS 4 Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Event SMS 4 Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint <b>Telephone Number 4 (page 488)</b> and SMS wasn't send. |

🔍 back to List of alarms level 1

### Generator CCW Rotation

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Generator CCW Rotation  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The controller detects phase sequence on generator voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. |

🔍 back to List of alarms level 1

### Mains CCW Rotation

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Mains CCW Rotation  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The controller detects phase sequence on mains voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. |

🔍 back to List of alarms level 1

### Rental Timer 1 Elapsed

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Rental Timer 1 Elapsed   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm is activated when <b>Rental Timer 1 (page 441)</b> elapses. |

🔍 back to List of alarms level 1

## Rental Timer 2 Elapsed

|                      |  |
|----------------------|--|
| Alarm Type           | Warning  |
| Alarmlist message    | Rental Timer 2 Elapsed   |
| Alarm evaluated      | All the time   |
| Related applications | MINT, SPtM   |
| Description          | This alarm is activated when <b>Rental Timer 2 (page 443)</b> elapses. |

⬅ back to List of alarms level 1

## Rental Timer Block Start

|                      |   |
|----------------------|---|
| Alarm Type           | Other   |
| Alarmlist message    | Rental Timer Block Start  |
| Alarm evaluated      | All the time  |
| Related applications | MINT, SPtM  |
| Description          | Alarm is active when there is start command and <b>Rental Timer 1 (page 441)</b> or <b>Rental Timer 2 (page 443)</b> elapsed. |

⬅ back to List of alarms level 1

## Soft Transfer Fail

|                      |  |
|----------------------|--|
| Alarm Type           | Warning  |
| Alarmlist message    | Soft Transfer Fail   |
| Alarm evaluated      | During transition of load  |
| Related applications | MINT, SPtM   |
| Description          | This alarm is issued when the unloading was not successful ( <b>Load Ramp (page 353)</b> + 10 % gets elapsed). |

⬅ back to List of alarms level 1

## Speed Regulation Limit

|                      |   |
|----------------------|---|
| Alarm Type           | Warning   |
| Alarmlist message    | Speed Regulation Limit  |
| Alarm evaluated      | Gen-set is running  |
| Related applications | MINT, SPtM  |
| Description          | This alarm is issued when speed governor output ( <b>Speed control outputs (page 105)</b> ) stays close to one of the limit values for more than 2 seconds. |

⬅ back to List of alarms level 1

## Voltage Regulation Limit

|                      |  |
|----------------------|--|
| Alarm Type           | Warning  |
| Alarmlist message    | Voltage Regulation Limit   |
| Alarm evaluated      | Gen-set is running   |
| Related applications | MINT, SPtM   |
| Description          | This alarm is issued when AVR output ( <b>Voltage control outputs (page 107)</b> ) stays close to one of the limit values for more than 2 seconds. |

⬅ back to List of alarms level 1

### Wrn AIN Prot

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn + Name of analog input  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm indicates that value the general analog protection is out of warning protection limit. |

⬅ back to List of alarms level 1

### Wrn Charging Alternator Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Charging Alternator Fail  |
| <b>Alarm evaluated</b>      | Engine running only   |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm is issued if the engine is running and the voltage on the D+ terminal is lower than 80% of the controller supply voltage. This alarm works similar to the red “battery” alarm indicator on a vehicle dashboard.<br><br>The setpoint has to be in Charge Fail or Enabled position to enable this alarm. |

⬅ back to List of alarms level 1

### Wrn BadPwrCfg

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn BadPwrCfg   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT  |
| <b>Description</b>          | This alarm is issued when there is different power format on controller which are connected via CAN2. |

⬅ back to List of alarms level 1

### Wrn Battery > Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | All the time   |
| <b>Alarm evaluated</b>      | Wrn Battery > Voltage  |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm informs the operator that the controller supply voltage is too high. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Battery Overvoltage (page 301)</b></li> <li>▶ <b>Battery &lt;&gt; Voltage Delay (page 302)</b></li> </ul> |

⬅ back to List of alarms level 1

### Wrn Battery < Voltage

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Battery < Voltage   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm informs the operator that the controller supply voltage is too low. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Battery Undervoltage (page 301)</b></li> <li>▶ <b>Battery &lt;&gt; Voltage Delay (page 302)</b></li> </ul> |

⬅ back to List of alarms level 1

### Wrn BIN Protection

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn + Name of binary input  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>Binary input also can be adjusted like alarm. In this case message in alarmlist contains prefix - Wrn and binary input name. This alarm occurs, when appropriate binary input is active.</p> |

⬅ back to List of alarms level 1

### Wrn Coolant Temp

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Coolant Temp   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm indicates that the coolant temperature is higher than the temperature set in <b>Coolant Temperature Wrn (page 289)</b> setpoint.</p> |

⬅ back to List of alarms level 1

### Wrn Coolant Temperature Low

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Coolant Temperature Low   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm indicates that the coolant temperature is lower than the temperature set in <b>Coolant Temperature Low Wrn (page 295)</b> setpoint.</p> |

⬅ back to List of alarms level 1

## Wrn ECU Communication Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn ECU Communication Fail  |
| <b>Alarm evaluated</b>      | With configured LBO ECU POWER RELAY (PAGE 712) - only when this LBO is active<br>Without configured LBO ECU POWER RELAY (PAGE 712) - all the time |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when an ECU is configured, but the communication with the ECU is not established or has dropped out.                            |

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## ECU Red Lamp

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | ECU Red Lamp  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when an red ECU alarm is logged in Alarm List.<br><b>Note:</b> This lamp can be ignored during prestart phase. Use IntelliConfig to enable this function. |

◀ back to List of alarms level 1

## ECU Yellow Lamp

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | ECU Yellow Lamp  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when an yellow ECU alarm is logged in Alarm List.<br><b>Note:</b> This lamp can be ignored during prestart phase. Use IntelliConfig to enable this function. |

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## Wrn Fence 1 Alarm

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Fence 1 Alarm  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm evaluates the GPS position of gen-set. The following setpoint are related to it: <ul style="list-style-type: none"> <li>▶ Geo-Fencing (page 448)</li> <li>▶ Fence 1 Protection (page 449)</li> <li>▶ Fence Radius 1 (page 447)</li> </ul> |



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### Wrn Fence 2 Alarm

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Fence 2 Alarm   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the GPS position of gen-set. The following setpoint are related to it:</p> <ul style="list-style-type: none"> <li>▶ <a href="#">Geo-Fencing (page 448)</a></li> <li>▶ <a href="#">Fence 2 Protection (page 450)</a></li> <li>▶ <a href="#">Fence Radius 2 (page 447)</a></li> </ul> |

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### Wrn Fuel Level

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Fuel Level  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm indicates that the fuel level is lower than the level set in <b>Fuel Level Wrn (page 296)</b> setpoint.</p> |

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### Wrn Fuel Theft

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Fuel Theft   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm occurs when the fuel level value measured at relevant AI (Fuel Level) drops faster than is the limit adjusted by setpoint <b>Maximal Fuel Drop (page 298)</b>.</p> |

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### Wrn GCB Fail

|                          |              |
|--------------------------|--------------|
| <b>Alarm Type</b>        | Warning      |
| <b>Alarmlist message</b> | Wrn GCB Fail |
| <b>Alarm evaluated</b>   | All the time |

|                             |   |
|-----------------------------|---|
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm will occur when the <b>GCB FEEDBACK (PAGE 668)</b> input does not match the expected position given by the <b>GCB CLOSE/OPEN (PAGE 716)</b> output. It stays active until the mismatch between the output and feedback persists.</p> <ul style="list-style-type: none"> <li>▶ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately.</li> <li>▶ The alarm will be also issued if the breaker does not respond to an open or close command within 2 seconds.</li> </ul> |

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### Wrn Generator L1 > Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Generator L1 > Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Wrn (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L1 < Voltage

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Generator L1 < Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage Wrn (page 309)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L1L2 > Voltage

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Generator L1L2 > Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Wrn (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L1L2 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Generator L1L2 < Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage Wrn (page 309)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L2 > Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Generator L2 > Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Wrn (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L2 < Voltage

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Generator L2 < Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage Wrn (page 309)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L2L3 > Voltage

|                          |                              |
|--------------------------|------------------------------|
| <b>Alarm Type</b>        | Warning                      |
| <b>Alarmlist message</b> | Wrn Generator L2L3 > Voltage |
| <b>Alarm evaluated</b>   | Generator excited only       |

|                             |  |
|-----------------------------|--|
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Wrn (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L2L3 < Voltage

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Generator L2L3 < Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage Wrn (page 309)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L3 > Voltage

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Generator L3 > Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Wrn (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L3 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Generator L3 < Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage Wrn (page 309)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L3L1 > Voltage

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Generator L3L1 > Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Wrn (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator L3L1 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Generator L3L1 < Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage Wrn (page 309)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Wrn Generator > Frequency

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Generator > Frequency   |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overfrequency Wrn (page 310)</b></li> <li>▶ <b>Generator &lt;&gt; Frequency Delay (page 311)</b></li> </ul> |

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### Wrn Generator < Frequency

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Generator < Frequency  |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Underfrequency Wrn (page 311)</b></li> <li>▶ <b>Generator &lt;&gt; Frequency Delay (page 311)</b></li> </ul> |

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### Wrn Check DPF Status

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Check DPF Status  |
| <b>Alarm evaluated</b>      | When ECU is configured  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when ECU send alarm message about Tier IV protection.<br><b>Note:</b> Tier IV protection have to be supported by ECU. |

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### Wrn Maintenance 1

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Maintenance 1   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | Adjust the setpoint <b>Maintenance Timer 1 (page 302)</b> to the interval of the next maintenance check. The value of the setpoint will count down while the engine is running and if reaches zero, this alarm will be issued. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to a positive value. |

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### Wrn Maintenance 2

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Maintenance 2   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | Adjust the setpoint <b>Maintenance Timer 2 (page 303)</b> to the interval of the next maintenance check. The value of the setpoint will count down while the engine is running and if reaches zero, this alarm will be issued. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to a positive value. |

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### Wrn Maintenance 3

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Maintenance 3   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | Adjust the setpoint <b>Maintenance Timer 3 (page 303)</b> to the interval of the next maintenance check. The value of the setpoint will count down while the engine is running and if reaches zero, this alarm will be issued. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to a positive value. |

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### Wrn MCB Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn MCB Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm will occur when the <b>MCB FEEDBACK (PAGE 672)</b> input does not match the expected position given by the <b>MCB CLOSE/OPEN (PAGE 726)</b> output. It stays active until the mismatch between the output and feedback disappears.</p> <ul style="list-style-type: none"> <li>▶ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately.</li> <li>▶ Self-opening of the breaker is not considered a fault and if all mains values are within limits, the command to reclose the breaker is issued after delay given by the setpoint <b>Mains Return Delay (page 319)</b> has elapsed.</li> <li>▶ The alarm will be also issued, if the breaker does not respond to the close command within 2 seconds. After this period has elapsed the output MCB Close/Open is deactivated again and the next attempt to close the breaker will occur first after the alarm is reset.</li> <li>▶ The alarm will be also issued if the breaker does not respond to the open command within 2 seconds. The output MCB Close/Open will stay deactivated. Closing of GCB is blocked until this alarm becomes inactive.</li> </ul> |

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### Wrn Oil Pressure

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Oil Pressure  |
| <b>Alarm evaluated</b>      | Gen-set is running  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm indicates that the oil pressure is lower than the pressure set in <b>Oil Pressure Wrn (page 287)</b> setpoint. |

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## Wrn Overload

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Overload  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>The alarm is issued when the gen-setmains power is over the limit for time period longer than the delay. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Overload Wrn (page 304)</b> adjusts the overload limit.</li> <li>▶ <b>Overload Delay (page 304)</b> Overload Del adjusts the delay.</li> </ul> |

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## Wrn Override All Sd

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Override All Sd   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when binary input <b>SD OVERRIDE (PAGE 680)</b> is activated. |

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## Wrn Rental Timer 1

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Rental Timer 1  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs xx hours before <b>Rental Timer 1 (page 441)</b> elapsed. Hours are adjusted by setpoint <b>Rental Timer 1 Wrn (page 443)</b> . |

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## Wrn Rental Timer 2

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Warning   |
| <b>Alarmlist message</b>    | Wrn Rental Timer 2  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs xx hours before <b>Rental Timer 2 (page 443)</b> elapsed. Hours are adjusted by setpoint <b>Rental Timer 2 Wrn (page 445)</b> . |

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## Wrn Reverse Synchro Fail

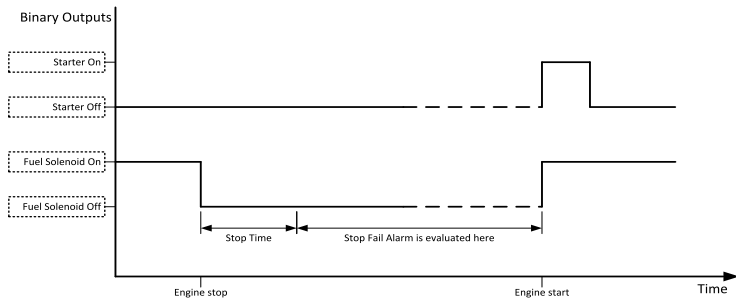
|                          |                          |
|--------------------------|--------------------------|
| <b>Alarm Type</b>        | Warning                  |
| <b>Alarmlist message</b> | Wrn Reverse Synchro Fail |
| <b>Alarm evaluated</b>   | During synchronization   |



|                             |   |
|-----------------------------|---|
| <b>Related applications</b> |   |
| <b>Description</b>          | This alarm is issued when gen-set is synchronizing to the mains/bus via MCB and <b>Synchronization Timeout (page 358)</b> gets elapsed. |

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## Wrn Stop Fail

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Stop Fail  |
| <b>Alarm evaluated</b>      | While the engine shall be stopped  |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm occurs if the gen-set shall be stopped, but some symptom indicates that it is not stopped. The period when the gen-set shall be stopped begins after the <b>FUEL SOLENOID (PAGE 715)</b> has been switched off and time delay <b>Stop Time (page 281)</b> has elapsed and lasts for the entire time the <b>FUEL SOLENOID (PAGE 715)</b> or <b>STARTER (PAGE 737)</b> are off.</p>  <p style="text-align: center;">Image 9.217 Stop Fail</p> <p><b>Note:</b> Gen-set cannot be started until this alarm is inactive and reset.</p> |

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## Other type

### ATT Filter Lamp

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Alarm indication   |
| <b>Alarmlist message</b>    | Aftertreatment   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | Indicates the Aftertreatment filter needs to be regenerated. |

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### ATT HEST Lamp

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Alarm indication                           |
| <b>Alarmlist message</b>    | Aftertreatment                             |
| <b>Alarm evaluated</b>      | All the time                               |
| <b>Related applications</b> | MINT, SPtM                                 |
| <b>Description</b>          | Indicates High exhaust system temperature. |

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### ATT SCR Error Lamp

|                             |                                |
|-----------------------------|--------------------------------|
| <b>Alarm Type</b>           | Alarm indication               |
| <b>Alarmlist message</b>    | Aftertreatment                 |
| <b>Alarm evaluated</b>      | All the time                   |
| <b>Related applications</b> | MINT, SPtM                     |
| <b>Description</b>          | Indicates SCR system problems. |

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### ATT DEF Level Lamp

|                             |                                |
|-----------------------------|--------------------------------|
| <b>Alarm Type</b>           | Alarm indication               |
| <b>Alarmlist message</b>    | Aftertreatment                 |
| <b>Alarm evaluated</b>      | All the time                   |
| <b>Related applications</b> | MINT, SPtM                     |
| <b>Description</b>          | Indicates DEF fluid low level. |

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### ATT Inhibited Lamp

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Alarm indication                                    |
| <b>Alarmlist message</b>    | Aftertreatment                                      |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | Indicates Aftertreatment regeneration is inhibited. |

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### Dead Bus GCB Blocked

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Alarm indication  |
| <b>Alarmlist message</b>    | Dead Bus GCB Blocked  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm is issued when controller is in AUTO mode and Droop operation is active. |

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### EM(A) - a message lost

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | EM(A) - a message lost   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that there is a problem with communication between controller and module in slot. |

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### EM(A) - configuration mistake

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | EM(A) - configuration mistake  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that there is a problem with configuration of binary input or output of module in slot. |

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### EM(A) - insufficient

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | EM(A) - insufficient   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that module does not support all required features. |

[◀ back to List of alarms level 1](#)

### EM(A) - missing or damaged

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | EM(A) - missing or damaged   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that there is a problem with communication with module in slot (in first 5 second there was no communication and module is configured in slot). |

[◀ back to List of alarms level 1](#)

### EM(B) - a message lost

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | EM(B) - a message lost   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that there is a problem with communication between controller and module in slot. |

⬅ back to List of alarms level 1

### EM(B) - configuration mistake

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | EM(B) - configuration mistake  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that there is a problem with configuration of binary input or output of module in slot. |

⬅ back to List of alarms level 1

### EM(B) - insufficient

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | EM(B) - insufficient   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that module does not support all required features. |

⬅ back to List of alarms level 1

### EM(B) - missing or damaged

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | EM(B) - missing or damaged   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that there is a problem with communication with module in slot (in first 5 second there was no communication and module is configured in slot). |

⬅ back to List of alarms level 1

### Generator CCW Rotation

|                          |                        |
|--------------------------|------------------------|
| <b>Alarm Type</b>        | Warning                |
| <b>Alarmlist message</b> | Generator CCW Rotation |
| <b>Alarm evaluated</b>   | All the time           |

|                             |  |
|-----------------------------|--|
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | The controller detects phase sequence on generator voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. There is a fixed defined phase sequence in IntelliGen 500 controller: T35 = N, T36 = L1, T37 = L2 and T38 = L3. When the phases are connected in a different order, alarms are detected. This alarm prevent circuit breaker closing. |

⬅ back to List of alarms level 1

### Mains CCW Rotation

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Alarm indication   |
| <b>Alarmlist message</b>    | Mains CCW Rotation   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | The controller detects phase sequence on mains voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. There is a fixed defined phase sequence in IntelliGen 500 controller: T39 = N, T40 = L1, T41 = L2 and T42 = L3. When the phases are connected in a different order, alarms are detected. This alarm prevent circuit breaker closing. |

⬅ back to List of alarms level 1

### Manual Restore

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Alarm indication   |
| <b>Alarmlist message</b>    | Manual Restore   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | Alarm is activated when controller is in AUTO mode, <b>Return From Island (page 324)</b> setpoint is set to manual, load is on gen-set a mains has returned. |

⬅ back to List of alarms level 1

### Module(slotA) - comm. outage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | Module(slotA) - comm. outage   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that there is a problem with communication between controller and module in slot. |

⬅ back to List of alarms level 1

### Module(slotA) - false module

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Module(slotA) - fake module                                 |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm indicates that false module is inserted in slot. |

[back to List of alarms level 1](#)

### Module(slotA) - unattended

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | Module(slotA) - unattended   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive. |

[back to List of alarms level 1](#)

### Module(slotA) - unexpected

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Module(slotA) - unexpected  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function. |

[back to List of alarms level 1](#)

### Module(slotA) - unknown module

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Module(slotA) - unknown module                                |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm indicates that unknown module is inserted in slot. |

[back to List of alarms level 1](#)

### Module(slotB) - comm. outage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | Module(slotB) - comm. outage   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that there is a problem with communication between controller and module in slot. |

⬅ back to List of alarms level 1

### Module(slotB) - false module

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Module(slotB) - fake module                                 |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm indicates that false module is inserted in slot. |

⬅ back to List of alarms level 1

### Module(slotB) - unattended

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Other  |
| <b>Alarmlist message</b>    | Module(slotB) - unattended   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive. |

⬅ back to List of alarms level 1

### Module(slotB) - unexpected

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Module(slotB) - unexpected  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function. |

⬅ back to List of alarms level 1

### Module(slotB) - unknown module

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Other   |
| <b>Alarmlist message</b>    | Module(slotB) - unknown module                                |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm indicates that unknown module is inserted in slot. |

🔍 back to List of alarms level 1

### Wrn Fuel Transfer Failed

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Wrn Fuel Transfer Failed   |
| <b>Alarm evaluated</b>      | When FUEL PUMP (PAGE 715) is active  |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm will occur when there is no increase of fuel level when FUEL PUMP (PAGE 715) is active. |

🔍 back to List of alarms level 1

### Wrn Transferring Fuel

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Warning  |
| <b>Alarmlist message</b>    | Transferring Fuel  |
| <b>Alarm evaluated</b>      | When FUEL PUMP (PAGE 715) is active                        |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm will occur when FUEL PUMP (PAGE 715) is active. |

🔍 back to List of alarms level 1

## 9.2.2 Alarms level 2

|                  |     |
|------------------|-----|
| Shutdown .....   | 820 |
| Other type ..... | 830 |

For full list of Alarms level 2 go to **List of alarms level 2 (page 819)**.

### What alarms level 2 are:

The level 2 level alarm indicates that a critical level of the respective value or parameter has been reached. For more information see **Alarm types - Level 2 on page 113**.



## List of alarms level 2

|                              |     |                             |     |                          |     |
|------------------------------|-----|-----------------------------|-----|--------------------------|-----|
| Emergency Stop .....         | 820 | Sd Overload .....           | 828 | BOC Rental Timer .....   | 836 |
| E-Stop .....                 | 820 | Sd Overspeed .....          | 829 | BOC Reverse Power .....  | 837 |
| Sd AIN Protec .....          | 820 | Sd RPM Measurement          |     | BOC Short Circuit .....  | 837 |
| Sd Battery Flat .....        | 821 | Fail .....                  | 829 | STP Bus Measurement      |     |
| Sd BIN Protection .....      | 821 | Sd Short Circuit .....      | 829 | Error .....              | 837 |
| Sd Coolant Temp .....        | 821 | Sd Start Fail .....         | 830 | STP Synchronization Fail | 837 |
| Sd Current Unbalance .....   | 821 | Sd Underspeed .....         | 830 |                          |     |
| Sd Earth Fault Current ..... | 822 | BOC AIN Prot .....          | 830 |                          |     |
| Sd ECU Communication         |     | BOC BIN Protection .....    | 830 |                          |     |
| Fail .....                   | 822 | BOC Coolant Temp .....      | 831 |                          |     |
| Sd Fence 1 Alarm .....       | 823 | BOC Current Unbalance ..... | 831 |                          |     |
| Sd Fence 2 Alarm .....       | 823 | BOC Excitation Loss .....   | 831 |                          |     |
| Sd Fuel Level .....          | 823 | BOC Fence 1 Alarm .....     | 831 |                          |     |
| Sd GCB Fail .....            | 823 | BOC Fence 2 Alarm .....     | 832 |                          |     |
| Sd Generator L1 > Voltage    | 824 | BOC Fuel Level .....        | 832 |                          |     |
| Sd Generator L1 < Voltage    | 824 | BOC Generator L1 <          |     |                          |     |
| Sd Generator L1L2 >          |     | Voltage .....               | 832 |                          |     |
| Voltage .....                | 824 | BOC Generator L1L2 <        |     |                          |     |
| Sd Generator L1L2 <          |     | Voltage .....               | 832 |                          |     |
| Voltage .....                | 825 | BOC Generator L2 <          |     |                          |     |
| Sd Generator L2 > Voltage    | 825 | Voltage .....               | 833 |                          |     |
| Sd Generator L2 < Voltage    | 825 | BOC Generator L2L3 <        |     |                          |     |
| Sd Generator L2L3 >          |     | Voltage .....               | 833 |                          |     |
| Voltage .....                | 825 | BOC Generator L3 <          |     |                          |     |
| Sd Generator L2L3 <          |     | Voltage .....               | 833 |                          |     |
| Voltage .....                | 826 | BOC Generator L3L1 <        |     |                          |     |
| Sd Generator L3 > Voltage    | 826 | Voltage .....               | 834 |                          |     |
| Sd Generator L3 < Voltage    | 826 | BOC Generator >             |     |                          |     |
| Sd Generator L3L1 >          |     | Frequency .....             | 834 |                          |     |
| Voltage .....                | 827 | BOC Generator <             |     |                          |     |
| Sd Generator L3L1 <          |     | Frequency .....             | 834 |                          |     |
| Voltage .....                | 827 | BOC Gen Voltage             |     |                          |     |
| Sd Generator > Frequency     | 827 | Unbalance Ph-Ph .....       | 834 |                          |     |
| Sd Generator < Frequency     | 827 | BOC Gen Voltage             |     |                          |     |
| Sd Generator Voltage         |     | Unbalance Ph-N .....        | 835 |                          |     |
| Unbalance Ph-Ph .....        | 828 | BOC NCB Fail .....          | 835 |                          |     |
| Sd Generator Voltage         |     | BOC Oil Pressure .....      | 835 |                          |     |
| Unbalance Ph-N .....         | 828 | BOC Overcurrent IDMT ..     | 836 |                          |     |
| Sd Oil Pressure .....        | 828 | BOC Overload .....          | 836 |                          |     |

## Shutdown

### Default Credentials

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Default Credentials  |
| <b>Alarm evaluated</b>      | Default password / access code are used  |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>The alarm is issued, if the factory default password and/or access code are used and engine is running. Factory default password and access code are "0".</p> <p><b>IMPORTANT: Change password and/or access code to be able to operate a genset!</b></p> |

🔍 back to List of alarms level 1

### Emergency Stop

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Emergency Stop   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>Alarm is activated when binary input <b>EMERGENCY STOP (PAGE 665)</b> is activated. The gen-set shuts down in the moment the input is activated and starting is blocked until the input is deactivated and fault reset is pressed.</p> <p><b>Note:</b> Use red emergency button placed on the switchboard door and connect it to a binary input of the controller. Then configure the function Emergency Stop to this binary input. It is recommended to use NC contact of the button.</p> <p><b>Note:</b> The MCB control is not affected by this alarm.</p> |

🔍 back to List of alarms level 2

### E-Stop

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | E-Stop   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>Alarm is activated when dedicated E-Stop input is activated. The gen-set shuts down in the moment the input is activated and starting is blocked until the input is deactivated and fault reset is pressed.</p> |

🔍 back to List of alarms level 2

### Sd AIN Protec

|                          |                           |
|--------------------------|---------------------------|
| <b>Alarm Type</b>        | Sd                        |
| <b>Alarmlist message</b> | Sd + Name of analog input |
| <b>Alarm evaluated</b>   | All the time              |

|                             |  |
|-----------------------------|--|
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that value the general analog protection is out of shutdown protection limit. |

⬅ back to List of alarms level 2

### Sd Battery Flat

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Battery Flat   |
| <b>Alarm evaluated</b>      | During cranking   |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm will be issued if the controller was reset during cranking of the gen-set. If this situation occurs, the controller supposes the starting battery is so exhausted that its voltage drops so low when starter motor is energized that it causes controller reset. |

⬅ back to List of alarms level 2

### Sd BIN Protection

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd + Name of binary input   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | Binary input also can be adjusted like alarm. In this case message in alarmlist contains prefix - Sd and binary input name. This alarm occurs, when appropriate binary input is active. |

⬅ back to List of alarms level 2

### Sd Coolant Temp

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Coolant Temp  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that the coolant temperature is higher than the temperature set in <b>Coolant Temperature Sd (page 290)</b> setpoint. |

⬅ back to List of alarms level 2

### Sd Current Unbalance

|                          |                      |
|--------------------------|----------------------|
| <b>Alarm Type</b>        | Shutdown             |
| <b>Alarmlist message</b> | Sd Current Unbalance |
| <b>Alarm evaluated</b>   | All the time         |

|                             |  |
|-----------------------------|--|
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the unbalance of the phase currents, i.e. the difference between highest and lowest phase current at any given time. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Current Unbalance BOC (page 307)</b> adjusts the maximum allowed difference between the highest and lowest phase current at any given time.</li> <li>▶ <b>Current Unbalance BOC Delay (page 307)</b> adjusts the alarm delay.</li> </ul> |

⬅ back to List of alarms level 2

### Default Credentials

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Default Credentials  |
| <b>Alarm evaluated</b>      | Default password / access code are used  |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>The alarm is issued, if the factory default password and/or access code are used and engine is running. Factory default password and access code are "0".</p> <p><b>IMPORTANT: Change password and/or access code to be able to operate a genset!</b></p> |

⬅ back to List of alarms level 1

### Sd Earth Fault Current

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Earth Fault Current  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm indicates that the value of earth fault current is higher than adjusted limit. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Earth Fault Sd (page 491)</b> adjusts the maximum allowed earth fault current.</li> <li>▶ <b>Earth Fault Delay (page 490)</b> adjusts the alarm delay.</li> </ul> |

⬅ back to List of alarms level 2

### Sd ECU Communication Fail

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd ECU Communication Fail  |
| <b>Alarm evaluated</b>      | <p>With configured LBO ECU POWER RELAY (PAGE 712) - only when this LBO is active</p> <p>Without configured LBO ECU POWER RELAY (PAGE 712) - all the time</p> |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm occurs when an ECU is configured, but the communication with the ECU is not established or has dropped out.</p>                                |

⬅ back to List of alarms level 2

### Sd Fence 1 Alarm

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Fence 1 Alarm  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the GPS position of gen-set. The following setpoint are related to it:</p> <ul style="list-style-type: none"> <li>▶ <a href="#">Geo-Fencing (page 448)</a></li> <li>▶ <a href="#">Fence 1 Protection (page 449)</a></li> <li>▶ <a href="#">Fence Radius 1 (page 447)</a></li> </ul> |

⬅ back to List of alarms level 2

### Sd Fence 2 Alarm

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Fence 2 Alarm  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the GPS position of gen-set. The following setpoint are related to it:</p> <ul style="list-style-type: none"> <li>▶ <a href="#">Geo-Fencing (page 448)</a></li> <li>▶ <a href="#">Fence 1 Protection (page 449)</a></li> <li>▶ <a href="#">Fence Radius 1 (page 447)</a></li> </ul> |

⬅ back to List of alarms level 2

### Sd Fuel Level

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Fuel Level  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm indicates that the fuel level is lower than the level set in <b>Fuel Level Sd (page 296)</b> setpoint.</p> |

⬅ back to List of alarms level 2

### Sd GCB Fail

|                          |              |
|--------------------------|--------------|
| <b>Alarm Type</b>        | Shutdown     |
| <b>Alarmlist message</b> | Sd GCB Fail  |
| <b>Alarm evaluated</b>   | All the time |

|                             |   |
|-----------------------------|---|
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm will occur when the <b>GCB FEEDBACK (PAGE 668)</b> input does not match the expected position given by the <b>GCB CLOSE/OPEN (PAGE 716)</b> output. It stays active until the mismatch between the output and feedback persists.</p> <ul style="list-style-type: none"> <li>▶ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately.</li> <li>▶ The alarm will be also issued if the breaker does not respond to an open or close command within 5 seconds.</li> </ul> |

⬅ back to List of alarms level 2

### Sd Generator L1 > Voltage

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Generator L1 > Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 307)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

⬅ back to List of alarms level 2

### Sd Generator L1 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Generator L1 < Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phases 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator L1L2 > Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Generator L1L2 > Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 307)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator L1L2 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Generator L1L2 < Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator L2 > Voltage

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Generator L2 > Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 307)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator L2 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Generator L2 < Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phases 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator L2L3 > Voltage

|                          |                             |
|--------------------------|-----------------------------|
| <b>Alarm Type</b>        | Shutdown                    |
| <b>Alarmlist message</b> | Sd Generator L2L3 > Voltage |
| <b>Alarm evaluated</b>   | Generator excited only      |

|                             |  |
|-----------------------------|--|
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 307)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator L2L3 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Generator L2L3 < Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator L3 > Voltage

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Generator L3 > Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 307)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator L3 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Generator L3 < Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phases 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator L3L1 > Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Generator L3L1 > Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overvoltage Sd (page 307)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator L3L1 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Generator L3L1 < Voltage  |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### Sd Generator > Frequency

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Generator > Frequency  |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Overfrequency BOC (page 310)</b></li> <li>▶ <b>Generator &lt;&gt; Frequency Delay (page 311)</b></li> </ul> |

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### Sd Generator < Frequency

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Generator < Frequency   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Underfrequency BOC (page 311)</b></li> <li>▶ <b>Generator &lt;&gt; Frequency Delay (page 311)</b></li> </ul> |

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### Sd Generator Voltage Unbalance Ph-Ph

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Generator Voltage Unbalance Ph-Ph  |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the unbalance of the phase to phase voltage, i.e. the difference between highest and lowest phase to phase voltage at any given time. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Voltage Unbalance BOC (page 309)</b> adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time.</li> <li>▶ <b>Bus Voltage Unbalance BOC Delay (page 310)</b> adjusts the alarm delay.</li> </ul> |

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### Sd Generator Voltage Unbalance Ph-N

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Generator Voltage Unbalance Ph-N   |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the unbalance of the phase voltage, i.e. the difference between highest and lowest phase voltage at any given time. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Voltage Unbalance BOC (page 309)</b> adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time.</li> <li>▶ <b>Bus Voltage Unbalance BOC Delay (page 310)</b> adjusts the alarm delay.</li> </ul> |

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### Sd Oil Pressure

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Oil Pressure   |
| <b>Alarm evaluated</b>      | Gen-set is running  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm indicates that the oil pressure is lower than the pressure set in <b>Oil Pressure Sd (page 288)</b> setpoint.</p> |

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### Sd Overload

|                          |              |
|--------------------------|--------------|
| <b>Alarm Type</b>        | Shutdown     |
| <b>Alarmlist message</b> | Sd Overload  |
| <b>Alarm evaluated</b>   | All the time |

|                             |  |
|-----------------------------|--|
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>The alarm is issued when the gen-set power is over the limit for time period longer than the delay. The behavior of the overload alarm is adjusted by the following setpoints:</p> <ul style="list-style-type: none"> <li>▶ <b>Overload BOC (page 304)</b> adjusts the overload limit.</li> <li>▶ <b>Overload Delay (page 304)</b> adjusts the delay</li> </ul> |

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### Sd Overspeed

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Overspeed   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm occurs immediately when the engine speed has exceeded the limit. The behavior of the overspeed alarm is adjusted by the following setpoints:</p> <ul style="list-style-type: none"> <li>▶ <b>Overspeed Sd (page 285)</b> adjust the overspeed limit</li> </ul> |

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### Sd RPM Measurement Fail

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd RPM Measurement Fail  |
| <b>Alarm evaluated</b>      | During cranking  |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>The alarm is issued if the engine speed has not exceeded the <b>Starting RPM (page 273)</b> within the <b>Maximum Cranking Time (page 272)</b>, although some of additional running engine indication sources indicate that the engine has started.</p> |

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### Sd Short Circuit

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd Short Circuit  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This is a fast overcurrent protection. The following setpoints are related to this alarm:</p> <ul style="list-style-type: none"> <li>▶ <b>Short Circuit BOC (page 305)</b> adjusts the short current limit</li> <li>▶ <b>Short Circuit BOC MPR Delay (page 305)</b> adjusts the delay in fine steps</li> </ul> |

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## Sd Start Fail

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Start Fail  |
| <b>Alarm evaluated</b>      | When the gen-set is being started  |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm will be issued after all attempts to start the gen-set have run out but the gen-set did not start. The following setpoints are related to this alarm:</p> <p>▶ <b>Cranking Attempts (page 271)</b> adjust the number of attempts</p> |

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## Sd Underspeed

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | Sd Underspeed  |
| <b>Alarm evaluated</b>      | Engine running only  |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm will be issued when the gen-set is running and then stops by itself, i.e. the RPM drops under the value of setpoint <b>Starting RPM (page 273)</b>.</p> <p>The underspeed alarm starts to be evaluated after successful gen-set start and is being evaluated for the entire time that the fuel solenoid is on.</p> |

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## Other type

### BOC AIN Prot

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC + Name of analog input   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that the value of general analog protection is out of BOC protection limit. |

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### BOC BIN Protection

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC + Name of binary input   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | Binary input also can be adjusted like alarm. In this case message in alarmlist contains prefix - BOCMPRBOR and binary input name. This alarm occurs, when appropriate binary input is active. |

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## BOC Coolant Temp

|                      |  |
|----------------------|--|
| Alarm Type           | BOC  |
| Alarmlist message    | BOC Coolant Temperature  |
| Alarm evaluated      | All the time   |
| Related applications | MINT, SPtM   |
| Description          | This alarm indicates that the coolant temperature is higher than the temperature set in <b>Coolant Temperature Sd (page 290)</b> setpoint. |

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## BOC Current Unbalance

|                      |  |
|----------------------|--|
| Alarm Type           | BOC  |
| Alarmlist message    | BOC Current Unbalance  |
| Alarm evaluated      | All the time   |
| Related applications | MINT, SPtM   |
| Description          | <p>This alarm evaluates the unbalance of the phase currents, i.e. the difference between highest and lowest phase current at any given time. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Current Unbalance BOC (page 307)</b> adjusts the maximum allowed difference between the highest and lowest phase current at any given time.</li> <li>▶ <b>Current Unbalance BOC Delay (page 307)</b> adjusts the alarm delay.</li> </ul> |

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## BOC Excitation Loss

|                      |  |
|----------------------|--|
| Alarm Type           | BOC  |
| Alarmlist message    | BOC Excitation Loss  |
| Alarm evaluated      | Gen-set is running   |
| Related applications | MINT, SPtM   |
| Description          | The alarm is issued when the level of reactive power (-kVAr) gets under limit given by setpoint <b>Excitation Loss Level (page 312)</b> for time longer then the value of setpoint <b>Excitation Loss Delay (page 313)</b> . |

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## BOC Fence 1 Alarm

|                      |  |
|----------------------|--|
| Alarm Type           | BOC  |
| Alarmlist message    | BOC Fence 1 Alarm  |
| Alarm evaluated      | All the time   |
| Related applications | MINT, SPtM   |
| Description          | <p>This alarm evaluates the GPS position of gen-set. The following setpoint are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Geo-Fencing (page 448)</b></li> <li>▶ <b>Fence 1 Protection (page 449)</b></li> <li>▶ <b>Fence Radius 1 (page 447)</b></li> </ul> |

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### BOC Fence 2 Alarm

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | BOC   |
| <b>Alarmlist message</b>    | BOC Fence 2 Alarm   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the GPS position of gen-set. The following setpoint are related to it:</p> <ul style="list-style-type: none"> <li>▶ <a href="#">Geo-Fencing (page 448)</a></li> <li>▶ <a href="#">Fence 1 Protection (page 449)</a></li> <li>▶ <a href="#">Fence Radius 1 (page 447)</a></li> </ul> |

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### BOC Fuel Level

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Fuel Level   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm indicates that the fuel level is lower than the level set level in <b>Fuel Level Sd (page 296)</b> setpoint.</p> |

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### BOC Generator L1 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Generator L1 < Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phases 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <a href="#">Generator Undervoltage BOC (page 308)</a></li> <li>▶ <a href="#">Generator &lt;&gt; Voltage Delay (page 309)</a></li> </ul> |

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### BOC Generator L1L2 < Voltage

|                          |                              |
|--------------------------|------------------------------|
| <b>Alarm Type</b>        | BOC                          |
| <b>Alarmlist message</b> | BOC Generator L1L2 < Voltage |
| <b>Alarm evaluated</b>   | Generator excited only       |

|                             |  |
|-----------------------------|--|
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### BOC Generator L2 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Generator L2 < Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phases 2. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### BOC Generator L2L3 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Generator L2L3 < Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### BOC Generator L3 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Generator L3 < Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase voltage in phases 3. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Generator Undervoltage BOC (page 308)</b></li> <li>▶ <b>Generator &lt;&gt; Voltage Delay (page 309)</b></li> </ul> |

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### BOC Generator L3L1 < Voltage

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Generator L3L1 < Voltage   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Undervoltage BOC (page 308)</li> <li>▶ Generator &lt;&gt; Voltage Delay (page 309)</li> </ul> |

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### BOC Generator > Frequency

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | BOC   |
| <b>Alarmlist message</b>    | BOC Generator > Frequency   |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Overfrequency BOC (page 310)</li> <li>▶ Generator &lt;&gt; Frequency Delay (page 311)</li> </ul> |

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### BOC Generator < Frequency

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Generator < Frequency  |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ Generator Underfrequency BOC (page 311)</li> <li>▶ Generator &lt;&gt; Frequency Delay (page 311)</li> </ul> |

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### BOC Gen Voltage Unbalance Ph-Ph

|                          |                                 |
|--------------------------|---------------------------------|
| <b>Alarm Type</b>        | BOC                             |
| <b>Alarmlist message</b> | BOC Gen Voltage Unbalance ph-ph |
| <b>Alarm evaluated</b>   | Generator excited only          |



|                             |  |
|-----------------------------|--|
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the unbalance of the phase to phase voltages, i.e. the difference between highest and lowest phase to phase voltage at any given time. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Voltage Unbalance BOC (page 309)</b> adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time.</li> <li>▶ <b>Bus Voltage Unbalance BOC Delay (page 310)</b> adjusts the alarm delay.</li> </ul> |

🔍 back to List of alarms level 2

### BOC Gen Voltage Unbalance Ph-N

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Gen Voltage Unbalance ph-n   |
| <b>Alarm evaluated</b>      | Generator excited only   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>This alarm evaluates the unbalance of the phase voltages, i.e. the difference between highest and lowest phase voltage at any given time. The following setpoints are related to it:</p> <ul style="list-style-type: none"> <li>▶ <b>Voltage Unbalance BOC (page 309)</b> adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time.</li> <li>▶ <b>Bus Voltage Unbalance BOC Delay (page 310)</b> adjusts the alarm delay.</li> </ul> |

🔍 back to List of alarms level 2

### BOC NCB Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | BOC   |
| <b>Alarmlist message</b>    | BOC NCB Fail  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>This alarm will occur when the <b>NCB FEEDBACK (PAGE 673)</b> input does not match the expected position given by the <b>NCB CLOSE/OPEN (PAGE 730)</b> output. It stays active until the mismatch between the output and feedback persists.</p> <ul style="list-style-type: none"> <li>▶ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately.</li> <li>▶ The alarm will be also issued if the breaker does not respond to an open or close command within 5 seconds.</li> </ul> |

🔍 back to List of alarms level 2

### BOC Oil Pressure

|                          |                  |
|--------------------------|------------------|
| <b>Alarm Type</b>        | BOC              |
| <b>Alarmlist message</b> | BOC Oil Pressure |
| <b>Alarm evaluated</b>   | All the time     |

|                             |  |
|-----------------------------|--|
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm indicates that the oil pressure is lower than the pressure set in <b>Oil Pressure Sd (page 288)</b> setpoint. |

🔍 back to List of alarms level 2

### BOC Overcurrent IDMT

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Shutdown  |
| <b>Alarmlist message</b>    | Sd + Name of binary input   |
| <b>Alarm evaluated</b>      | Generator excited only  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | <p>The overcurrent alarm is based on IDMT principle. The reaction time of an IDMT alarm is not fixed, but depends on how much is the protected value (generator current in this case) above the limit (<b>Nominal Current (page 243)</b>). The higher is the overcurrent, the shorter the reaction time will be. All generator phases are evaluated.</p> <p>The behaviour of the overcurrent alarm is adjusted by the following setpoints:</p> <ul style="list-style-type: none"> <li>▶ <b>IDMT Overcurrent Delay (page 306)</b> defines the reaction time of the protection when the current is twice the amount of nominal value.</li> <li>▶ <b>Nominal Current (page 243)</b> set the nominal current level, where the alarm starts to be evaluated. The reaction time is infinite at this point.</li> </ul> |

🔍 back to List of alarms level 2

### BOC Overload

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Overload   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | <p>The alarm is issued when the gen-set power is over the limit for time period longer than the delay. The behavior of the overload alarm is adjusted by the following setpoints:</p> <ul style="list-style-type: none"> <li>▶ <b>Overload BOC (page 304)</b> adjusts the overload limit.</li> <li>▶ <b>Overload Delay (page 304)</b> adjusts the delay</li> </ul> |

🔍 back to List of alarms level 2

### BOC Rental Timer

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Shutdown   |
| <b>Alarmlist message</b>    | BOC Rental Timer   |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when <b>Rental Timer BOC (page 445)</b> elapses. |

🔍 back to List of alarms level 2

### BOC Reverse Power

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Reverse Power  |
| <b>Alarm evaluated</b>      | Gen-set is running   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | The alarm is issued when the level of active power (-kW) gets under limit given by setpoint <b>Reverse Power Level (page 312)</b> for time longer then the value of setpoint <b>Reverse Power Delay (page 312)</b> . |

🔍 back to List of alarms level 2

### BOC Short Circuit

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | BOC  |
| <b>Alarmlist message</b>    | BOC Short Circuit  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This is a fast overcurrent protection. The following setpoints are related to this alarm: <ul style="list-style-type: none"> <li>▶ <b>Short Circuit BOC (page 305)</b> adjusts the short current limit</li> <li>▶ <b>Short Circuit BOC MPR Delay (page 305)</b> adjusts the delay in fine steps</li> </ul> |

🔍 back to List of alarms level 2

### STP Bus Measurement Error

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | STP   |
| <b>Alarmlist message</b>    | STP Bus Measurement Error   |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | The alarm is issued when any controller on the CAN has closed its GCB, or MCB feedback is active and voltage on bus is within limits. |

🔍 back to List of alarms level 2

### STP Synchronization Fail

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | STP   |
| <b>Alarmlist message</b>    | STP Synchronization Fail  |
| <b>Alarm evaluated</b>      | During synchronization  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm is issued when gen-set is synchronizing to the mains/bus via GCB and <b>Synchronization Timeout (page 358)</b> gets elapsed. |

🔍 back to List of alarms level 2

## 9.2.3 Fail sensor and other types

|                        |     |
|------------------------|-----|
| FIs Coolant Temp ..... | 840 |
|------------------------|-----|

|                          |     |
|--------------------------|-----|
| FIs Fuel Level .....     | 840 |
| FIs AIN Prot 1 .....     | 840 |
| FIs AIN Protect 2 .....  | 840 |
| FIs AIN Protect 3 .....  | 841 |
| FIs AIN Protect 4 .....  | 841 |
| FIs AIN Protect 5 .....  | 841 |
| FIs AIN Protect 6 .....  | 841 |
| FIs AIN Protect 7 .....  | 842 |
| FIs AIN Protect 8 .....  | 842 |
| FIs AIN Protect 9 .....  | 842 |
| FIs AIN Protect 10 ..... | 842 |
| FIs AIN Protect 11 ..... | 843 |
| FIs AIN Protect 12 ..... | 843 |
| FIs AIN Protect 13 ..... | 843 |
| FIs AIN Protect 14 ..... | 843 |
| FIs AIN Protect 15 ..... | 844 |
| FIs AIN Protect 16 ..... | 844 |
| FIs AIN Protect 17 ..... | 844 |
| FIs AIN Protect 18 ..... | 844 |
| FIs AIN Protect 19 ..... | 845 |
| FIs AIN Protect 20 ..... | 845 |
| FIs Oil Pressure .....   | 845 |

For full list of Fails sensor and other types of alarms go to **List of fail sensor alarms (page 839)**.

**What Fail sensor and other types of alarms are**

If the measured resistance on an analog input exceeds the valid range, a sensor fail will be detected and a sensor fail message will appear in the Alarmlist. For more information **see Sensor fail detection (FLS) on page 114**.

## List of fail sensor alarms

|                          |     |
|--------------------------|-----|
| FIs Coolant Temp .....   | 840 |
| FIs Fuel Level .....     | 840 |
| FIs AIN Prot 1 .....     | 840 |
| FIs AIN Protect 2 .....  | 840 |
| FIs AIN Protect 3 .....  | 841 |
| FIs AIN Protect 4 .....  | 841 |
| FIs AIN Protect 5 .....  | 841 |
| FIs AIN Protect 6 .....  | 841 |
| FIs AIN Protect 7 .....  | 842 |
| FIs AIN Protect 8 .....  | 842 |
| FIs AIN Protect 9 .....  | 842 |
| FIs AIN Protect 10 ..... | 842 |
| FIs AIN Protect 11 ..... | 843 |
| FIs AIN Protect 12 ..... | 843 |
| FIs AIN Protect 13 ..... | 843 |
| FIs AIN Protect 14 ..... | 843 |
| FIs AIN Protect 15 ..... | 844 |
| FIs AIN Protect 16 ..... | 844 |
| FIs AIN Protect 17 ..... | 844 |
| FIs AIN Protect 18 ..... | 844 |
| FIs AIN Protect 19 ..... | 845 |
| FIs AIN Protect 20 ..... | 845 |
| FIs Oil Pressure .....   | 845 |

## Fail sensor

### Fls Coolant Temp

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | Fls  |
| <b>Alarmlist message</b>    | Fls Coolant Temperature  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of coolant temperature is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### Fls Fuel Level

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Fls   |
| <b>Alarmlist message</b>    | Fls Fuel Level  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when measurement value of fuel level is out of range or is missing. |

[▶ List of fail sensor alarms \(page 839\)](#)

### Fls AIN Prot 1

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Fls   |
| <b>Alarmlist message</b>    | Fls + name of analog input 1  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm indicates that the value of general analog protection is out of range or is missing. |

[▶ back to List of fail sensor alarms](#)

### Fls AIN Protect 2

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | Fls   |
| <b>Alarmlist message</b>    | Fls + name of analog input 2  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 2 is out of range or is missing. |

[▶ back to List of fail sensor alarms](#)

### FIs AIN Protect 3

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | FIs   |
| <b>Alarmlist message</b>    | FIs + name of analog input 3  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 3 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 4

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | FIs   |
| <b>Alarmlist message</b>    | FIs + name of analog input 4  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 4 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 5

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | FIs   |
| <b>Alarmlist message</b>    | FIs + name of analog input 5  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 5 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 6

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | FIs   |
| <b>Alarmlist message</b>    | FIs + name of analog input 6  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 6 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 7

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | FIs   |
| <b>Alarmlist message</b>    | FIs + name of analog input 7  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 7 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 8

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | FIs   |
| <b>Alarmlist message</b>    | FIs + name of analog input 8  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 8 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 9

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | FIs   |
| <b>Alarmlist message</b>    | FIs + name of analog input 9  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 9 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 10

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 10  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 10 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)



### FIs AIN Protect 11

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 11  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 11 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 12

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 12  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 12 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 13

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 13  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 13 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 14

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 14  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 14 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 15

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 15  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 15 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 16

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 16  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 16 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 17

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 17  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 17 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 18

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 18  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 18 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 19

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 19  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 19 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs AIN Protect 20

|                             |  |
|-----------------------------|--|
| <b>Alarm Type</b>           | FIs  |
| <b>Alarmlist message</b>    | FIs + name of analog input 20  |
| <b>Alarm evaluated</b>      | All the time   |
| <b>Related applications</b> | MINT, SPtM   |
| <b>Description</b>          | This alarm occurs when measurement value of analog input 20 is out of range or is missing. |

[◀ back to List of fail sensor alarms](#)

### FIs Oil Pressure

|                             |   |
|-----------------------------|---|
| <b>Alarm Type</b>           | FIs   |
| <b>Alarmlist message</b>    | FIs Oil Pressure  |
| <b>Alarm evaluated</b>      | All the time  |
| <b>Related applications</b> | MINT, SPtM  |
| <b>Description</b>          | This alarm occurs when measurement value of oil pressure is out of range or is missing. |

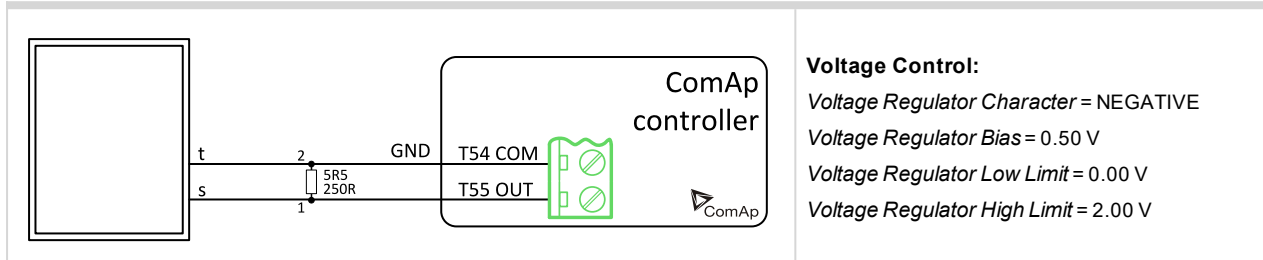
[◀ back to List of fail sensor alarms](#)

## 9.3 AVR interfaces

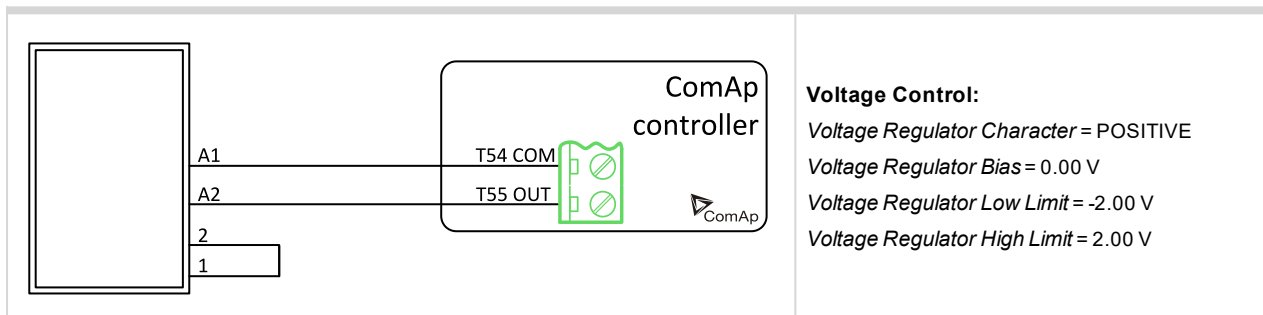
**IMPORTANT:** Read carefully AVR instructions before connecting to a controller! It is not sufficient to use suggested wiring settings, it is necessary as well to adjust AVR settings!

### 9.3.1 AVR interfaces alphabetically

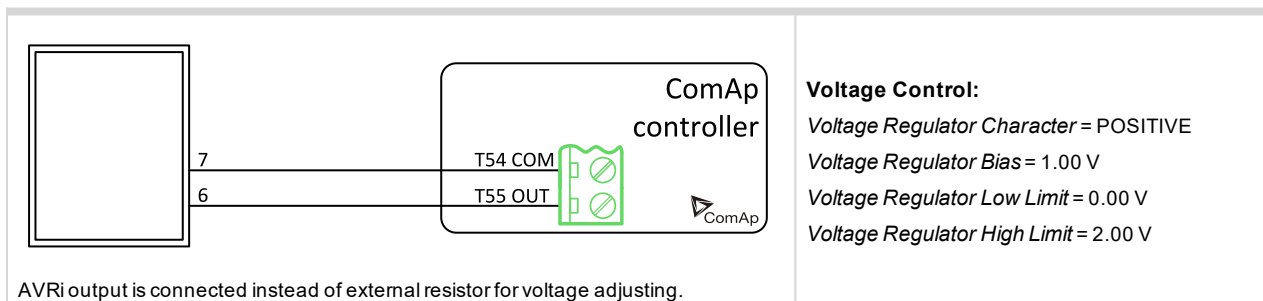
#### AVK Newage Cosimat N+



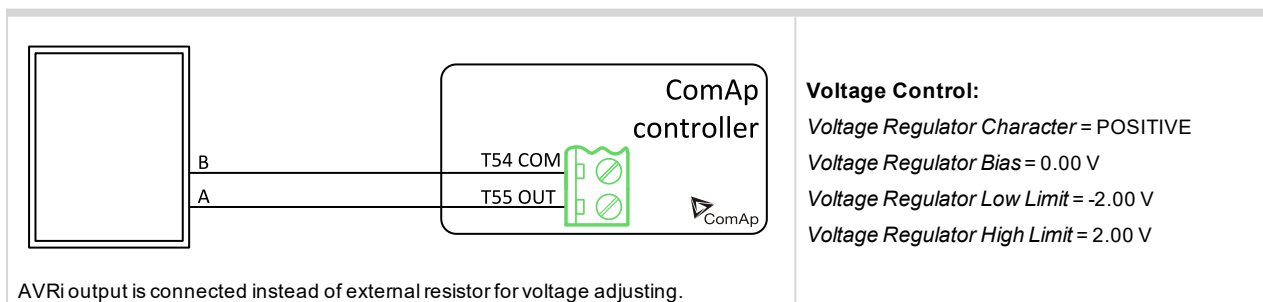
#### AVK Newage MA330, 327, 321, 341



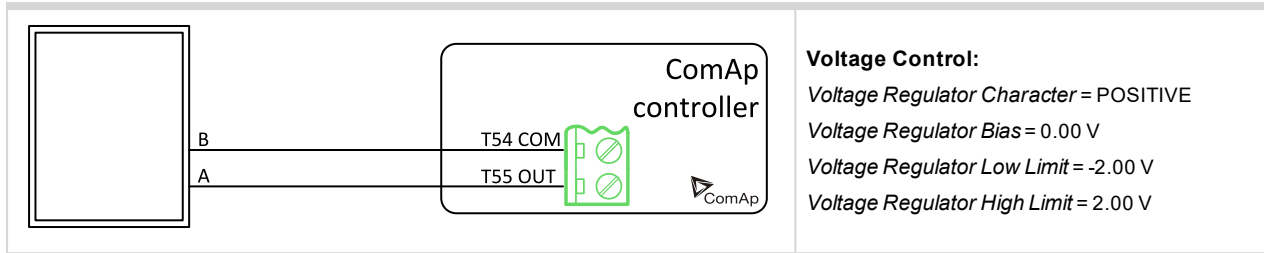
#### Basler: APR 63-5, AEC 63-7, KR-FX, KR-FFX



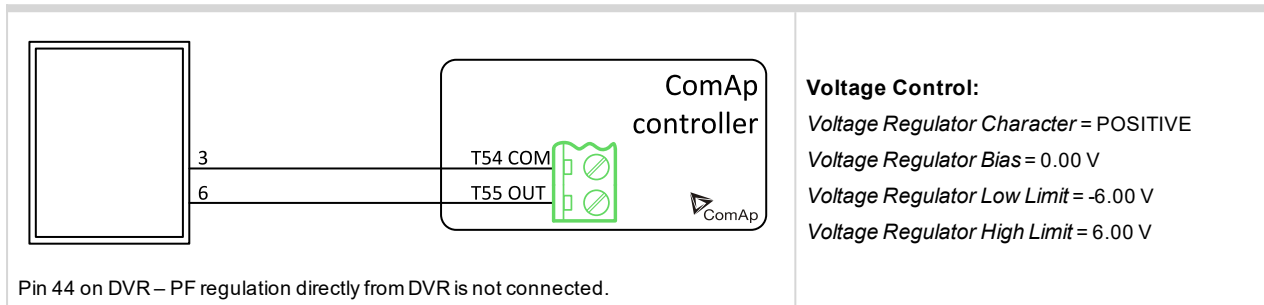
#### Basler: DECS 100



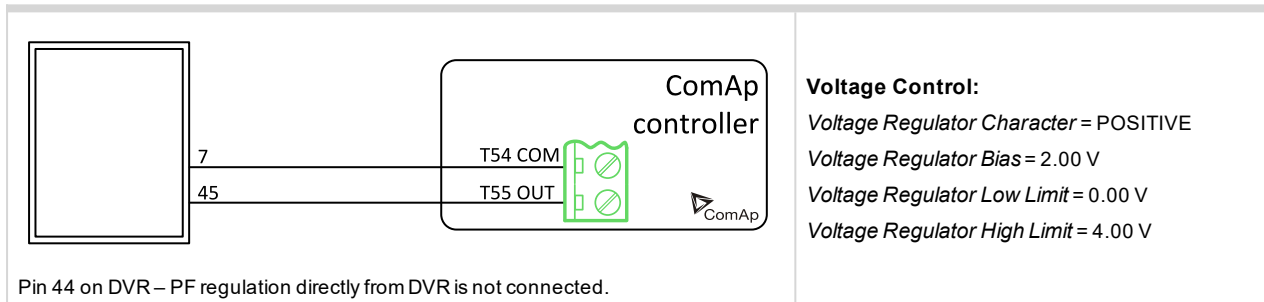
### Basler: DECS 200



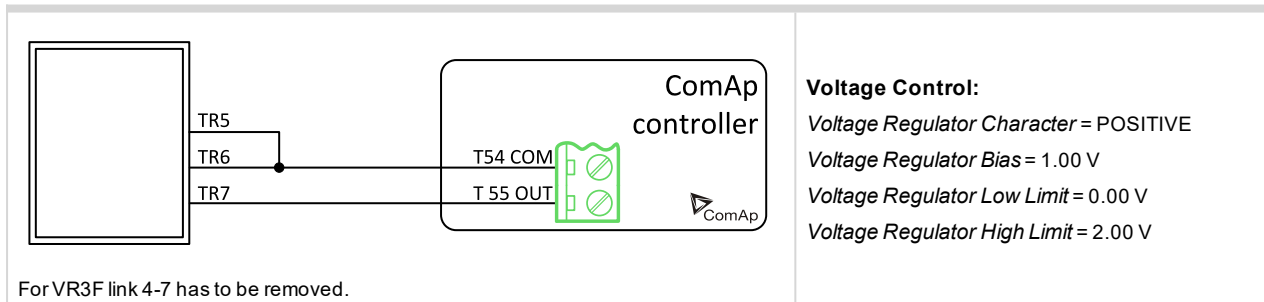
### Catterpillar CDVR



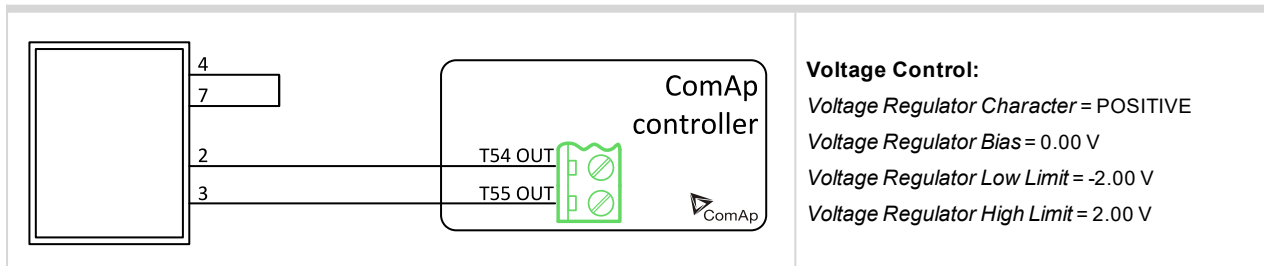
### Catterpillar DVR



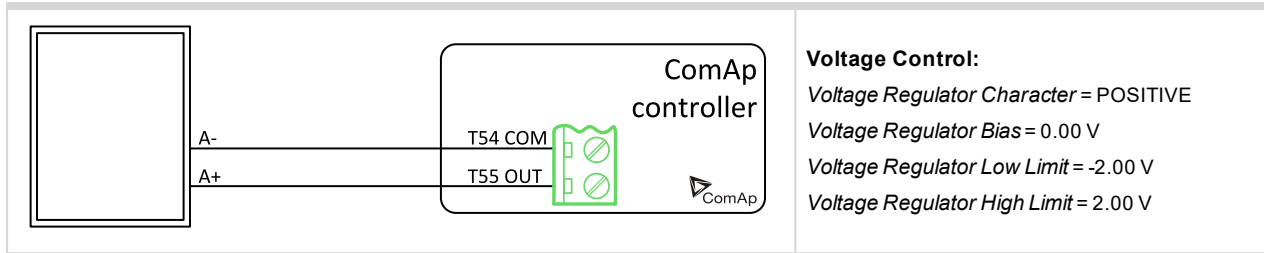
### Catterpillar VR6, VR3F



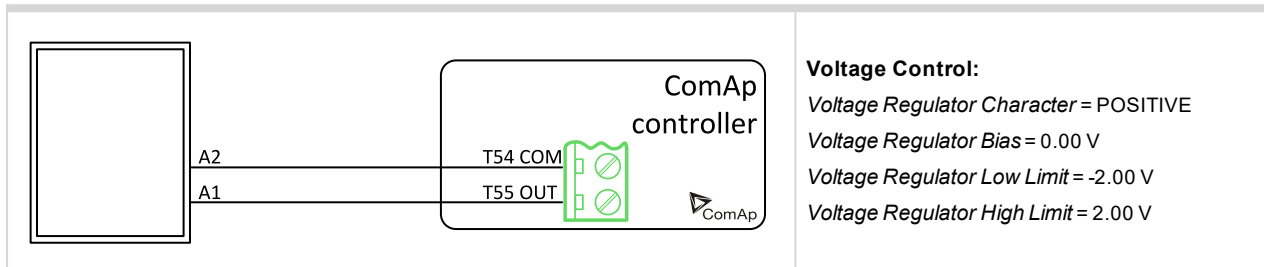
### Catterpillar VR6-B



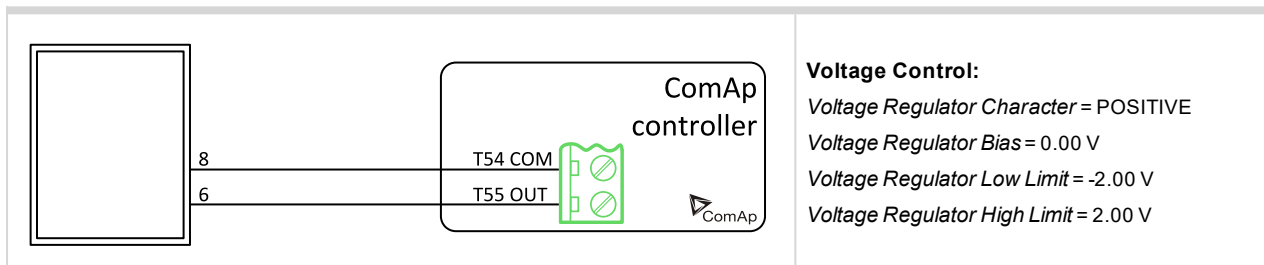
### ENGGA WT- 2



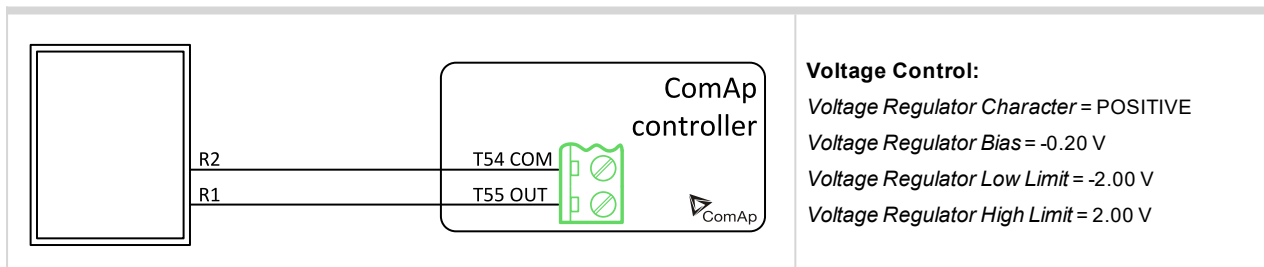
### ENGGA WT- 3



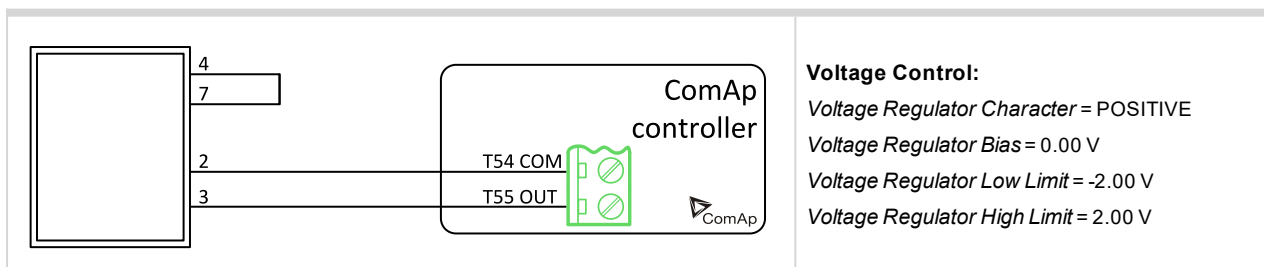
### KATO KCR 360



### KATO KCR 760



### KATO KCR K-65-12B



### Kutai EA448

ST4

**ComAp controller**

**Voltage Control:**  
*Voltage Regulator Character* = POSITIVE  
*Voltage Regulator Bias* = 1.00 V  
*Voltage Regulator Low Limit* = 0.00 V  
*Voltage Regulator High Limit* = 2.00 V

AVRi output is connected instead Remote voltage trimmer 470 Ω to terminal ST4.  
 Module R726 is not required.

### Leroy Somer: R 129

J2

**ComAp controller**

**Voltage Control:**  
*Voltage Regulator Character* = POSITIVE  
*Voltage Regulator Bias* = 1.00 V  
*Voltage Regulator Low Limit* = 0.00 V  
*Voltage Regulator High Limit* = 2.00 V

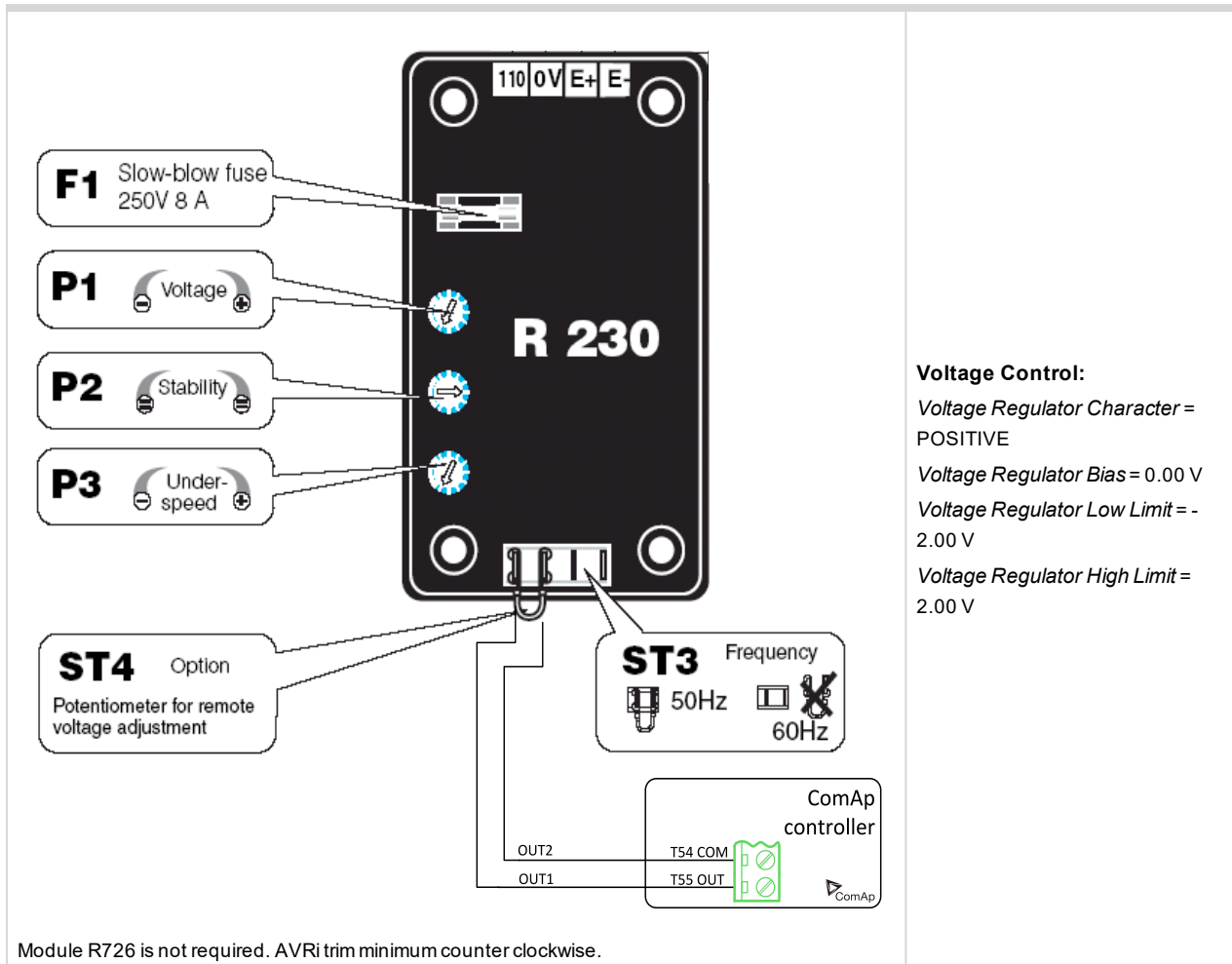
AVRi output is connected instead Remote voltage trimmer 470 Ω to terminal J2.  
 module R726 is not required.

### Leroy Somer: R 221, R 222

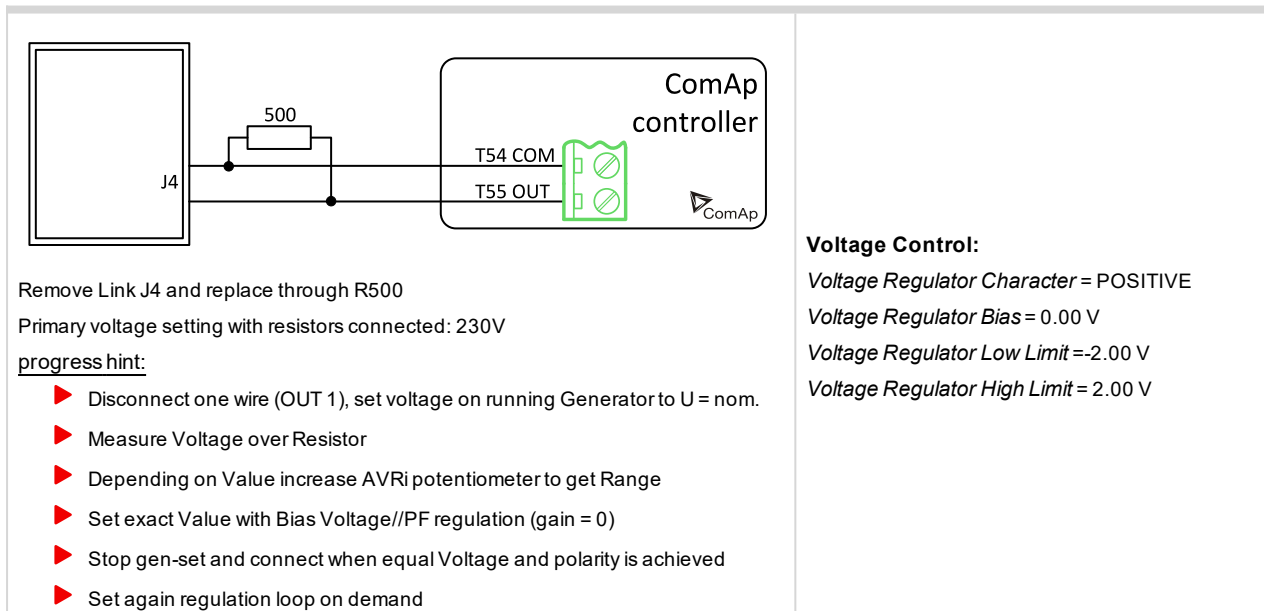
**Voltage Control:**  
*Voltage Regulator Character* = POSITIVE  
*Voltage Regulator Bias* = -1.00 V  
*Voltage Regulator Low Limit* = -2.10 V  
*Voltage Regulator High Limit* = 2.10 V

Module R726 is not required. AVRi trim to minimum counter clockwise +5%.

## Leroy Somer: R 230

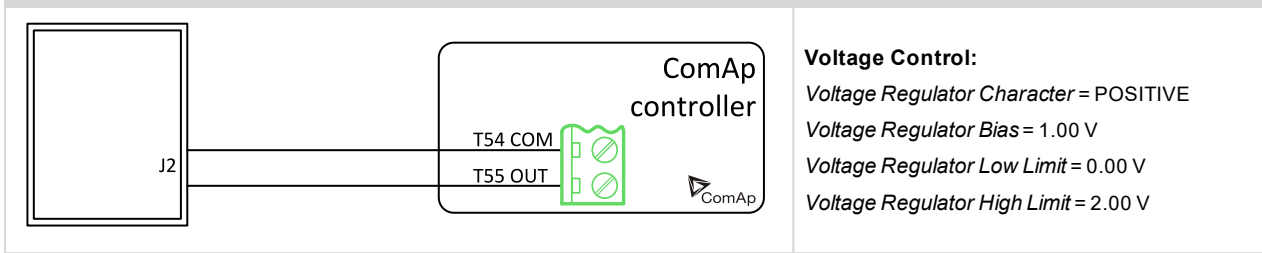


## Leroy Somer: R 230

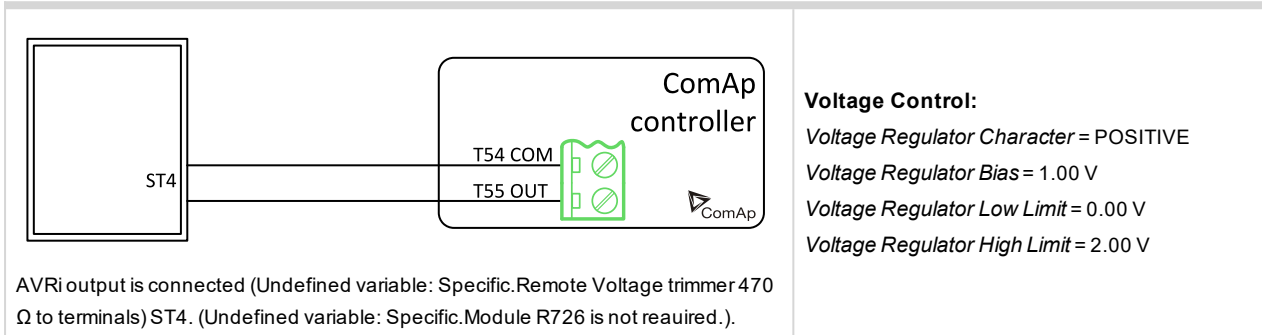




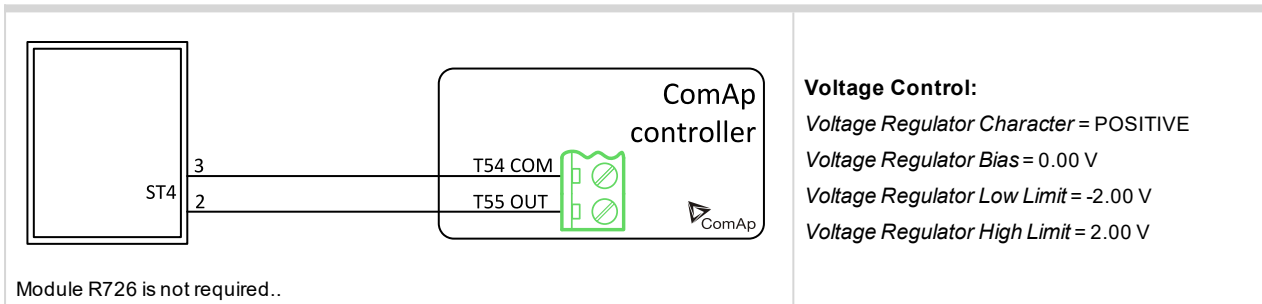
### Leroy Somer: R 250



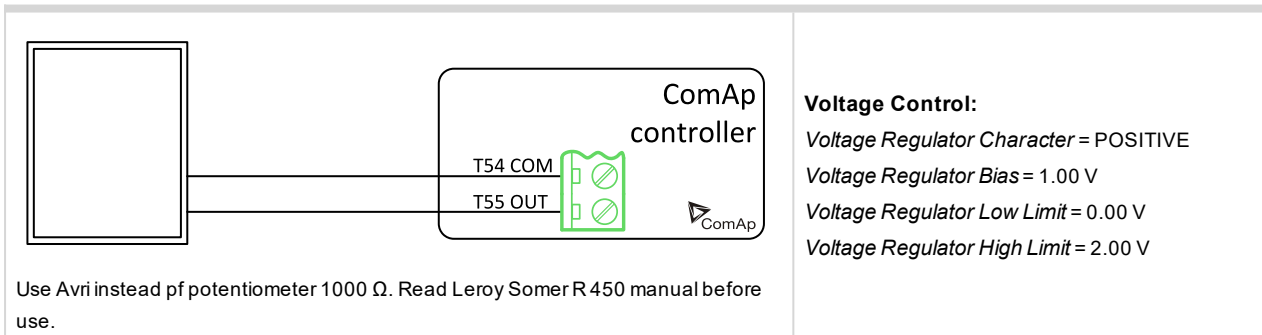
### Leroy Somer: R 438 LS, R448



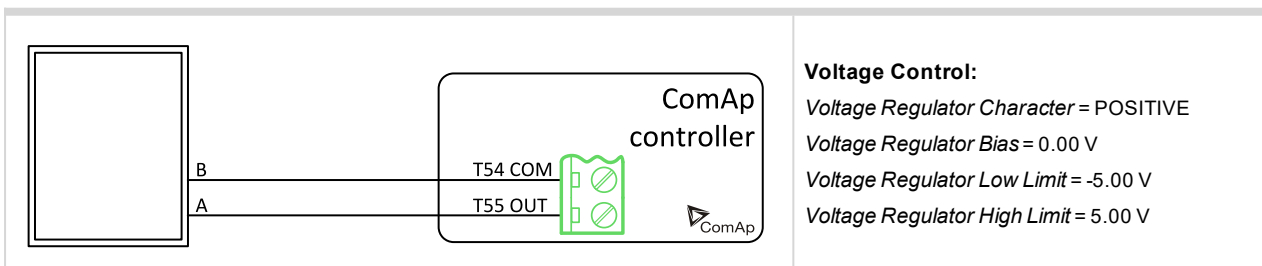
### Leroy Somer: R 449



### Leroy Somer: R 450



### Marathon DVR2000E



### Marathon PM100, 200

|  |   |
|--|---|
|  | <p><b>Voltage Control:</b><br/> <i>Voltage Regulator Character</i> = POSITIVE<br/> <i>Voltage Regulator Bias</i> = 0.00 V<br/> <i>Voltage Regulator Low Limit</i> = -2.00 V<br/> <i>Voltage Regulator High Limit</i> = 2.00 V</p> |
|--|---|

### MarelliGenerators MARK 5 (M16FA655A)

|  |  |
|--|--|
|  | <p><b>Voltage Control:</b><br/> <i>Voltage Regulator Character</i> = POSITIVE<br/> <i>Voltage Regulator Bias</i> = 0.60 V<br/> <i>Voltage Regulator Low Limit</i> = 0.00 V<br/> <i>Voltage Regulator High Limit</i> = 4.00 V</p> |
|--|--|

### MarelliMotori (M40FA610A)

|  |   |
|--|---|
|  | <p><b>Voltage Control:</b><br/> <i>Voltage Regulator Character</i> = POSITIVE<br/> <i>Voltage Regulator Bias</i> = 0.00 V<br/> <i>Voltage Regulator Low Limit</i> = -3.50 V<br/> <i>Voltage Regulator High Limit</i> = 3.50 V</p> |
|--|---|

### MarelliMotori Mark I (M40FA640A/A)

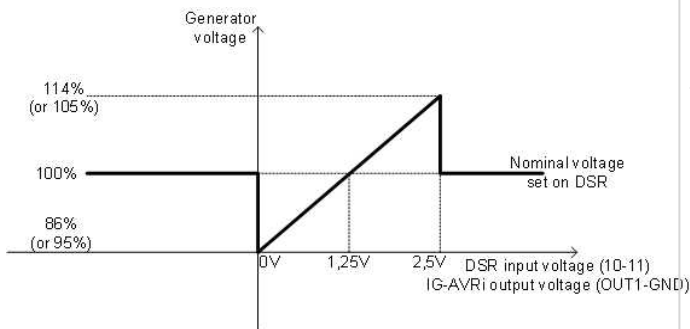
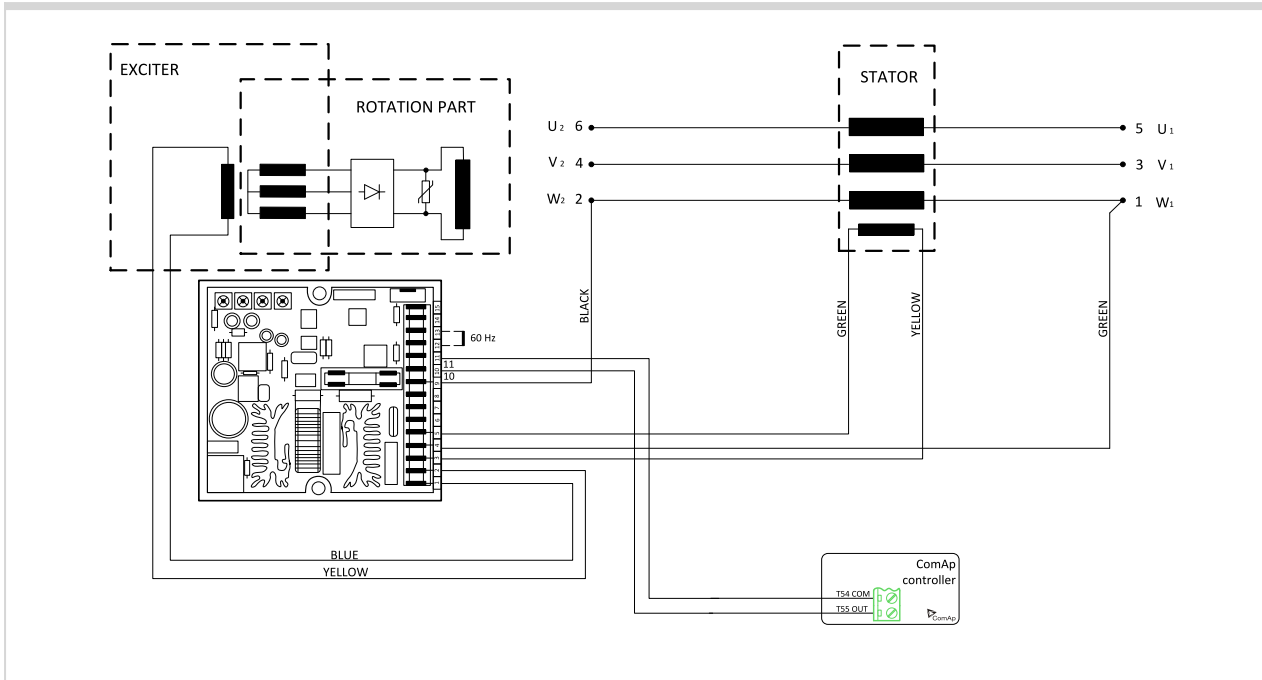
|  |   |
|--|---|
|  | <p><b>Voltage Control:</b><br/> <i>Voltage Regulator Character</i> = POSITIVE<br/> <i>Voltage Regulator Bias</i> = 0.00 V<br/> <i>Voltage Regulator Low Limit</i> = -3.50 V<br/> <i>Voltage Regulator High Limit</i> = 3.50 V</p> |
|--|---|

### Mecc Alte Der 1

|  |   |
|--|---|
|  | <p><b>Voltage Control:</b><br/> <i>Voltage Regulator Character</i> = POSITIVE<br/> <i>Voltage Regulator Bias</i> = 0.00 V<br/> <i>Voltage Regulator Low Limit</i> = -10.00 V<br/> <i>Voltage Regulator High Limit</i> = 10.00 V</p> |
|--|---|

Remove jumpers connecting input 27 to 28 and input 31 to 32.

## Mecc Alte DSR



### Voltage Control:

*Voltage Regulator Character* = POSITIVE

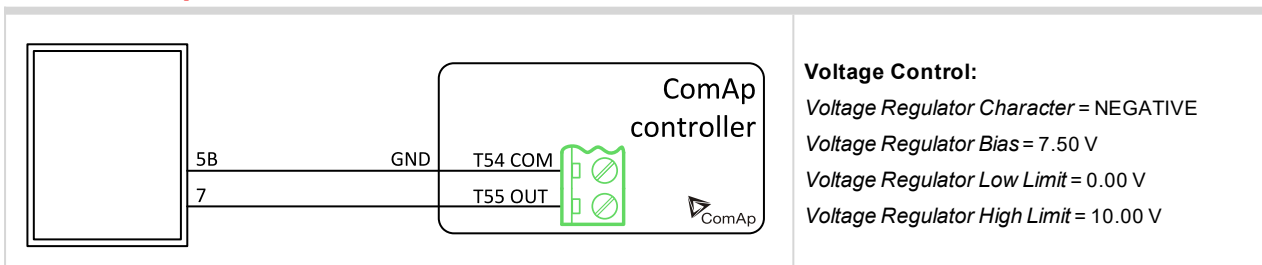
*Voltage Regulator Bias* = 1.25 V

*Voltage Regulator Low Limit* = 0.00 V

*Voltage Regulator High Limit* = 2.50 V

The Vext input (connector CN1 – terminals 10 and 11) permits analogical remote control of output voltage with a programmable variation range of up to  $\pm 10\%$  (parameter 16, by default the setting is  $\pm 5\%$ ) with respect to the value set. If you want to use continuous voltage, it will be effective if it is in the range between 0 V and +2,5 V. The input tolerates voltages from -5 V to +5 V, but for values exceeding the limits of 0 V / +2,5 V (or in the event of disconnection) it is automatically disabled and the voltage adjustment goes back to the value set through the trimmer (if enabled) or through parameter 19 (as shown on the picture). Changing of DSR parameters requires PC with dedicated software and DI1-DSR unit! DSR automatically detects presence of transformer for parallel operation (if used it works with droop, if not used it works isochronous).

## Mecc Alte Spa: S.R:7/2



### Voltage Control:

*Voltage Regulator Character* = NEGATIVE

*Voltage Regulator Bias* = 7.50 V

*Voltage Regulator Low Limit* = 0.00 V

*Voltage Regulator High Limit* = 10.00 V

### Mecc Alte Spa U.V.R.6

AVRi output is connected instead Remote voltage trimmer 100 Kohm  
(T55 OUT = top position wire and T54 COM = second top position).

**Voltage Control:**  
*Voltage Regulator Character* = NEGATIVE  
*Voltage Regulator Bias* = 7.50 V  
*Voltage Regulator Low Limit* = 0.00 V  
*Voltage Regulator High Limit* = 10.00 V

### Newer Leroy Somer

Regulation signal +/- 0...2,5 V

**Voltage Control:**  
*Voltage Regulator Character* = POSITIVE  
*Voltage Regulator Bias* = 0.00 V  
*Voltage Regulator Low Limit* = -2.50 V  
*Voltage Regulator High Limit* = 2.50 V

### Piller

AVRi output is connected instead Remote voltage trimmer 100 kΩ.

**Voltage Control:**  
*Voltage Regulator Character* = POSITIVE  
*Voltage Regulator Bias* = -0.44 V  
*Voltage Regulator Low Limit* = -2.00 V  
*Voltage Regulator High Limit* = 2.00 V

### SINCRO AVR BL4 or AVR BL3

**Voltage Control:**  
*Voltage Regulator Character* = NEGATIVE  
*Voltage Regulator Bias* = 1.20 V  
*Voltage Regulator Low Limit* = 0.00 V  
*Voltage Regulator High Limit* = 6.00 V

### Stamford AS480

AVRi output is connected instead of external resistor for voltage adjusting.

**Voltage Control:**  
*Voltage Regulator Character* = NEGATIVE  
*Voltage Regulator Bias* = 1.00 V  
*Voltage Regulator Low Limit* = 0.00 V  
*Voltage Regulator High Limit* = 2.00 V

### Stamfrod MX 341

|  |  |
|--|--|
| <p>Disconnect the droop CT ( terminal S1&amp;S2) and short the droop CT leads.</p> | <p><b>Voltage Control:</b><br/> <i>Voltage Regulator Character</i> = POSITIVE<br/> <i>Voltage Regulator Bias</i> = 1.00 V<br/> <i>Voltage Regulator Low Limit</i> = 0.00 V<br/> <i>Voltage Regulator High Limit</i> = 2.00 V</p> |
|--|--|

### Stamfrod SX 440, AS 440, MX 321, SX 421

|                                     |   |
|-------------------------------------|---|
| <p>PFC3 module is not required.</p> | <p><b>Voltage Control:</b><br/> <i>Voltage Regulator Character</i> = POSITIVE<br/> <i>Voltage Regulator Bias</i> = 0.00 V<br/> <i>Voltage Regulator Low Limit</i> = -2.00 V<br/> <i>Voltage Regulator High Limit</i> = 2.00 V</p> |
|-------------------------------------|---|

### Stamfrod SX 460

|   |   |
|---|---|
| <p>AVRi output is connected instead of external resistor for voltage adjusting.</p> | <p><b>Voltage Control:</b><br/> <i>Voltage Regulator Character</i> = POSITIVE<br/> <i>Voltage Regulator Bias</i> = 0.00 V<br/> <i>Voltage Regulator Low Limit</i> = -2.00 V<br/> <i>Voltage Regulator High Limit</i> = 2.00 V</p> |
|---|---|

[back to Appendix](#)

## 9.4 Speed governor interfaces

**IMPORTANT:** Read carefully Speed governor instructions before connecting controller Speed governor interface! It is not sufficient to use suggested wiring settings, it is necessary as well to adjust speed governor settings!

### 9.4.1 Electronic engines interface

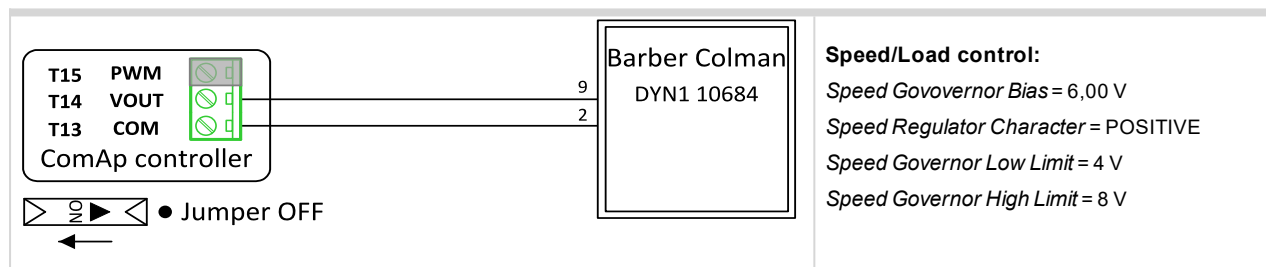
All below mentioned interface examples describe analog interface even if they are (in some cases) used for Electronic Control Units (electronic engines) with CAN data bus. There are several possibilities to connect CAN bus interface between Electronic engine and ComAp controller. Refer to ComAp Electronic Engines Support manual.

### 9.4.2 Controller Speed Regulator Output voltage limits

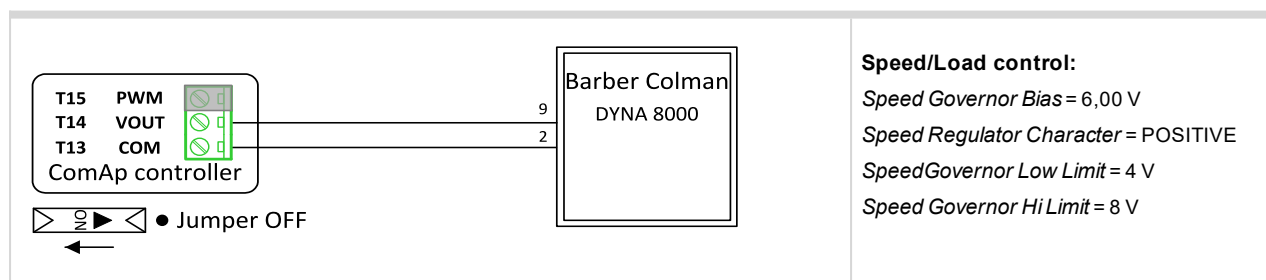
Setpoints **Sync/Load Control:** Speed Governor Low Limit [0.01 V] and Speed Governor High Limit [0.01 V] limit low and high levels of output voltage. E.g. instead of full -10 V to +10 V Speed governor output range can be set Speed Governor Low Limit = 0.00 V and Speed Governor High Limit = 5.00 V to reduce the output range from 0 to 5 V.

### 9.4.3 Speed governors interfaces alphabetically

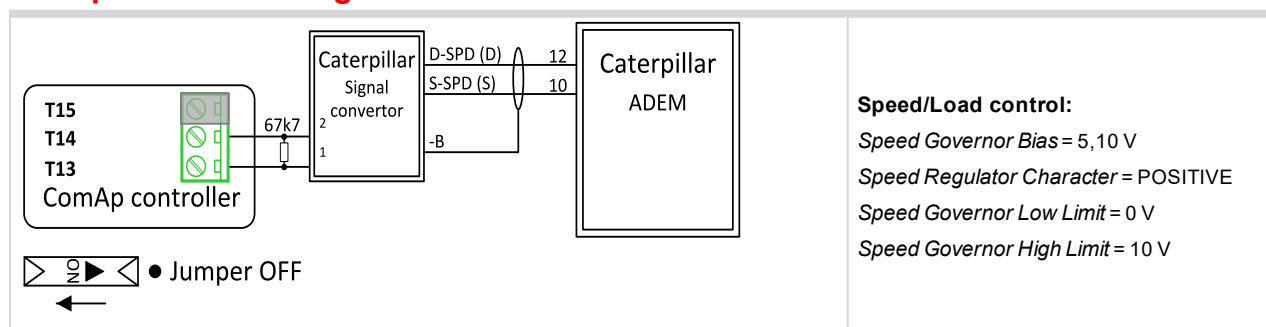
#### Barber Colman DYN1 10684



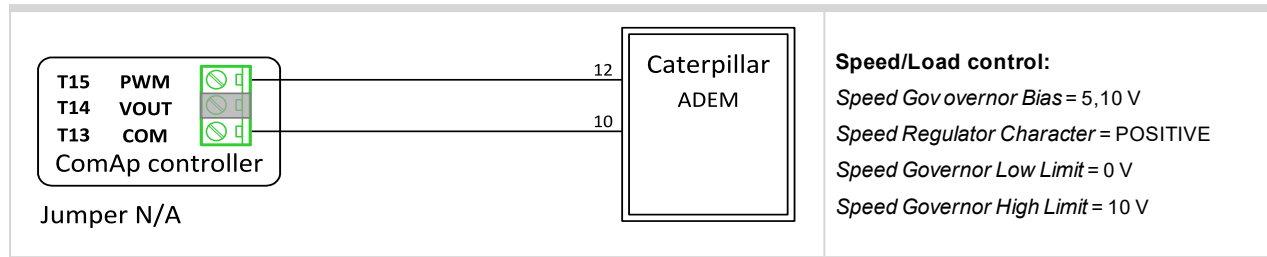
#### Barber Colman DYNA 8000



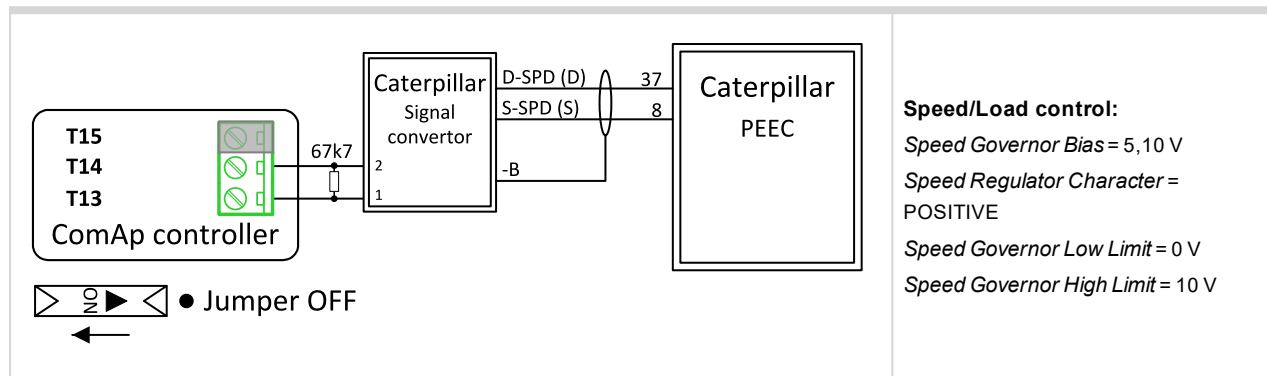
#### Caterpillar ADEM + Signal convertor



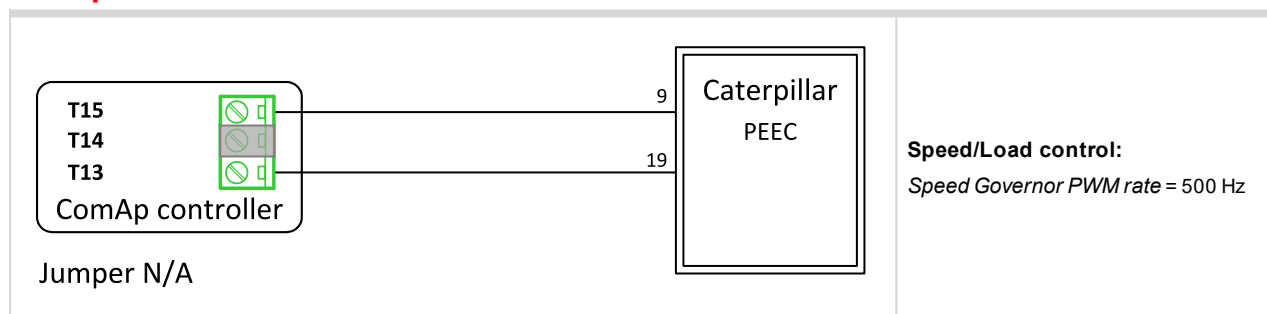
### Caterpillar ADEM



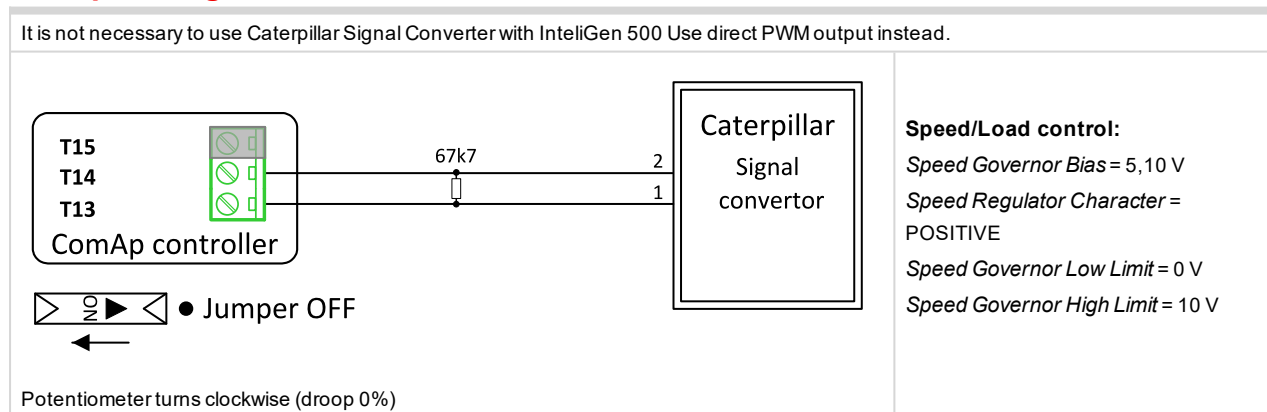
### Caterpillar PEEC + Signal convertor



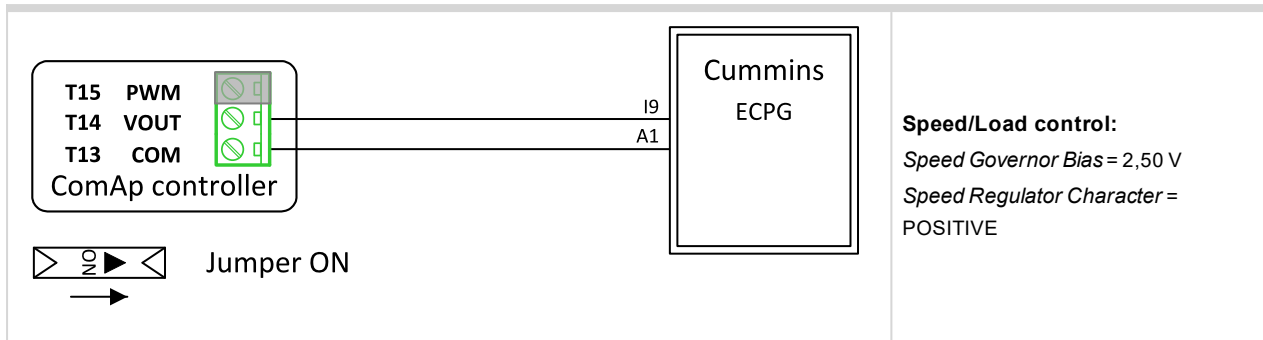
### Caterpillar PEEC



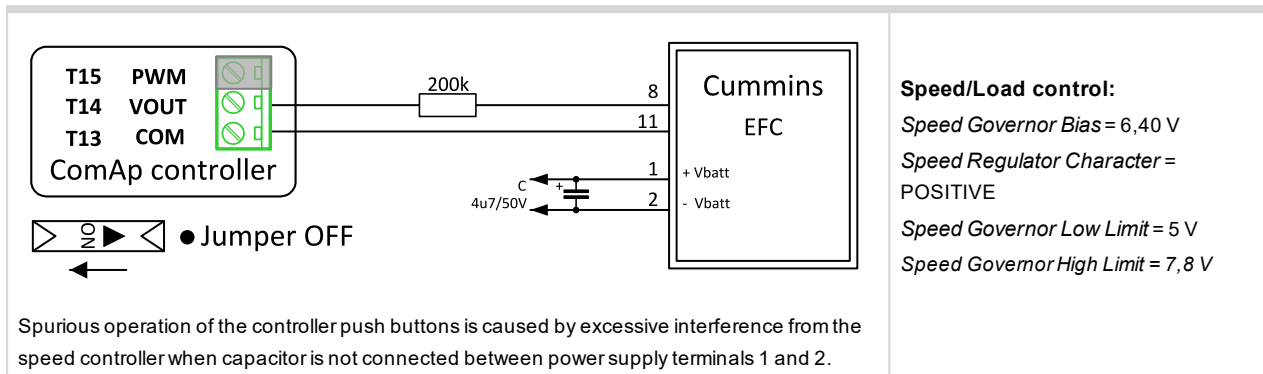
### Caterpillar Signal Converter



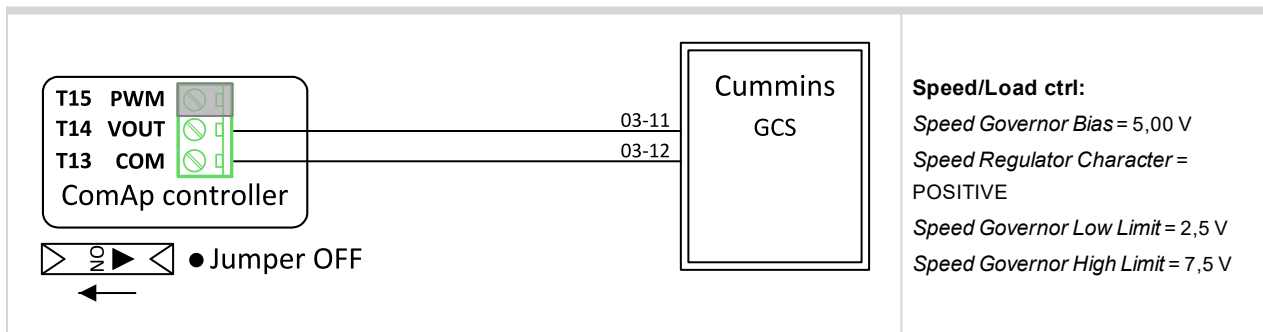
### Cummins ECPG



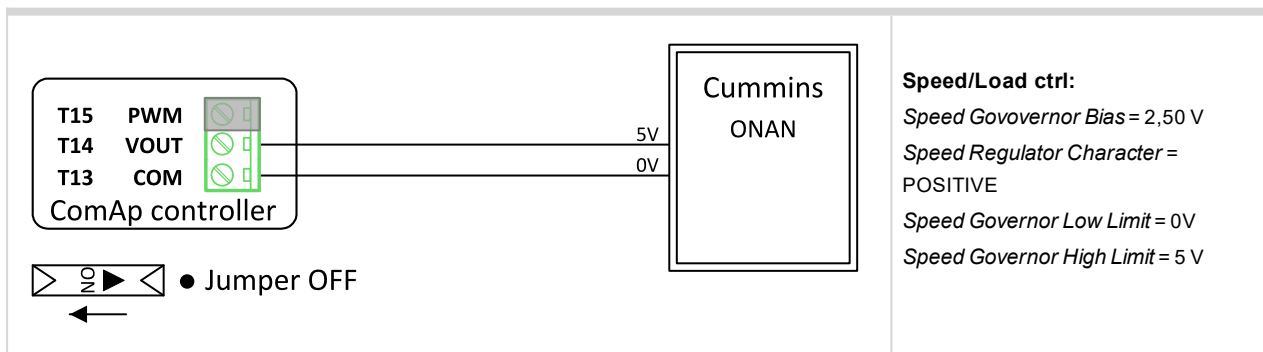
### Cummins EFC



### Cummins GCS

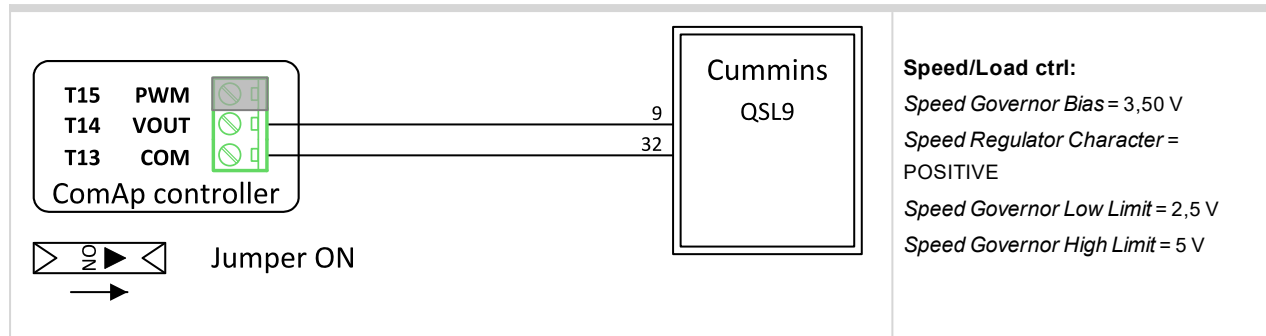


### Cummins ONAN

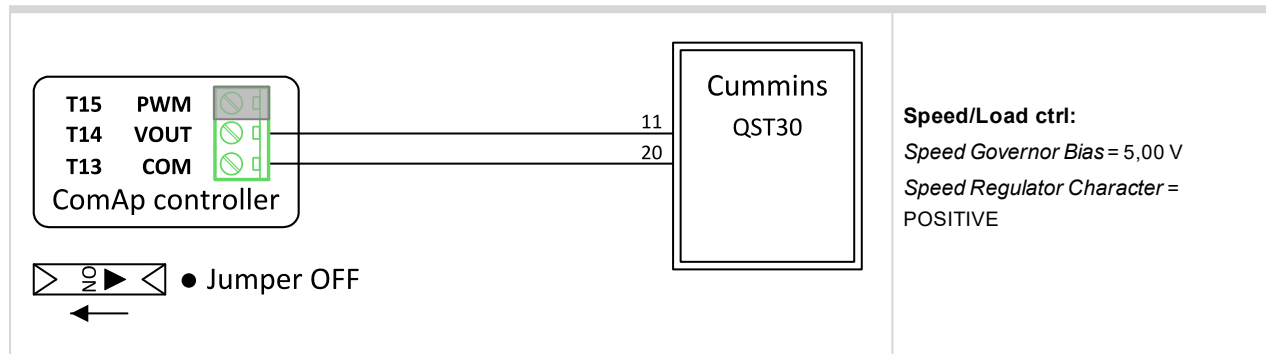




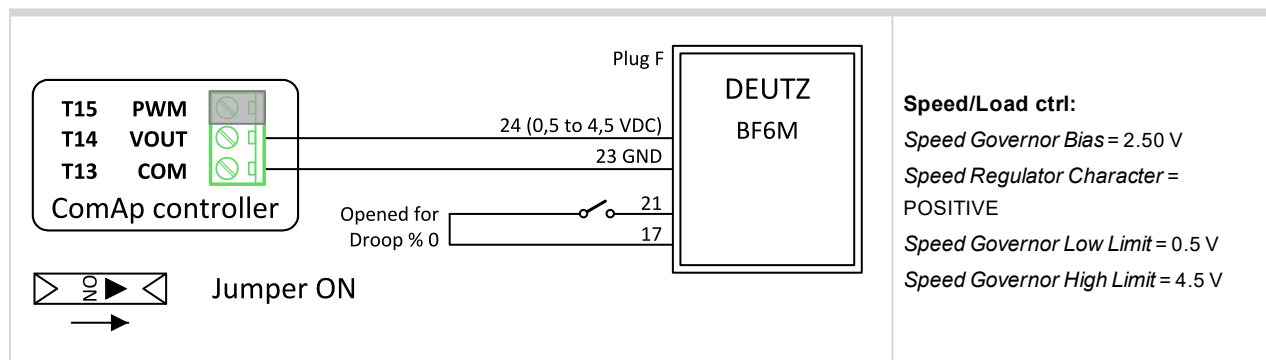
### Cummins QSL9



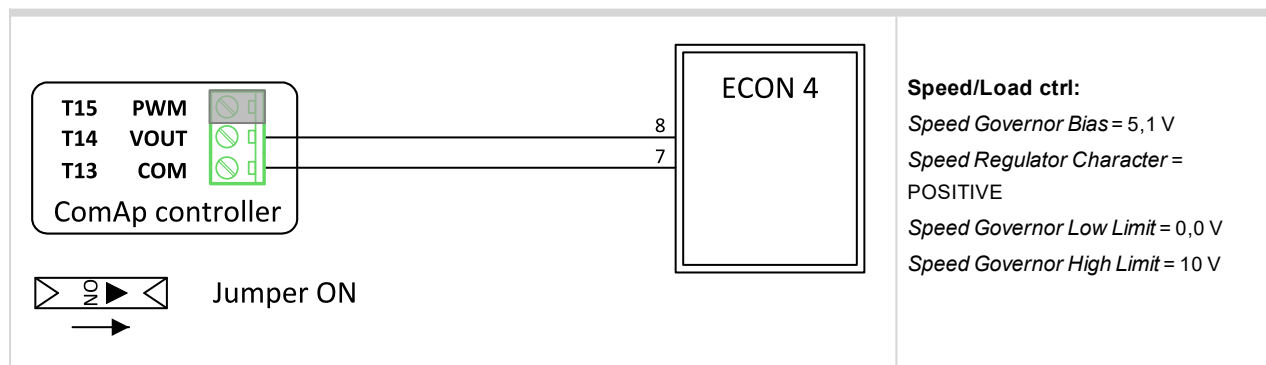
### Cummins QST30



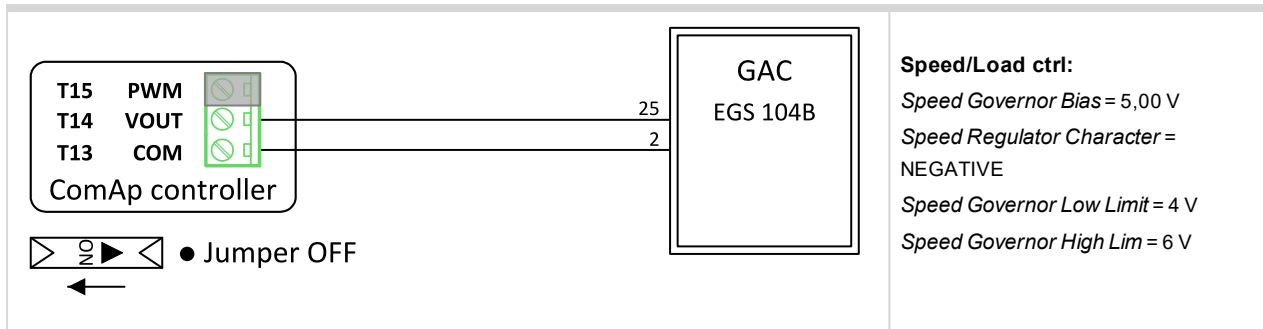
### DEUTZ BF6M



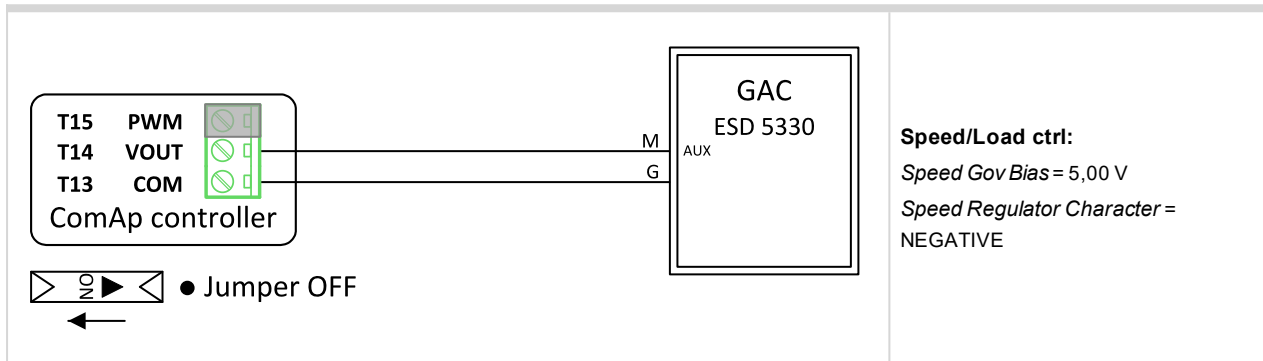
### ECON 4



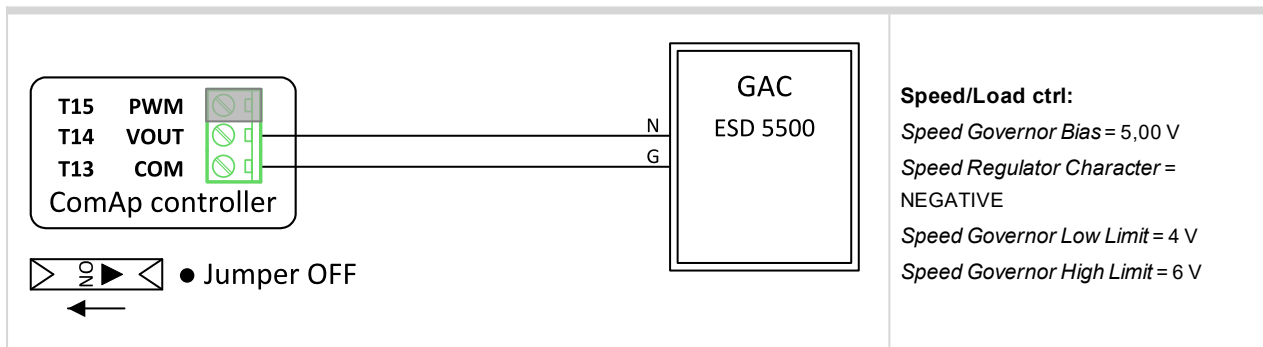
### GAC EGS 104B



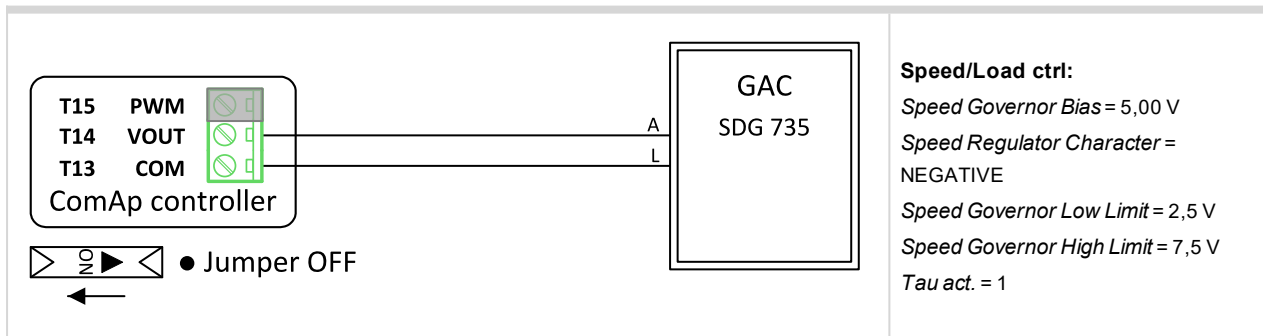
### GAC ESD 5330



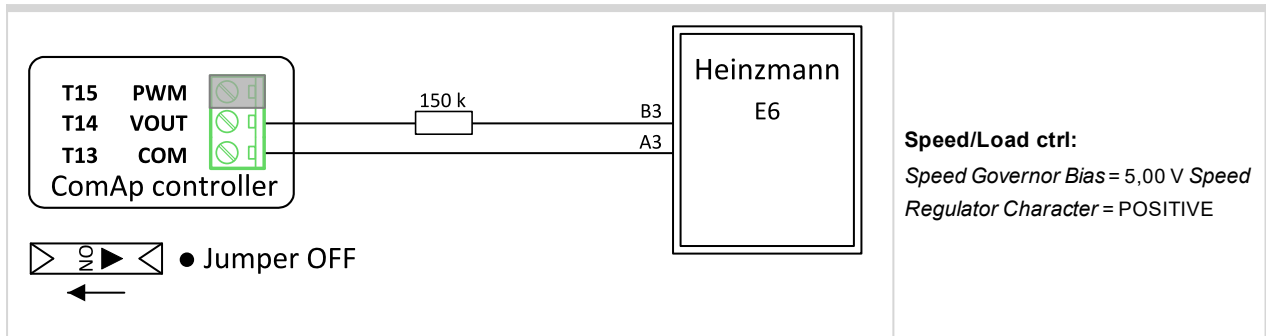
### GAC ESD 5500



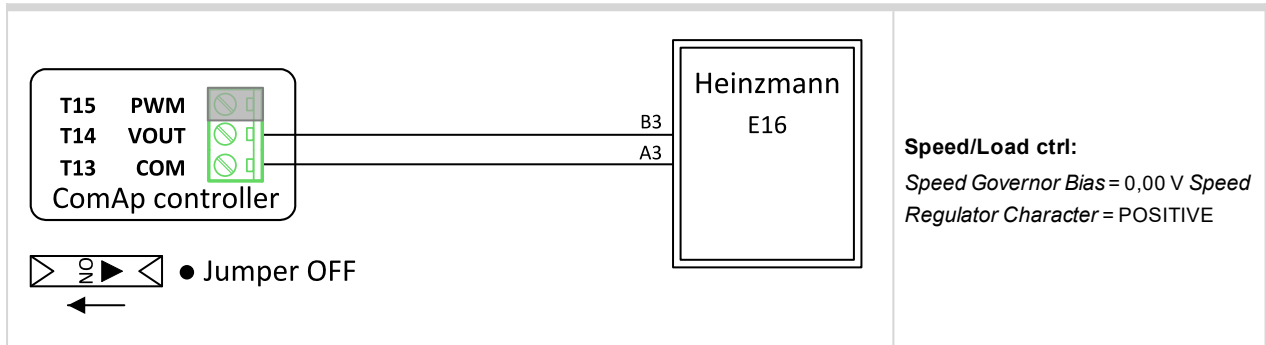
### GAC SDG 735



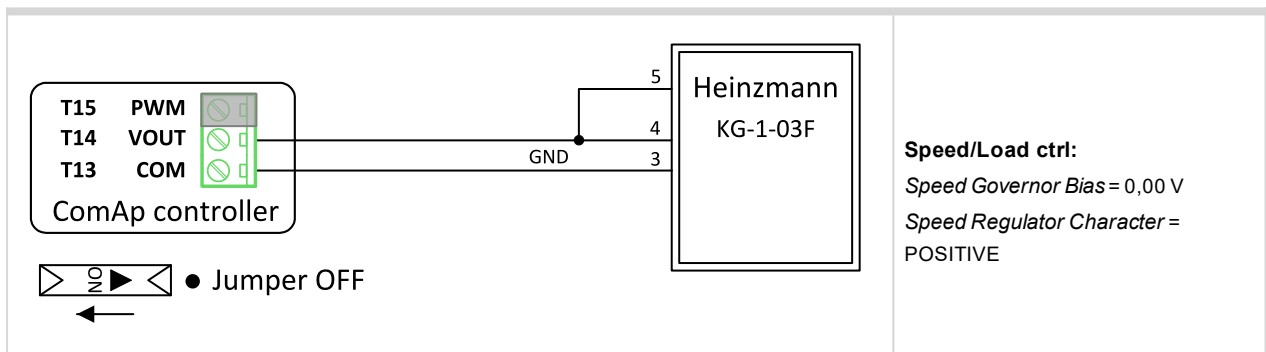
### Heinzmann E6



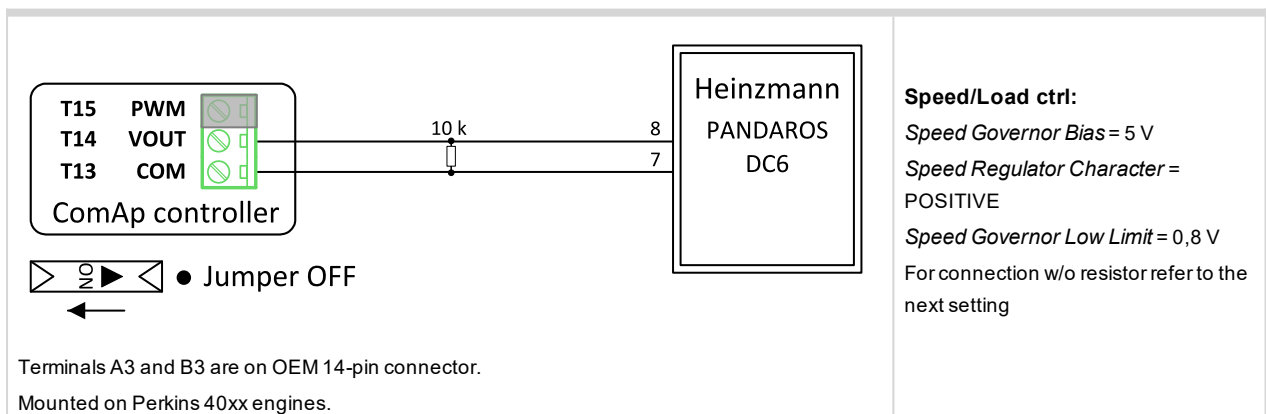
### Heinzmann E16



### Heinzmann KG-1-03F



### Heinzmann PANDAROS DC6



### Heinzmann PANDAROS DC6

|   |                                       |  |
|---|---------------------------------------|--|
| <p>T15 PWM<br/>T14 VOUT<br/>T13 COM</p> <p>ComAp controller</p> | <p>Heinzmann<br/>PANDAROS<br/>DC6</p> | <p><b>Speed/Load ctrl:</b><br/>Speed Governor Bias = 2,7 V<br/>Speed Regulator Character = POSITIVE<br/>Speed Governor Low Limit = 0 V<br/>Speed Governor High Limit = 6 V</p> |
| <p>● Jumper OFF</p>   |                                       |  |

### MTU MDEC 2000, 4000

|   |                                |  |
|---|--------------------------------|--|
| <p>T15 PWM<br/>T14 VOUT<br/>T13 COM</p> <p>ComAp controller</p> | <p>MTU MDEC<br/>2000, 4000</p> | <p><b>Speed/Load ctrl:</b><br/>Speed Governor Bias = 4,90 V<br/>Speed Regulator Character = POSITIVE<br/>Speed Governor Low Limit = 0 V<br/>Speed Governor High Limit = 10 V</p> |
| <p>Jumper ON</p>  |                                |  |

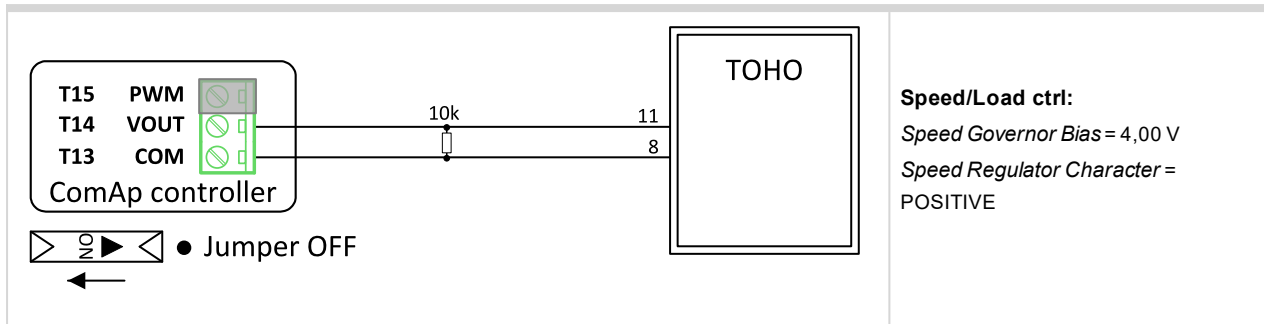
### PERKINS 1300 EDi

|   |                             |  |
|---|-----------------------------|--|
| <p>T15 PWM<br/>T14 VOUT<br/>T13 COM</p> <p>ComAp controller</p> | <p>PERKINS<br/>1300 EDi</p> | <p><b>Speed/Load ctrl:</b><br/>Speed Governor Bias = 2,50 V<br/>Speed Regulator Character = POSITIVE<br/>Speed Governor Low Limit = 0,8V<br/>Speed Governor High Limit = 4,5 V</p> |
| <p>Jumper ON</p>  |                             |  |

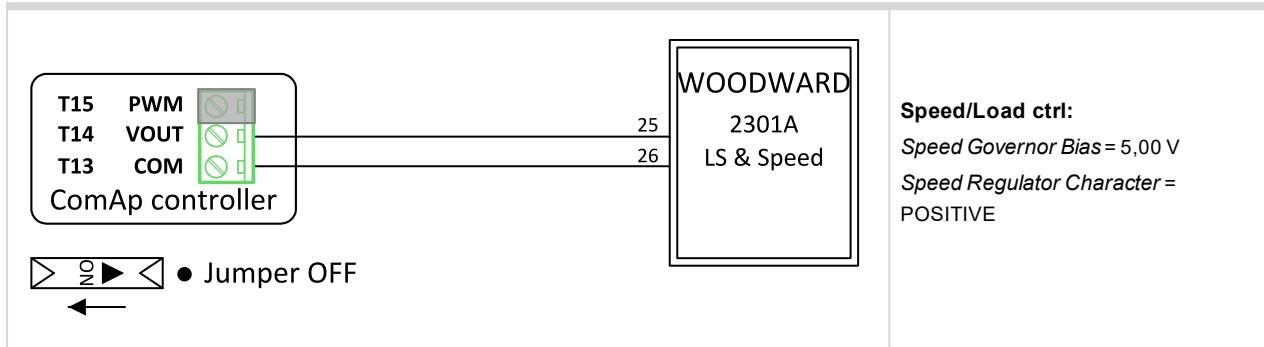
### PERKINS 2300, 2800

|  |                               |   |
|--|-------------------------------|---|
| <p>T15 PWM<br/>T14 VOUT<br/>T13 COM</p> <p>ComAp controller</p>  | <p>PERKINS<br/>2300, 2800</p> | <p><b>Speed/Load ctrl:</b><br/>Speed Governor Bias = 2,50 V<br/>Speed Regulator Character = POSITIVE<br/>Speed Governor Low Limit = 0,5 V<br/>Speed Governor High Limit = 4,5 V</p> |
| <p>Jumper ON</p>   |                               |   |
| <p>Above mentioned pin numbers refer to the Customer Interface Connector. The J1 connector on ECM has the following numbering:<br/>20 = J1/3; 24 = J1/17</p> |                               |   |

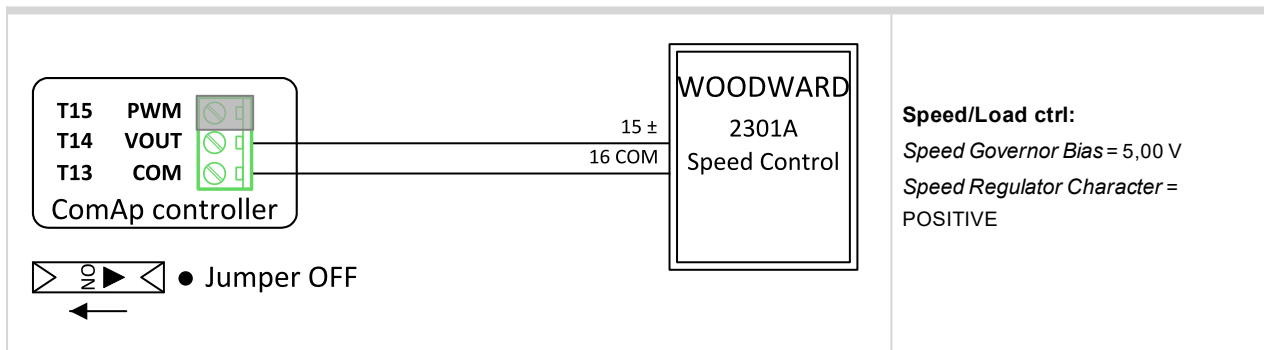
## TOHO



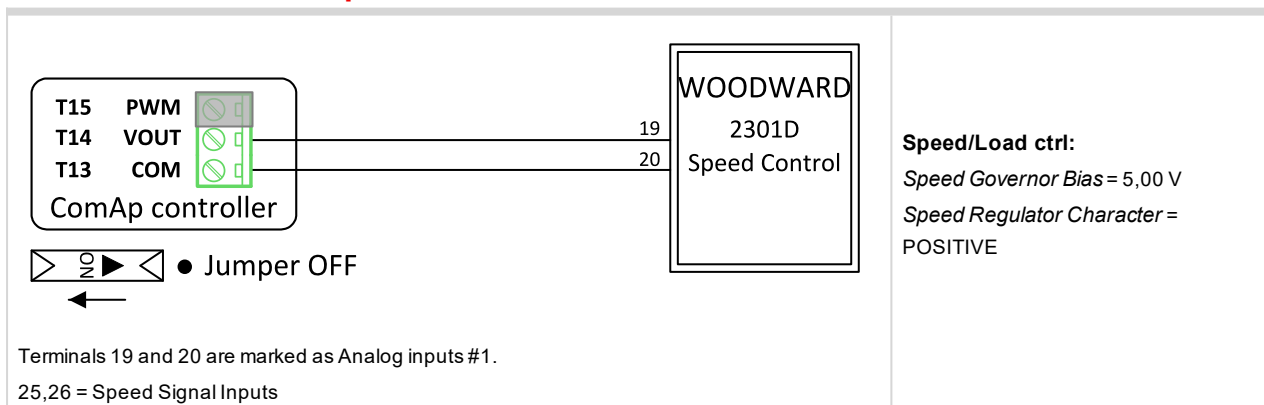
## WOODWARD 2301A LS and Speed



## WOODWARD 2301A Speed Control



## WOODWARD 2301D Speed Control



### WOODWARD DPG 2201

For Woodward DPG 2223 the ILS terminal is 10.

**Speed/Load ctrl:**  
*Speed Governor Bias* = 2,50 V  
*Speed Regulator Character* = POSITIVE  
*Speed Governor Low Limit* = 0 V  
*Speed Governor High Limit* = 5 V

### WOODWARD EPG 1712/512 (1724/524)

**Speed/Load ctrl:**  
*Speed Governor Bias* = 3,1 V  
*Speed Regulator Character* = POSITIVE  
*Speed Governor Low Limit* = 6,5V  
*Speed Governor High Limit* = 0,0 V

### WOODWARD EPG

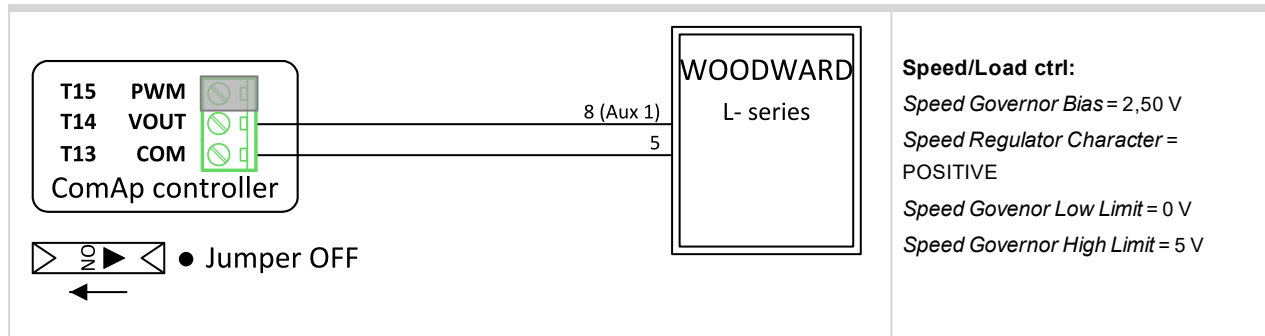
For Woodward EPG speed governor (revision F) are limits:  
*Speed Governor Low Limit* = -3 V  
*Speed Governor High Limit* = + 2 V  
*Speed Governor Bias* = - 0,5 V

**Speed/Load ctrl:**  
*Speed Governor Bias* = 0,00 V  
*Speed Regulator Character* = POSITIVE  
*Speed Governor Low Limit* = - 3 V  
*Speed Governor High Limit* = 3 V

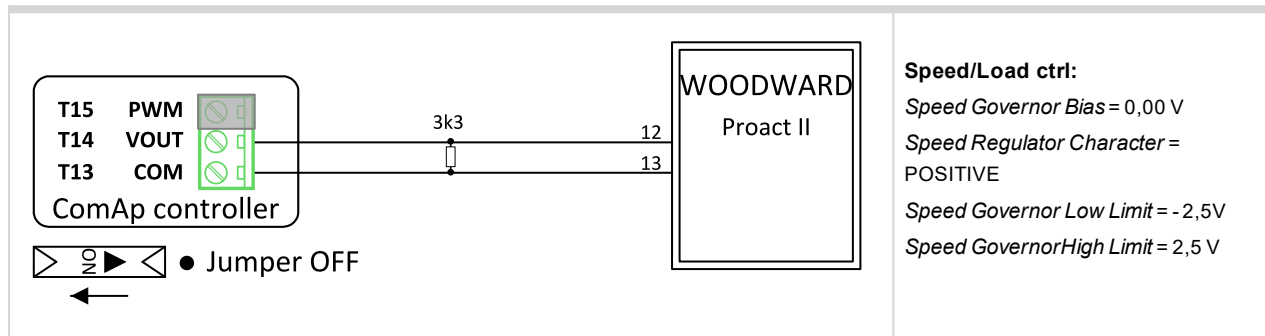
### WOODWARD Flo - tech Speed Control

**Speed/Load ctrl:**  
*Speed Governor Bias* = 0,00 V

## WOODWARD L - series



## WOODWARD Proact II



◀ back to Appendix

## 9.5 Modules

|                             |     |
|-----------------------------|-----|
| 9.5.1 Plug-In modules ..... | 865 |
| 9.5.2 CAN modules .....     | 876 |

### 9.5.1 Plug-In modules

|                             |     |
|-----------------------------|-----|
| Communication modules ..... | 865 |
| Extension modules .....     | 873 |

**IMPORTANT: 2nd generation of IntelliGen 500 controllers does not support new modules and 3rd generation does not support all old modules.**

The available communication plug-in modules are:

- ▶ CM-RS232-485 - communication module for connection via RS232 or RS485 line
- ▶ CM-4G-GPS - communication module for connection via 4G
- ▶ CM-GPRS - communication module for connection via GPRS
- ▶ Ethernet - communication module for internet connection via Ethernet

The available extension plug-in modules are:

- ▶ EM-BIO8-EFCP - extension module with 8 binary inputs/outputs

**Note:** Controller has plug-in module slot.

### Communication modules

|                    |     |
|--------------------|-----|
| CM-RS232-485 ..... | 866 |
|--------------------|-----|

CM-GPRS ..... 868  
 CM-4G-GPS ..... 871

## CM-RS232-485

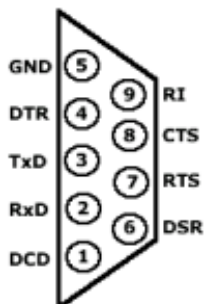
CM-RS232-485 is optional plug-in card to enable IntelliGen 500 the RS232 and RS485 communication. This is required for computer or MODBUS connection. The CM-RS232-485 is a dual port module with RS232 and RS485 interfaces at independent COM channels. The RS232 is connected to COM1 and RS485 to COM2.



Image 9.218 CM-RS232-485 interface

**IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.**

### RS-232 DB-9 Male Pinout



- PIN 1: Data Carrier Detect**
- PIN 2: Receive Data**
- PIN 3: Transmit Data**
- PIN 4: Data Terminal Ready**
- PIN 5: Signal Ground**
- PIN 6: Data Set Ready**
- PIN 7: Request to Send**
- PIN 8: Clear to Send**
- PIN 9: Ring Indicator**

### SERIAL "CROSS-WIRED" CABLE

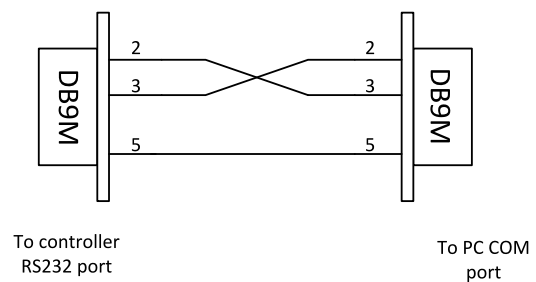


Image 9.219 Pinout of RS-232 line



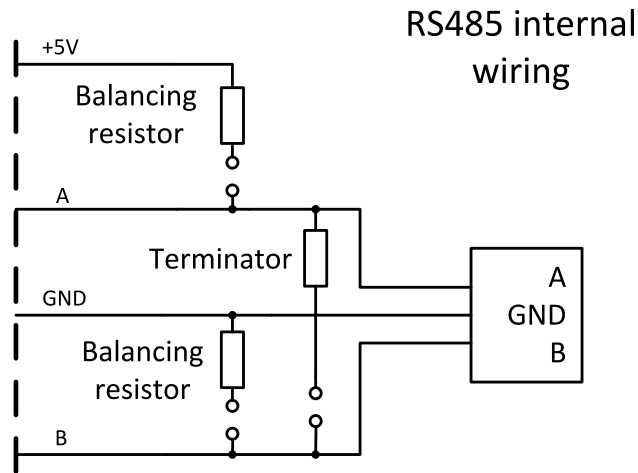


Image 9.220 Pinout of RS-485 line



Image 9.221 Jumpers description

**Note:** Balancing resistors shall be both closed at only one device in whole RS485 network.

Maximal distance of line is 10m for RS232 line and 1200m for RS485 line.

Terminator 120Ω

Balancing resistor +5V

**Technical data**

|                          |                     |
|--------------------------|---------------------|
| <b>Power consumption</b> | 40 mA / 8 VDC       |
|                          | 26 mA / 12 VDC      |
|                          | 14 mA / 24 VDC      |
|                          | 10 mA / 36 VDC      |
| <b>Isolation</b>         | Galvanic separation |

**Firmware upgrade**

- ▶ Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- ▶ Instal package to computer or open PSI to instal it into InteliConfig
- ▶ Plug the module into the controller and power the controller on.
- ▶ Open a connection with controller via InteliConfig
- ▶ Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware

you want to program into the module (in InteliConfig).

- ▶ Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

## CM-GPRS



Image 9.222 CM-GPRS module

**IMPORTANT:** Any manipulation with plug-in module shall be done with disconnected power supply to controller.

**IMPORTANT:** CM-4G-GPS and CM-GPRS modules can't be used in one controller in the same time.

**Note:** GPRS and CSD services must be provided by your GSM/GPRS operator for successful operation.

**Note:** The GPRS and CSD connection should not be used for the firmware update process.

## Technical data

|                   |                |
|-------------------|----------------|
| Power consumption | 32 mA / 8 VDC  |
|                   | 18 mA / 12 VDC |
|                   | 10 mA / 24 VDC |
|                   | 12 mA / 36 VDC |

## SIM card settings

SIM card to be used in CM-4G-GPS or CM-GPRS modules must be adjusted as follows:

- ▶ SMS service enabled
- ▶ Packet data (Internet access) enabled (when required for the selected mode of operation)
- ▶ PIN code security disabled

## How to start using CM-GPRS module

- ▶ You will need a controller, CM-GPRS module, antenna and SIM card with SMS and packet data service.

Make sure that your SIM supports the packet data network type you want to use. I.e. if you want to use the module in GPRS (2,5G) network you have to confirm with the operator that the particular SIM card does support 2,5G network.

- ▶ Make sure SIM card does not require PIN code. Use any mobile phone to switch the SIM PIN security off.
- ▶ Place the SIM card into slot on CM-GPRS card
- ▶ Connect the antenna to Cellular module antenna connector.
- ▶ Switch off the controller.
- ▶ Insert CM-GPRS module into controller
- ▶ Power up the controller.



Image 9.223 Main screen of CM-GPRS module

GSM Diag Code – Diagnostic code for CM-GPRS modem

### GSM Diag Code – Common list of diagnostic codes for cellular modules

| Code | Description   |
|------|---|
| 0    | OK. No error.   |
| 1    | Not possible to hang up.  |
| 2    | Modul is switched off   |
| 3    | Module is switched on   |
| 4    | Module – error in initialization  |
| 5    | Module – not possible to set the APN  |
| 6    | Module – not possible to connect to GPRS network  |
| 7    | Module – not possible to retrieve IP address  |
| 8    | Module – not accepted DNS IP address  |
| 9    | Error in modem detection  |
| 10   | Error in initialization of analog modem   |
| 11   | SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking |
| 12   | No GSM signal   |
| 13   | Not possible to read the SIM card parameters  |
| 14   | GSM modem did not accepted particular initialization command, possibly caused by locked SIM card              |
| 15   | Unknown modem   |
| 16   | Bad answer to complement initialization string  |

|     |  |
|-----|--|
| 17  | Not possible to read GSM signal strength         |
| 18  | CDMA modem not detected                          |
| 19  | No CDMA network                                  |
| 20  | Unsuccessful registration to CDMA network        |
| 21  | SIMCom/ME909s: can't read FW version             |
| 22  | SIMCom: GSM signal not found                     |
| 23  | SIMCom: can't detect module speed                |
| 24  | SIMCom: HW reset issued                          |
| 25  | PUK is required                                  |
| 26  | Error of SIM card detected                       |
| 27  | ME909s: can't set module bps                     |
| 28  | ME909s: can't set link configuration             |
| 29  | ME909s: can't do power-off                       |
| 30  | ME909s: can't do power-on                        |
| 31  | ME909s: can't do hardware reset                  |
| 32  | ME909s: ME909s not started                       |
| 33  | ME909s: switch off issued                        |
| 34  | ME909s: switch on issued                         |
| 35  | ME909s: HW reset issued                          |
| 36  | ME909s: can't switch echo off                    |
| 37  | ME909s: can't find out state of registration     |
| 38  | ME909s: GSM signal not found                     |
| 39  | ME909s: no SIM memory for SMS                    |
| 40  | ME909s: waiting for registration                 |
| 41  | Can't read operator name                         |
| 42  | ME909s: can't set flow control                   |
| 43  | APN not typed                                    |
| 255 | Only running communication is needed to indicate |

### Firmware upgrade

- ▶ Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- ▶ Instal package to computer or open PSI to instal it into InteliConfig
- ▶ Plug the module into the controller and power the controller on.
- ▶ Open a connection with controller via InteliConfig
- ▶ Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- ▶ Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

## CM-4G-GPS



Image 9.224 CM-4G-GPS module

**IMPORTANT:** Any manipulation with plug-in module shall be done with disconnected power supply to controller.

**IMPORTANT:** CM-4G-GPS and CM-GPRS modules cant be used in one controller in the same time.

**IMPORTANT:** Operating temperature of module is from -30°C to +75°C.

**Note:** Cellular data service must be enabled in your SIM card by your mobile operator for successful operation.

Supported 4G bands are as follows:

- ▶ FDD LTE: Band 1, Band 2, Band 3, Band 4, Band 5, Band 7, Band 8, Band 20, all bands with diversity
- ▶ WCDMA/HSDPA/HSUPA/HSPA+: Band 1, Band 2, Band 5, Band 8, all bands with diversity
- ▶ GSM/GPRS/EDGE: 850 MHz/900 MHz/1800 MHz/1900 MHz

### Technical data

|                   |                |
|-------------------|----------------|
| Power consumption | 55 mA / 8 VDC  |
|                   | 35 mA / 12 VDC |
|                   | 8 mA / 24 VDC  |
|                   | 5 mA / 36 VDC  |

### SIM card settings

SIM card to be used in CM-4G-GPS or CM-GPRS modules must be adjusted as follows:

- ▶ SMS service enabled
- ▶ Packet data (Internet access) enabled (when required for the selected mode of operation)
- ▶ PIN code security disabled

### How to start using CM-4G-GPS module

- ▶ You will need a controller, CM-4G-GPS module, antenna and SIMs card with SMS and packet data service.

**Note:** Make sure that your SIM supports the packet data network type you want to use. - i.e. if you want to use the module in LTE (4G) network you have to confirm with the operator that the particular SIM card supports 4G network.

- ▶ Make sure SIM card does not require PIN code. Use any mobile phone to switch the SIM PIN security off.
- ▶ Place the SIM card into slot on CM-4G-GPS card

- ▶ Connect the antenna to Cellular module antenna connector.
- ▶ Switch off the controller.
- ▶ Insert CM-4G-GPS module into controller
- ▶ Power up the controller.

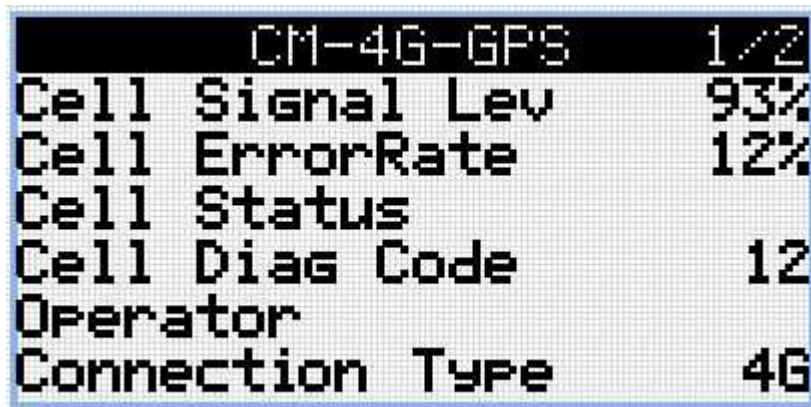


Image 9.225 Main screen of CM-4G-GPS module

GSM Diag Code – Common list of diagnostic codes for cellular modules

### GSM Diag Code – Common list of diagnostic codes for cellular modules

| Code | Description   |
|------|---|
| 0    | OK. No error.   |
| 1    | Not possible to hang up.  |
| 2    | Modul is switched off   |
| 3    | Module is switched on   |
| 4    | Module – error in initialization  |
| 5    | Module – not possible to set the APN  |
| 6    | Module – not possible to connect to GPRS network  |
| 7    | Module – not possible to retrieve IP address  |
| 8    | Module – not accepted DNS IP address  |
| 9    | Error in modem detection  |
| 10   | Error in initialization of analog modem   |
| 11   | SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking |
| 12   | No GSM signal   |
| 13   | Not possible to read the SIM card parameters  |
| 14   | GSM modem did not accepted particular initialization command, possibly caused by locked SIM card              |
| 15   | Unknown modem   |
| 16   | Bad answer to complement initialization string  |
| 17   | Not possible to read GSM signal strength  |
| 18   | CDMA modem not detected   |

|     |  |
|-----|--|
| 19  | No CDMA network                                  |
| 20  | Unsuccessful registration to CDMA network        |
| 21  | SIMCom/ME909s: can't read FW version             |
| 22  | SIMCom: GSM signal not found                     |
| 23  | SIMCom: can't detect module speed                |
| 24  | SIMCom: HW reset issued                          |
| 25  | PUK is required                                  |
| 26  | Error of SIM card detected                       |
| 27  | ME909s: can't set module bps                     |
| 28  | ME909s: can't set link configuration             |
| 29  | ME909s: can't do power-off                       |
| 30  | ME909s: can't do power-on                        |
| 31  | ME909s: can't do hardware reset                  |
| 32  | ME909s: ME909s not started                       |
| 33  | ME909s: switch off issued                        |
| 34  | ME909s: switch on issued                         |
| 35  | ME909s: HW reset issued                          |
| 36  | ME909s: can't switch echo off                    |
| 37  | ME909s: can't find out state of registration     |
| 38  | ME909s: GSM signal not found                     |
| 39  | ME909s: no SIM memory for SMS                    |
| 40  | ME909s: waiting for registration                 |
| 41  | Can't read operator name                         |
| 42  | ME909s: can't set flow control                   |
| 43  | APN not typed                                    |
| 255 | Only running communication is needed to indicate |

### Firmware upgrade

- ▶ Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- ▶ Instal package to computer or open PSI to instal it into InteliConfig
- ▶ Plug the module into the controller and power the controller on.
- ▶ Open a connection with controller via InteliConfig
- ▶ Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- ▶ Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

### Extension modules

|                    |     |
|--------------------|-----|
| EM-BIO8-EFCP ..... | 874 |
|--------------------|-----|



### EM-BIO8-EFCP

EM-BIO8-EFCP is optional plug-in card. Through this card controller can accommodate up to 8 binary inputs or outputs. In IntelConfig PC configuration tool it is possible to easily choose if particular I/O will be binary input or output.

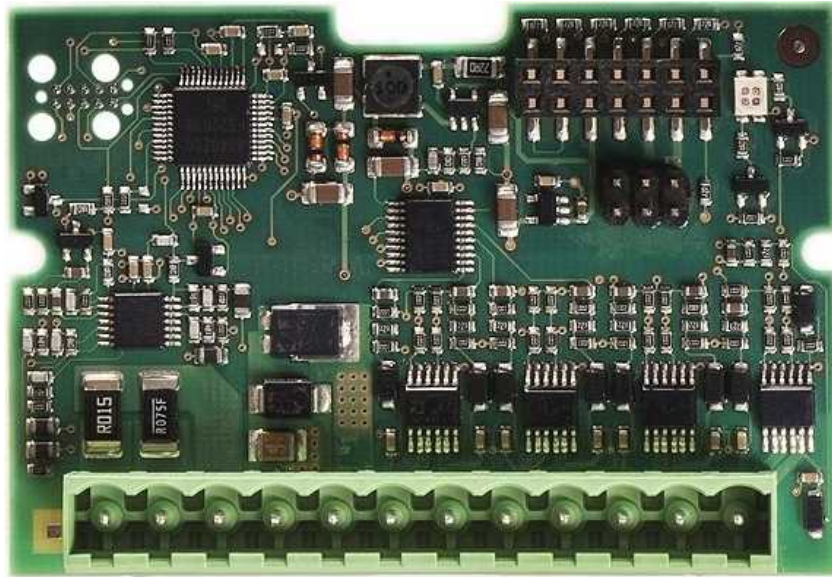
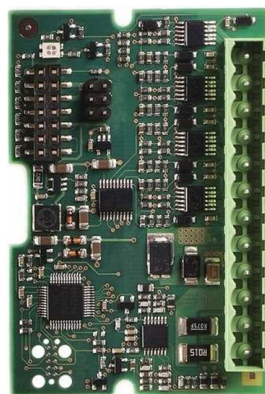


Image 9.226 EM-BIO8-EFCP interface

**IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.**



- Binary IN/OUT 8 -A
- Binary IN/OUT 7 -B
- Binary IN/OUT 6 -C
- Binary IN/OUT 5 -D
- Binary IN/OUT 4 -E
- Binary IN/OUT 3 -F
- Binary IN/OUT 2 -G
- Binary IN/OUT 1 -H
- Battery + -I
- COM -J
- 1A input -K
- 5A input -L

Image 9.227 Overview of EM-BIO8-EFCP



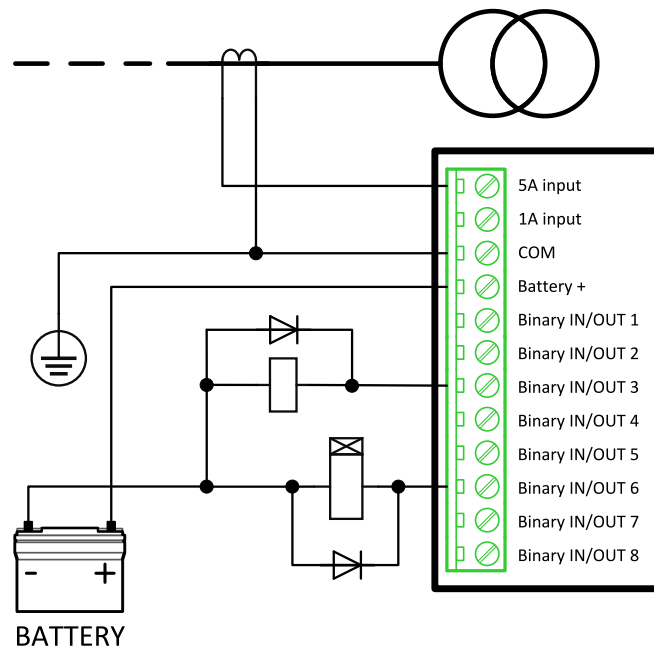


Image 9.228 EM-BIO8-EFCP wiring

## EM-BIO8-EFCP technical data

### Power supply

|                    |                |
|--------------------|----------------|
| Power supply range | 8-36 VDC       |
| Power consumption  | 40 mA / 8 VDC  |
|                    | 27 mA / 12 VDC |
|                    | 22 mA / 24 VDC |
|                    | 19 mA / 36 VDC |

### Binary inputs

|                       |  |
|-----------------------|--|
| Number                | Up to 8, non-isolated                        |
| Close/Open indication | 0-2 VDC close contact<br>>6 VDC open contact |

### Binary outputs

|              |                          |
|--------------|--------------------------|
| Number       | Up to 8, non-isolated    |
| Max. current | 0,5A                     |
| Switching to | positive supply terminal |

### Earth fault current measurement

The Earth Fault protection is done by the extension module EM-BIO8-EFCP.

When the measured current exceeds the set value, which indicates that part of the current is dispersed to earth, and when the set **Earth Fault Delay** (page 490) time elapses, the **Earth Fault Current Protection** (page 489), **Sd Earth Fault Current** (page 822) alarm and **AL EARTH FAULT** (PAGE 688) output are activated. Earth Fault protection is not active when gen-set does not run and when the **Earth Fault Current Protection** (page 489) is disabled.

**IMPORTANT: Earth fault current measurement is not intended to protect human health, but the machines!**

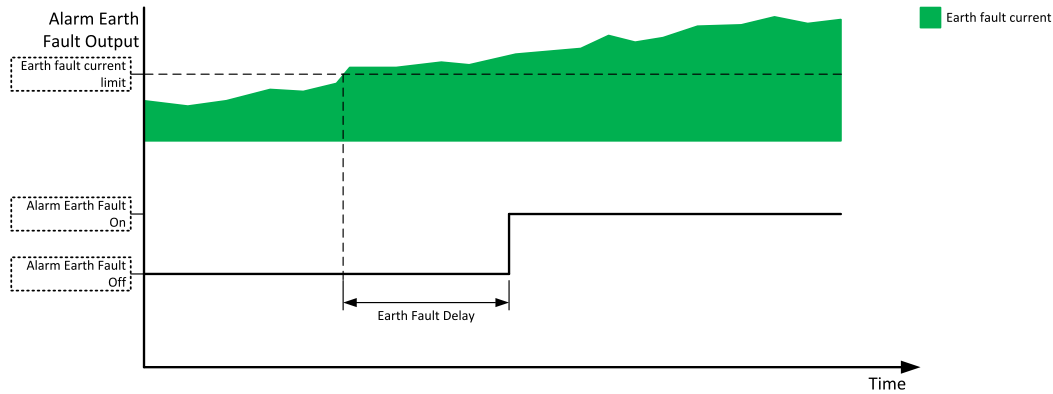


Image 9.229 Earth fault current protection

### Firmware upgrade

- ▶ Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- ▶ Instal package to computer or open PSI to instal it into InteliConfig
- ▶ Plug the module into the controller and power the controller on.
- ▶ Open a connection with controller via InteliConfig
- ▶ Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- ▶ Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

## 9.5.2 CAN modules

Extension modules .....877

The available extension CAN modules are:

- ▶ Inteli AIN8 - extension CAN module with 8 analog inputs
- ▶ Inteli IO8/8 - extension CAN module with 8 binary inputs, 8 binary outputs and 2 analog outputs
  - this CAN module can be switched to Inteli IO16/0 - extension CAN module with 16 binary inputs and 2 analog outputs

### Supported combinations of modules

| Slot | Inteli AIN8 | Inteli AIN8TC | Inteli IO8/8 | Inteli IO16/0 | IGL-RA15 | IGS-PTM | Inteli AIO9/1 |
|------|-------------|---------------|--------------|---------------|----------|---------|---------------|
| 1    | ✓           | ✓             | ✓            | ✓             | ✓        | ✓       | ✓             |
| 1    | ✓           | ✓             | ✓            | ✓             | ✓        | ✓       | ✓             |
| 3    | ✓           | ✓             | ✓            | ✓             | ✓        | ✗       | ✗             |

| Slot | Intel AIN8 | Intel AIN8TC | Intel IO8/8 | Intel IO16/0 | IGL-RA15 | IGS-PTM | Intel AIO9/1 |
|------|------------|--------------|-------------|--------------|----------|---------|--------------|
| 4    | ✓          | ✓            | ✓           | ✓            | ✓        | ✗       | ✗            |
| 5    | ✗          | ✗            | ✓           | ✓            | ✗        | ✗       | ✗            |

**IMPORTANT:** In slot 3, 4 and 5 CAN modules Intel IO8/8 and Intel IO16/0 are supported without analog outputs. Analog outputs of these CAN modules are supported only in slot 1 and 2.

It is possible to add up to 80 binary inputs or up to 68 binary outputs or up to 32 analog inputs on CAN modules.

### Extension modules

|                    |     |
|--------------------|-----|
| Intel AIN8 .....   | 877 |
| Intel AIN8TC ..... | 883 |
| Intel IO8/8 .....  | 886 |
| IGS-PTM .....      | 893 |

### Intel AIN8

Intel AIN8 module is extension module equipped with analog inputs. Intel AIN8 module is connected to controller by CAN1 bus.



Image 9.230 Intel AIN8

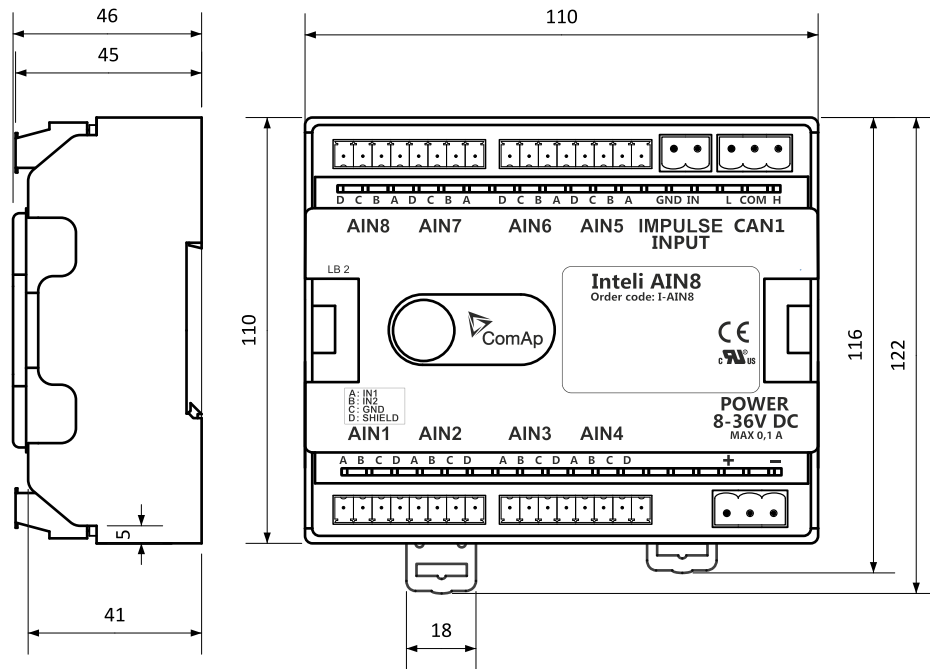
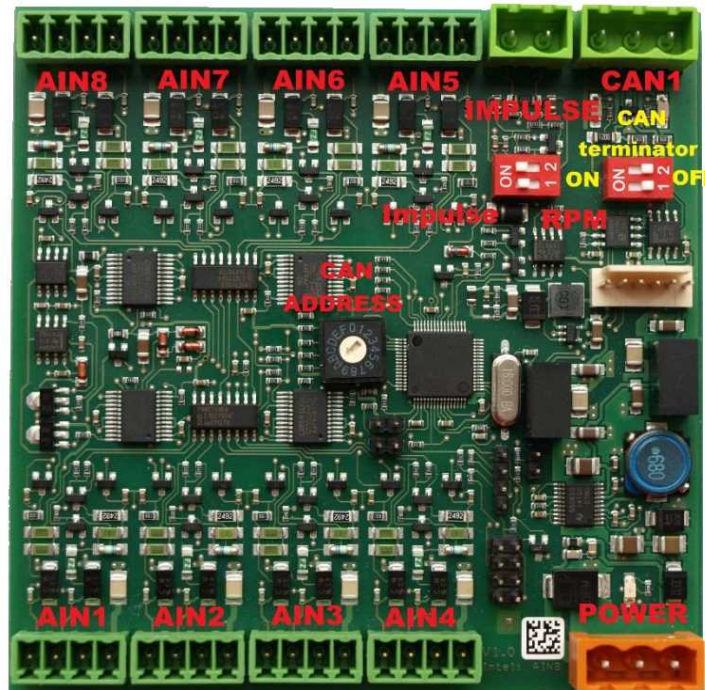


Image 9.231 Intel AIN8 dimensions

**Note:** All dimensions are in mm.

### Terminals



|                |   |
|----------------|---|
| Analog input   | 8 analog Inputs   |
| CAN            | CAN1 line   |
| Power          | Power supply  |
| CAN LED Tx, Rx | Indication transmitted or received data                                   |
| Status LED     | LED indication of correct function  |
| CAN terminator | Terminating CAN resistor (active in position "ON" - switch both switches) |

**Note:** Impulse input is not supported.

## Analog inputs

- ▶ 8 channels
- ▶ can be configured as:
  - resistor three wire input
  - current input
  - voltage input

All inputs can be configured to any logical function or protection.

**IMPORTANT:** Impulse input is not supported in controller.

## Supported sensors

| Sensors           |                   |                |
|-------------------|-------------------|----------------|
| User curves       | NI100 [°F] (fix)  | 0-5V           |
| PT100 [°C] (fix)  | NI1000 [°F] (fix) | 0-10V          |
| PT1000 [°C] (fix) |                   | 4-20mA passive |
| NI100 [°C] (fix)  | 0-2400ohm         | 4-20mA active  |
| NI1000 [°C] (fix) | 0-10k ohm         | 0-20mA passive |
| PT100 [°F] (fix)  | +1V               | +20mA active   |
| PT1000 [°F] (fix) | 0-2.4V            |                |

## CAN address

DIP switch determinates CAN address for analog inputs.



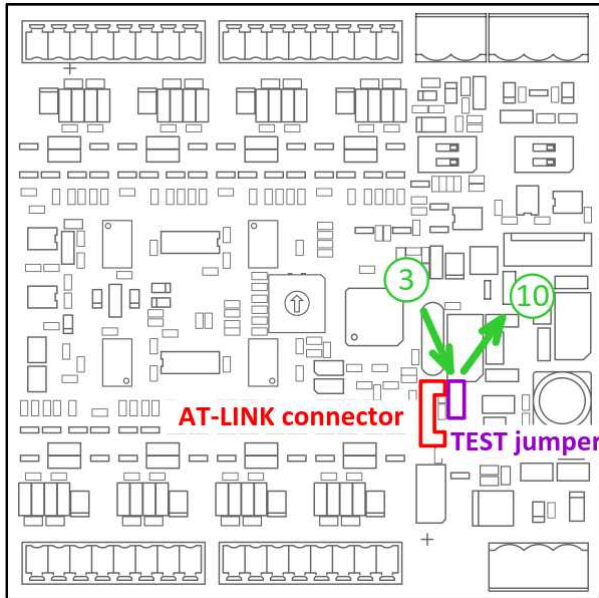
**Note:** In case of setting the CAN address to zero, the appropriate group of signals is deactivated.

## Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Separate the top cover of module
3. Put the TEST jumper on a pins

4. Connect the unit with PC via RS232-null modem cable and AT-Link conv



5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli AIN8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press Start button
9. Wait till process is done (If the process doesn't start – after 60 second the "Timeout" will be evaluated. In this case please check:
  - ▶ You have proper connection with the unit
  - ▶ COM port selection is correct
  - ▶ Module has power supply, (no CAN bus connection, status LED lights continuously)
10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blinking)
12. Module FW is upgraded

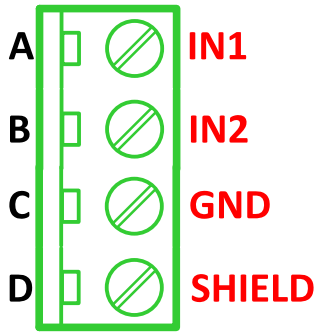
### LED indication

| LED status | Description  |
|------------|--|
| Dark       | Fw in module does not work correctly.  |
| Flashing   | Module does not communicate with controller (in case non-zero CAN address).  |
| Lights     | Power supply is in the range and the communication between Inteli AIN8 and controller works properly.<br>Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller). |

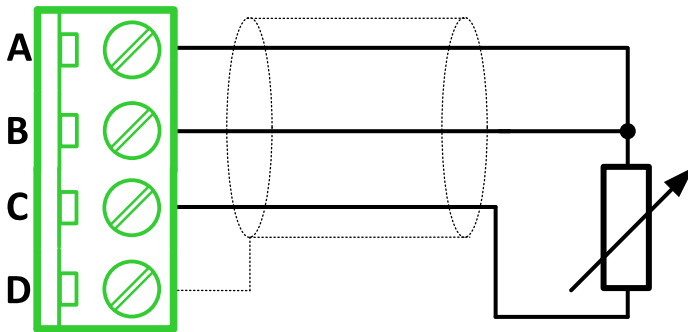
### Wiring

The following diagrams show the correct connection of sensors.

Terminator

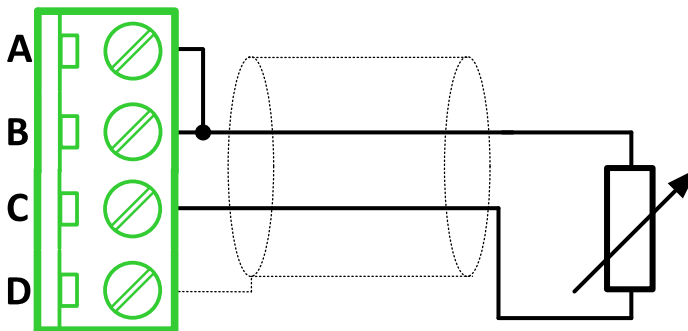


Resistance sensor - 3 wires



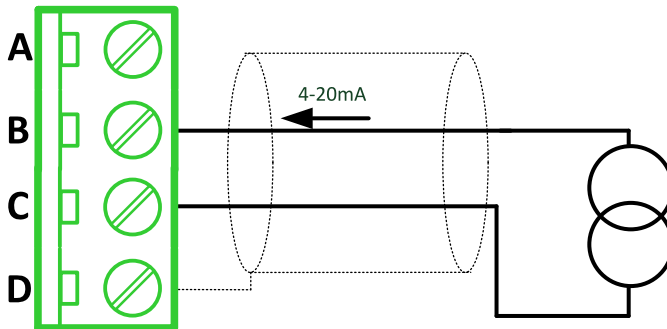
*Note:* Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400  $\Omega$ , 0 – 10 k $\Omega$

Resistance sensor - 2 wires



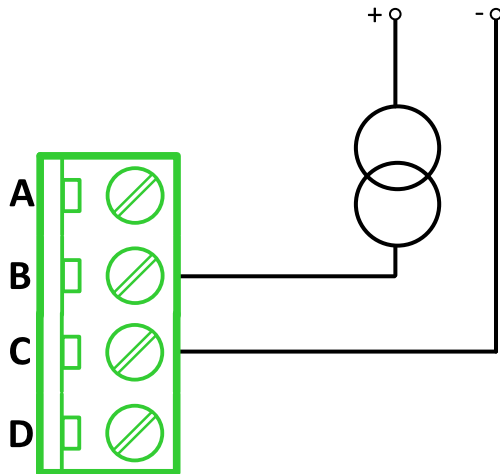
*Note:* Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400  $\Omega$ , 0 – 10 k $\Omega$

Current sensor - active



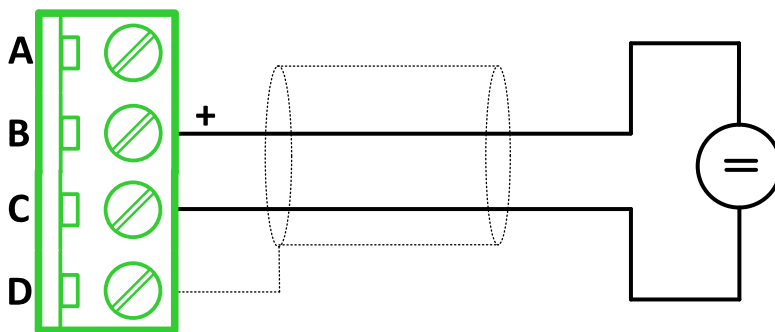
*Note:* Ranges:  $\pm 20$  mA, 4 – 20 mA

### Current sensor - passive



**Note:** Ranges: 0 – 20 mA, 4 – 20 mA

### Voltage sensor



**Note:** Ranges:  $\pm 1$  V, 0 – 2,5 V, 0 – 5 V, 0 – 10 V

### Technical data

#### General data

|                         |                                |
|-------------------------|--------------------------------|
| Power supply            | 8 to 36 V DC                   |
| Current consumption     | 35 mA at 24 V ÷ 100 mA at 8 V  |
| Interface to controller | CAN1                           |
| Protection              | IP20                           |
| Storage temperature     | - 40 °C to + 80 °C             |
| Operating temperature   | - 30 °C to + 70 °C             |
| Dimensions (WxHxD)      | 110x110x46 mm (4,3"x4,3"x1,8") |
| Weight                  | 221,5 grams                    |

#### Analog inputs

|                    |  |
|--------------------|--|
| Number of channels | 8  |
| Voltage            | Range 0-10 V<br>Accuracy: $\pm 0,25$ % of actual value + $\pm 25$ mV |
| Current            | Range: $\pm 20$ mA   |



|           |  |
|-----------|--|
|           | Accuracy: $\pm 0,25\%$ of actual value + $\pm 50\ \mu\text{A}$ |
| Resistive | Range: 0- 10 k $\Omega$  |
|           | Accuracy: $\pm 0,5\%$ of actual value + $\pm 2\ \Omega$        |

### Inteli AIN8TC

Inteli AIN8TC module is extension module equipped with 8 analog inputs dedicated for thermocouple sensors only.

Inteli AIN8TC module is connected to controller by CAN1 bus.



Image 9.232 IntelI AIN8TC

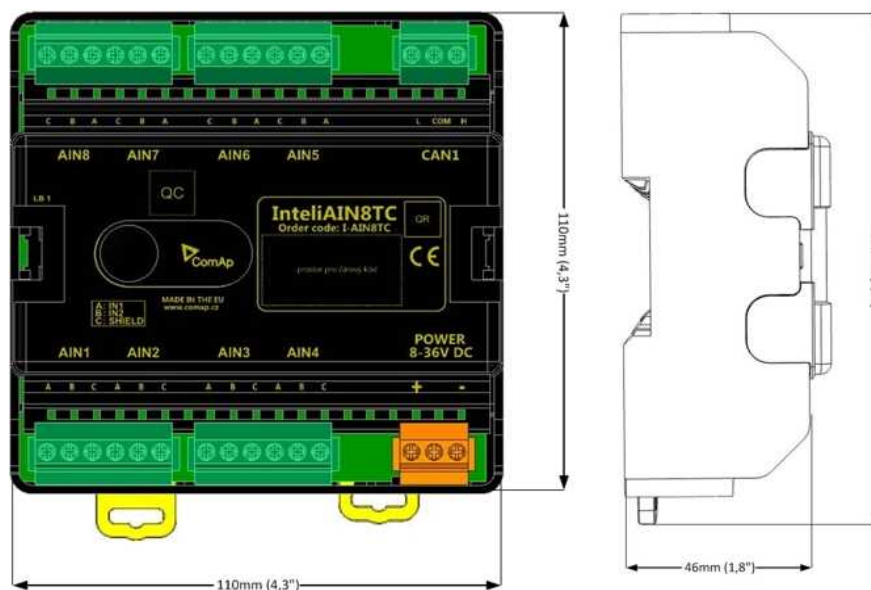


Image 9.233 IntelI AIN8TC dimensions

## Terminals



|                |   |
|----------------|---|
| Analog input   | 8 analog Inputs   |
| CAN            | CAN1 line   |
| Power          | Power supply  |
| CAN LED Tx, Rx | Indication transmitted or received data                                   |
| Status LED     | LED indication of correct function  |
| CAN terminator | Terminating CAN resistor (active in position "ON" - switch both switches) |

**Note:** Impulse input is not supported.

### Analog inputs

- ▶ 8 channels
- ▶ Can be configured as thermocouple sensors only

All inputs can be configured to any logical function or protection

### Supported sensors

| Sensors                |                             |
|------------------------|-----------------------------|
| Thermocpl J [°C] (fix) | Thermocpl (nc) J [°C] (fix) |
| Thermocpl K [°C] (fix) | Thermocpl (nc) K [°C] (fix) |
| Thermocpl L [°C] (fix) | Thermocpl (nc) L [°C] (fix) |
| Thermocpl J [°F] (fix) | Thermocpl (nc) J [°F] (fix) |
| Thermocpl K [°F] (fix) | Thermocpl (nc) K [°F] (fix) |
| Thermocpl L [°F] (fix) | Thermocpl (nc) L [°F] (fix) |

**Note:** “nc” means “not cold junction compensation (by external sensor). In this case is used internal temperature sensor on the PCB

### CAN address

DIP switch determinates CAN address for analog inputs.



**Note:** In case of setting the CAN address to zero, the appropriate group of signals is deactivated.

### Programming firmware

Firmware is upgraded via AT-link (TTL). For programming it is necessary to close jumper TEST.

For programming FlashProg PC tool version 4.2 or higher must be used.

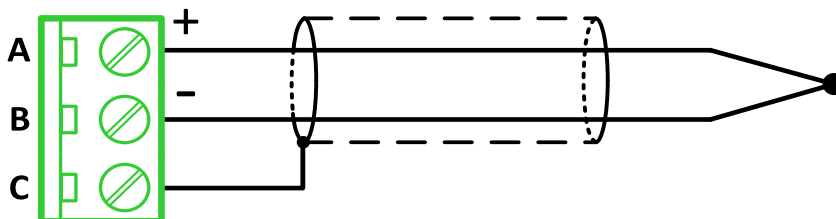
### LED indication

| LED status    | Description   |
|---------------|---|
| Dark          | Fw in module does not work correctly.   |
| Flashing      | Module does not communicate with controller (in case non-zero CAN address)  |
| Fast flashing | Detection of CAN communication speed  |
| Lights        | Power supply is in the range and the communication between Inteli AIN8TC and controller works properly.<br>Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller) |

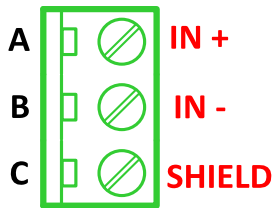
### Wiring

The following diagrams show the correct connection of sensors.

#### Thermocouple



## Terminator



## Technical data

### General data

|                         |  |
|-------------------------|--|
| Power supply            | 8 to 36 V DC                           |
| Current consumption     | 35 mA at 24 V ÷ 100 mA at 8 V          |
| Interface to controller | CAN1                                   |
| Protection              | IP20                                   |
| Storage temperature     | - 40 °C to + 80 °C                     |
| Operating temperature   | - 30 °C to + 70 °C                     |
| Dimensions (WxHxD)      | 110 × 110 × 46 mm (4.3" × 4.3" × 1.8") |
| Weight                  | 237.5 grams                            |

### Analog inputs

|                    |   |
|--------------------|---|
| Number of channels | 8, no galvanic separated  |
| Voltage            | Range: ± 100 mV<br>Accuracy: ± 0.1 % of actual value + ± 100 µV<br>(± 3 °C) |

## Inteli IO8/8

Inteli IO8/8 module is an extension module equipped with binary inputs, binary outputs and analog outputs.

Inteli IO8/8 is the name of the module, but it is possible to configure the module (by internal switch) to two configurations:

- ▶ Inteli IO8/8 - 8 binary inputs, 8 binary outputs and 2 analog outputs
- ▶ Inteli IO16/0 - 16 binary inputs, 0 binary outputs and 2 analog outputs

The detection of communication speed is indicated by fast flashing of status LED. Once the speed is detected the module remains set for the speed even when the communication is lost. Renewal of communication speed detection is done by reset of the module.



Image 9.234 IntelI IO8/8

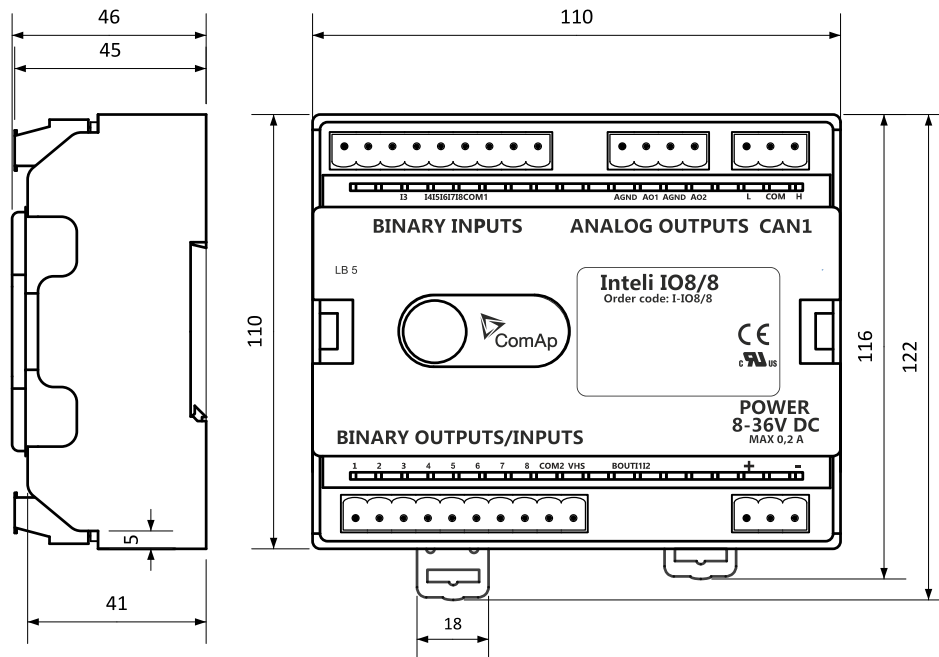
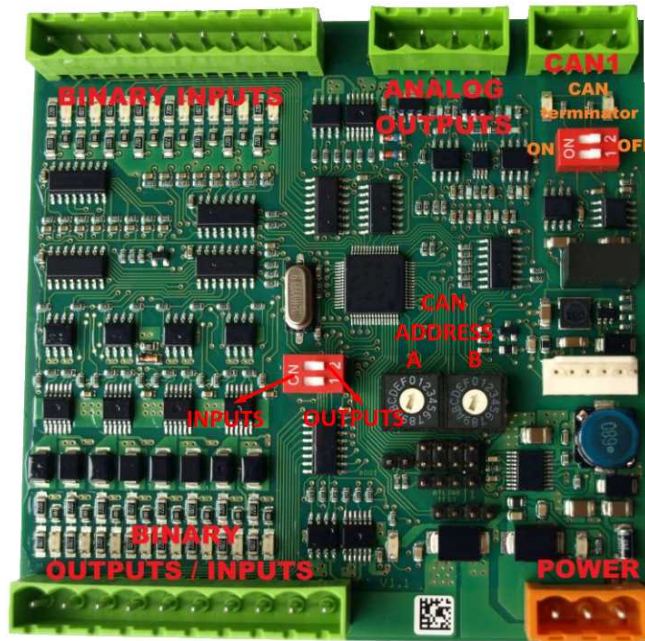


Image 9.235 IntelI IO8/8 dimensions

**Note:** All dimensions are in mm.

## Terminals



|                     |   |
|---------------------|---|
| Binary inputs       | 8 binary inputs   |
| Binary outputs      | 8 binary outputs (8 binary inputs)  |
| Analog outputs      | 2 analog outputs  |
| CAN                 | CAN1 line   |
| Power               | Power supply  |
| Binary inputs LEDs  | 8 LEDs for binary input indication  |
| Binary outputs LEDs | 8 LEDs for binary output indication                                       |
| CAN LED             | Indication transmitted or received data                                   |
| Status              | LED indication of correct function  |
| CAN terminator      | Terminating CAN resistor (active in position "ON" - switch both switches) |

## Inputs and outputs

### Binary inputs

- ▶ 8 channels
- ▶ can be configured as:
  - pull up
  - pull down

All 8 inputs are configured to one type together.

All inputs can be configured to any logical function or protection.

### Binary outputs

- ▶ 8 channels
- ▶ can be configured as:
  - High side switch
  - Low side switch

Always all 8 inputs are configured to one type (HSS/LSS) together. All 8 outputs can be modified to inputs by switch on the PCB ( Intel IO8/8 to Intel IO16/0).

### Analog outputs

- ▶ 2 channels
- ▶ can be configured as:
  - voltage 0-10V
  - current 0-20mA
  - PWM (level 5V, with adjustable frequency from 200Hz to 2400Hz, with step 1Hz)

All inputs/outputs can be configured to any logical function or protection.

### Output state check

Output state check function evaluates in real time the state of binary outputs and adjusted (required) state. In case of failure (different state of required state and real state) history record and alarm are issued (type of the alarm is set by “Protection upon module failure” - (No protection / Warning / Shutdown)).

This function is designed for short-circuit or other failure, which causes change of set state of binary output.

### CAN address

In Intel IO8/8 mode CAN address for binary inputs is determined by DIP switch A, CAN address for binary output and analog outputs is determined by DIP switch B.

In Intel IO16/0 mode CAN address for binary inputs is determined by DIP switch A, first group of 8 input has address A, second group of 8 inputs has address A+1. CAN address of analog outputs is set by DIP switch B.



**Note:** In case of setting the CAN address to zero, the appropriate group of signals is deactivated.

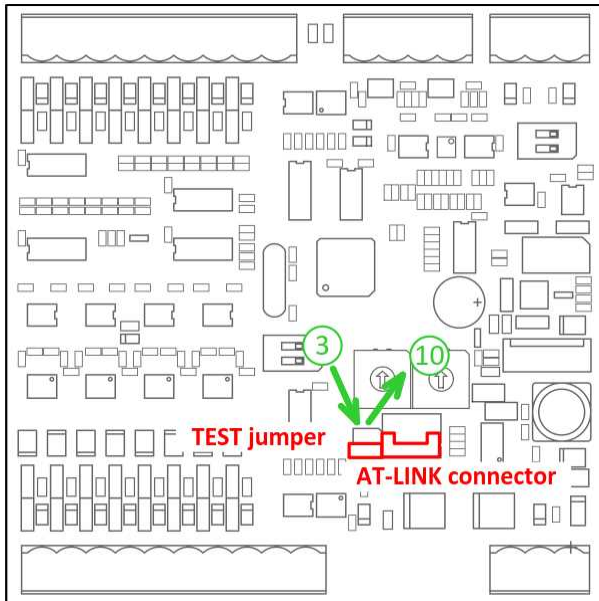
### Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Separate the top cover of module
3. Put the TEST jumper on a pins



4. Connect the unit with PC via RS232-null modem cable and AT-Link conv



5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli IO8/8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press Start button
9. Wait till process is done (If the process doesn't start – after 60 second the "Timeout" will be evaluated. In this case please check:
  - ▶ You have proper connection with the unit
  - ▶ COM port selection is correct
  - ▶ Module has power supply, (no CAN bus connection, status LED lights continuously)
10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blinking)
12. Module FW is upgraded

### LED indication

#### Binary input

Each binary input has LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

#### Binary output

Each binary output has LED which indicates output signal. Binary output LED is shining when binary output is set. When this LED is shining, then module is configured as 8 binary inputs and 8 binary outputs. When this LED is dark, then the module is configured as 16 binary inputs.

#### LED at power connector - status LED

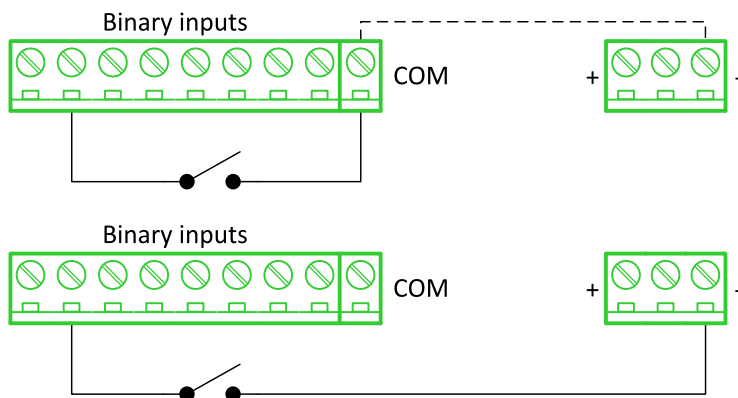


| LED status | Description   |
|------------|---|
| Dark       | Fw in module does not work correctly.   |
| Flashing   | Module does not communicate with controller (in case non-zero CAN address).   |
| Lights     | Power supply is in the range and the communication between Inteli IO8/8 and controller works properly.<br>Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller). |

## Wiring

The following diagrams show the correct connection of inputs and outputs.

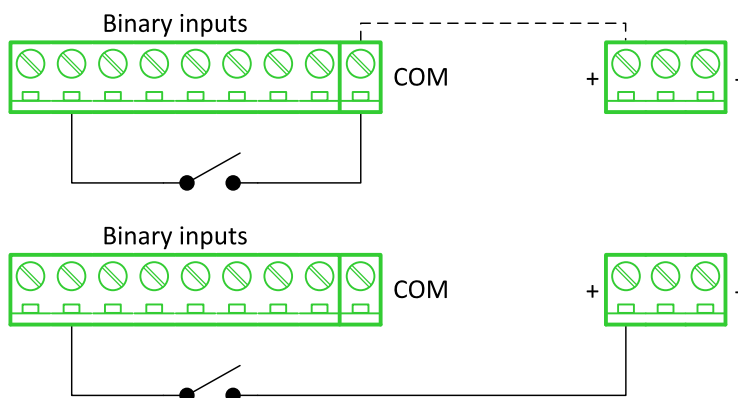
### Binary inputs - pull up



There are two options of wiring. On upper picture you can see case when binary input is connected between BIN2 and COM (COM is connected internally to the GND (-) - dashed line).

On lower picture is case of wiring between BIN2 and GND (-). Both ways are correct.

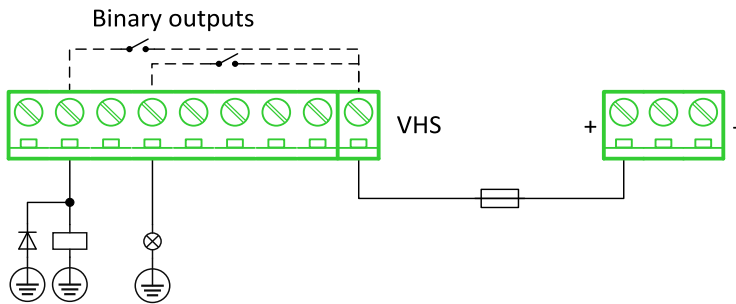
### Binary inputs - pull down



There are two options of wiring. On upper picture you can see case when binary input is connected between BIN2 and COM (COM is connected internally to the Ucc (+) - dashed line).

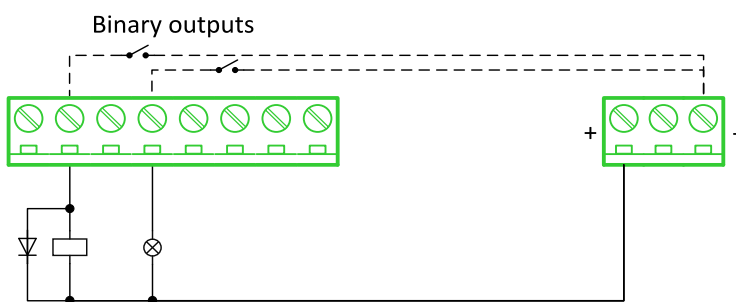
On lower picture is case of wiring between BIN2 and Ucc (+). Both ways are correct.

### Binary outputs - high side



When high side setting of outputs is chosen - binary output must be connected to the minus potential directly. Terminal VHS (voltage High side) has to be connected to positive potential directly. Maximal current of each binary output is 500 mA. Size of fuse depends on load.

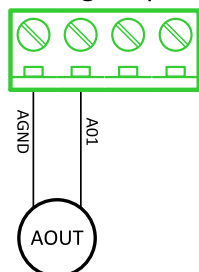
### Binary outputs - low side



When low side setting of outputs is chosen - binary output must be connected to the plus potential of power supply directly. Minus potential is connected internally - dashed line.

### Analog outputs

Analog outputs



**Note:** Limit of analog ground (AGND) is 100mA.

**IMPORTANT:** Terminator for analog output has special analog ground (AGND), which must not be connected to the GND.

### Technical data

#### General data

|                         |                               |
|-------------------------|-------------------------------|
| Power supply            | 8 to 36 V DC                  |
| Current consumption     | 35 mA at 24 V + 100 mA at 8 V |
| Interface to controller | CAN1                          |
| Protection              | IP20                          |
| Storage temperature     | - 40 °C to + 80 °C            |

|                       |                                |
|-----------------------|--------------------------------|
| Operating temperature | - 30 °C to + 70 °C             |
| Dimensions (WxHxD)    | 110x110x46 mm (4,3"x4,3"x1,8") |
| Weight                | 240 grams                      |

### Analog outputs

|                    |  |
|--------------------|--|
| Number of channels | 2  |
| Voltage            | Range 0-10 V<br>Accuracy: $\pm 20$ mV + $\pm 0,5$ % of actual value<br>I <sub>max</sub> 5 mA                 |
| Current            | Range: 0-20 mA<br>Accuracy: $\pm 100$ $\mu$ A + $\pm 0,5$ % of actual value<br>R <sub>max</sub> 500 $\Omega$ |
| PWM                | Level 5 V<br>Frequency - adjustable 200-2400 Hz<br>I <sub>max</sub> 20 mA                                    |

### Binary inputs

|   |  |
|---|--|
| Number of channels                                  | 8 for Intel IO8/8, 16 for Intel IO16/0 |
| Input resistance                                    | 4400 $\Omega$                          |
| Input range   | 0 to 36 V DC                           |
| Switching voltage level for open contact indication | 0 to 2 V DC                            |
| Max voltage level for close contact indication      | 6 to 36 V DC                           |

### Binary outputs

|                       |                                       |
|-----------------------|---------------------------------------|
| Number of channels    | 8 for Intel IO8/8, 0 for Intel IO16/0 |
| Max current           | 500 mA                                |
| Max switching voltage | 36 V DC                               |

### IGS-PTM

IGS-PTM module is extension module equipped with binary inputs, binary outputs, analog inputs and analog output. IGS-PTM module is connected to controller by CAN1 bus.



Image 9.236 IGS-PTM

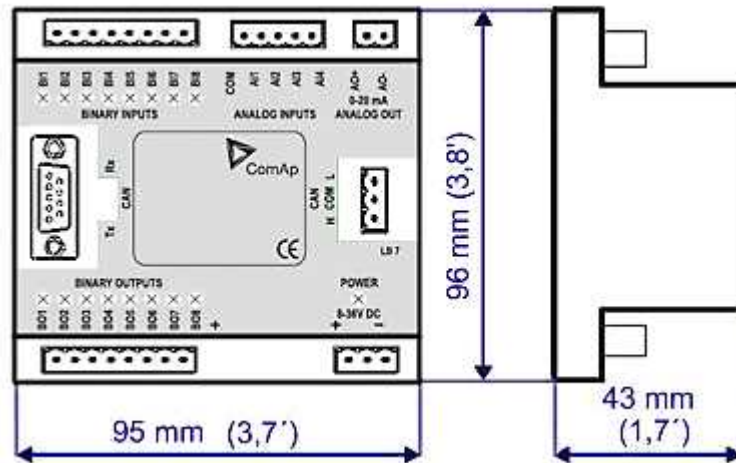
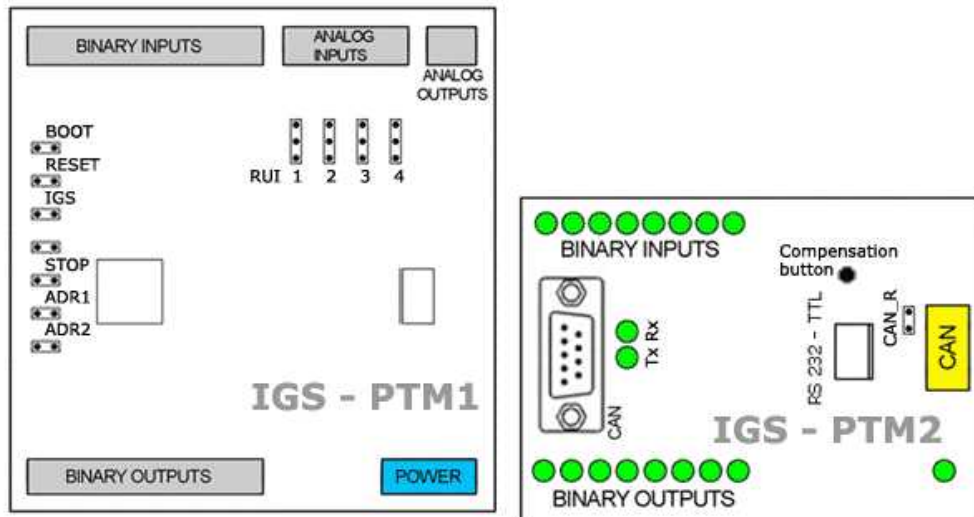


Image 9.237 IGS-PTM dimensions

## Terminals



|                |                           |
|----------------|---------------------------|
| Binary inputs  | 8 binary inputs           |
| Analog inputs  | 4 analog inputs           |
| Analog outputs | 1 analog output           |
| Binary outputs | 8 binary outputs          |
| CAN            | CAN1 line                 |
| RS232-TTL      | Interface for programming |
| Power          | Power supply              |

## Analog inputs

Analog inputs can be configured for:

- ▶ Resistance measurement
- ▶ Current measurement
- ▶ Voltage measurement

The type of analog inputs is configured via jumpers RUI located on lower PCB.

|           |                            |
|-----------|----------------------------|
| RUI       | Analog input configuration |
| 1 - 2     | Resistance measuring       |
| 2 - 3     | Current measuring          |
| no jumper | Voltage measuring          |

## Supported sensors

| Sensors          |             |
|------------------|-------------|
| PT100 [°C] (fix) | User curves |
| NI100 [°C] (fix) | 0-100 mV    |
| PT100 [°F] (fix) | 0-2400 ohm  |
| NI100 [°F] (fix) | ±20 mA      |

## CAN address

### Controller type selection

The type of controller to be used with IGS-PTM must be selected via jumper labeled IGS accessible at the lower PCB.

| IGS jumper | Controller type          |
|------------|--------------------------|
| OPEN       | IL-NT, IC-NT             |
| CLOSE      | IG-NT, IS-NT, IntelliGen |

### Address configuration

If IntelliGen controller type is selected (by IGS jumper), address of IGS-PTM could be modified via jumpers labeled ADR1 and ADR2.

| ADR1  | ADR2  | ADR offset  | BIN module | BOUT module | AIN module |
|-------|-------|-------------|------------|-------------|------------|
| Open  | Open  | 0 (default) | 1          | 1           | 1          |
| Close | Open  | 1           | 2          | 2           | 2          |
| Open  | Close | 2           | 3          | 3           | 3          |
| Close | Close | 3           | 4          | 4           | 4          |

## Programming firmware

Firmware upgrade is via AT-link (TTL). For programming is necessary to close jumper BOOT. RESET jumper is used to reset the device. Close jumper to reset the device. For programming is used FlashProg PC tool.

## LED indication

### Binary input

Each binary input has LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

### Binary output

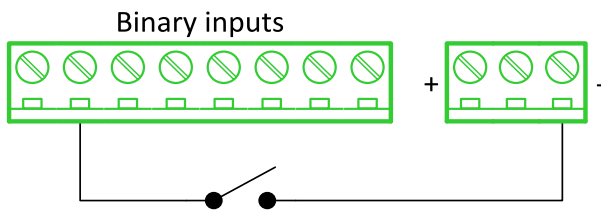
Each binary output has LED which indicates output signal. Binary output LED is shining when binary output is set.

### LED at power connector - status LED

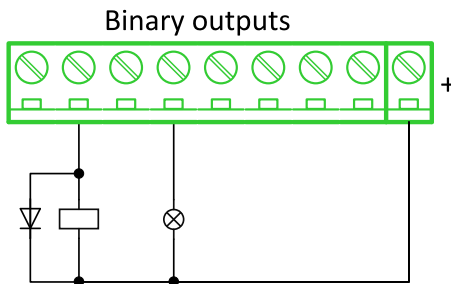
| LED status              | Description   |
|-------------------------|---|
| Dark                    | No required power connected.  |
| Quick flashing          | Program check failure.  |
| One flash and pause     | Compensation fail.  |
| Three flashes and pause | Compensation successful.  |
| Flashes                 | There is no communication between IGS-PTM and the controller.                                 |
| Lights                  | Power supply is in the range and communication between IGS-PTM and controller properly works. |

**Wiring**

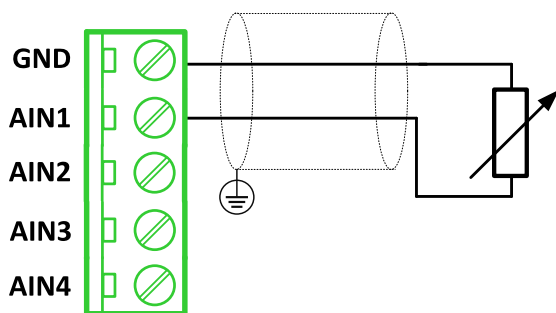
**Binary inputs**



**Binary outputs**



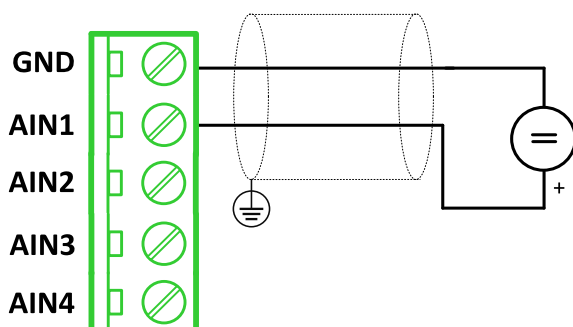
**Resistance sensor**



**Note:** Range: 0- 2400  $\Omega$

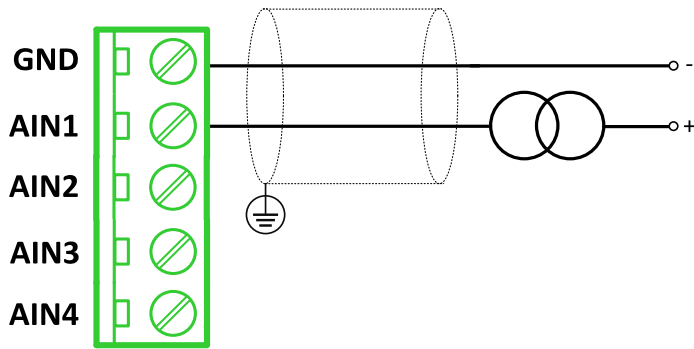
**IMPORTANT:** Physical analog input range is 0-250  $\Omega$ . In sensor configuration in PC tool it is necessary to chose 0-2400  $\Omega$  sensor HW type to ensure proper function of analog input.

**Voltage sensor**



**Note:** Range 0-100 mV

### Current sensor - passive



**Note:** Range:  $\pm 0-20\text{ mA}$

**IMPORTANT:** Physical analog input range is 0-20mA. In sensor configuration in PC tool it is necessary to chose +- 20mA active sensor HW type to ensure proper function of analog input.

### Analog outputs

#### Analog output



**Note:** Range: 0 to 20 mA  $\pm 0,33\text{ mA}$

### Technical data

#### General data

|                         |                              |
|-------------------------|------------------------------|
| Power supply            | 8 to 36 V DC                 |
| Current consumption     | 100 mA at 24V $\div$ 500 mA  |
| Interface to controller | CAN1                         |
| Protection              | IP20                         |
| Storage temperature     | - 40 °C to + 80 °C           |
| Operating temperature   | - 30 °C to + 70 °C           |
| Dimensions (WxHxD)      | 95×96×43 mm (3.7'×3.8'×1.7') |

#### Analog inputs

|                    |   |
|--------------------|---|
| Number of channels | 8   |
| Voltage            | Range 0-100 mV<br>Accuracy: 1,5 % $\pm$ 1 mV out of measured value        |
| Current            | Range: 0-20 mA<br>Accuracy: 2.5 % $\pm$ 0,5 ohm out of measured value     |
| Resistive          | Range: 0- 250 $\Omega$<br>Accuracy: 1 % $\pm$ 2 ohm out of measured value |



### Analog outputs

|                    |  |
|--------------------|--|
| Number of channels | 1  |
| Current            | Range: 0 to 20 mA $\pm$ 0,33 mA<br>Resolution 10 bit |

### Binary inputs

|   |               |
|---|---------------|
| Number of channels                                  | 8             |
| Input resistance                                    | 4700 $\Omega$ |
| Input range   | 0 to 36 V DC  |
| Switching voltage level for open contact indication | 0 to 2 V DC   |
| Max voltage level for close contact indication      | 8 to 36 V DC  |

### Binary outputs

|                       |   |
|-----------------------|---|
| Number of channels    | 8   |
| Max current           | 500 mA  |
| Max switching voltage | 36 V DC   |
| Number of channels    | 8   |
| Voltage               | Range 0-100 mV<br>Accuracy: 1,5 % $\pm$ 1 mV out of measured value        |
| Current               | Range: 0-20 mA<br>Accuracy: 2.5 % $\pm$ 0,5 ohm out of measured value     |
| Resistive             | Range: 0- 250 $\Omega$<br>Accuracy: 1 % $\pm$ 2 ohm out of measured value |

## IGL-RA15

Remote annunciator (IGL-RA15) is designed as an extension signaling unit.

The unit is equipped with a fully configurable tri color (red, orange, green) LED for intuitive operation together with high functionality.



Image 9.238 IGL-RA15

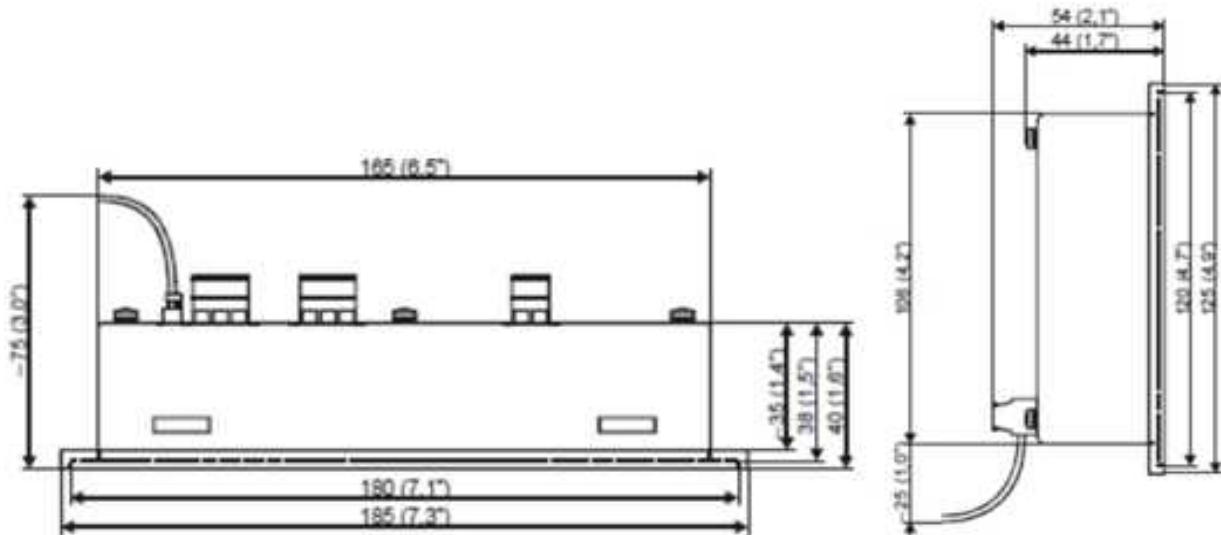


Image 9.239 IGL-RA15 dimensions

### Terminals

|       |              |
|-------|--------------|
| Horn  | Horn         |
| CAN   | CAN1 line    |
| Power | Power supply |

### CAN address

| Address          | Jumper A | Jumper B |
|------------------|----------|----------|
| 1                | OPEN     | OPEN     |
| 5+6              | CLOSED   | OPEN     |
| Customer defined | CLOSED   | CLOSED   |

SW changing of CAN1 address is enabled only when both jumpers are closed. Any one of these addresses (1+2 or 3+4 or 5+6 or 7+8) can be set by following steps:

- ▶ Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- ▶ Press Lamp test sixteen times
- ▶ Set the address up by pressing Horn reset.
  - The number of red luminous LEDs means the CAN1 addresses (two for addresses 1+2, four for addresses 3+4, six for addresses 5+6 and eight for addresses 7+8)
- ▶ Press Lamp test

### LED indication

Each LED color is adjusted independently of controller output settings. If controller output 1 is set as “Common Shutdown” it doesn’t mean red LED1 color for iGL-RA15. The LEDs color can be adjusted by following steps:

- ▶ Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- ▶ Press Horn reset to change the LED1 color (green, yellow, red)

- ▶ Press Lamp test to switch to the next LED color adjusting
- ▶ Continue to adjust all LEDs color
- ▶ After LED15 color adjusting press three times Lamp test

**Note:** *If there is no operator action during address setting, color adjusting or timeout setting, the unit returns to normal operation without changes saving.*

### Status LED

The signals LEDs are handled like binary outputs. It means all what can be configured to binary outputs can be also configured to the LEDs of IGL-RA15.

| LED status               | Description   |
|--------------------------|---|
| Lights                   | Configured logical output is active on the controller   |
| Dark green LED           | Configured logical output is not active on the controller                                       |
| Dark yellow or red LED   | Configured logical output is not active on the controller and horn reset was pressed.           |
| Yellow or red LED blinks | Configured logical output is not active on the controller and horn reset was still not pressed. |

### Power LED

| LED status      | Description  |
|-----------------|--|
| Blinking green  | The unit is OK and the communication to the master controller is OK.           |
| Blinking red    | The unit is OK, but the communication to the master controller is not running. |
| Blinking yellow | EEPROM check not passed OK after power on                                      |
| Yellow          | Horn timeout or controller address adjustment                                  |

### Horn setting

The horn output is activated if any of red or yellow LED is on. Output is on until pressing Horn reset or horn timeout counts down. The timeout can be set by following steps:

- ▶ Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- ▶ Press Lamp test fifteen times
- ▶ Set the horn timeout by pressing Horn reset.
  - The number of green luminous LEDs means timeout in 10 s (any for disabling horn output, 1 for 10s timeout, 2 for 10s timeout, 15 for disabling horn timeout).
  - Press Lamp test two times

**Note:** *If there is no operator action during address setting, color adjusting or timeout setting, the unit returns to normal operation without changes saving.*

#### The horn is activated if:

- ▶ Some of red or yellow LED lights up or
- ▶ At the end of the extended lamp test. See chapter **Lamp and horn test (page 902)**

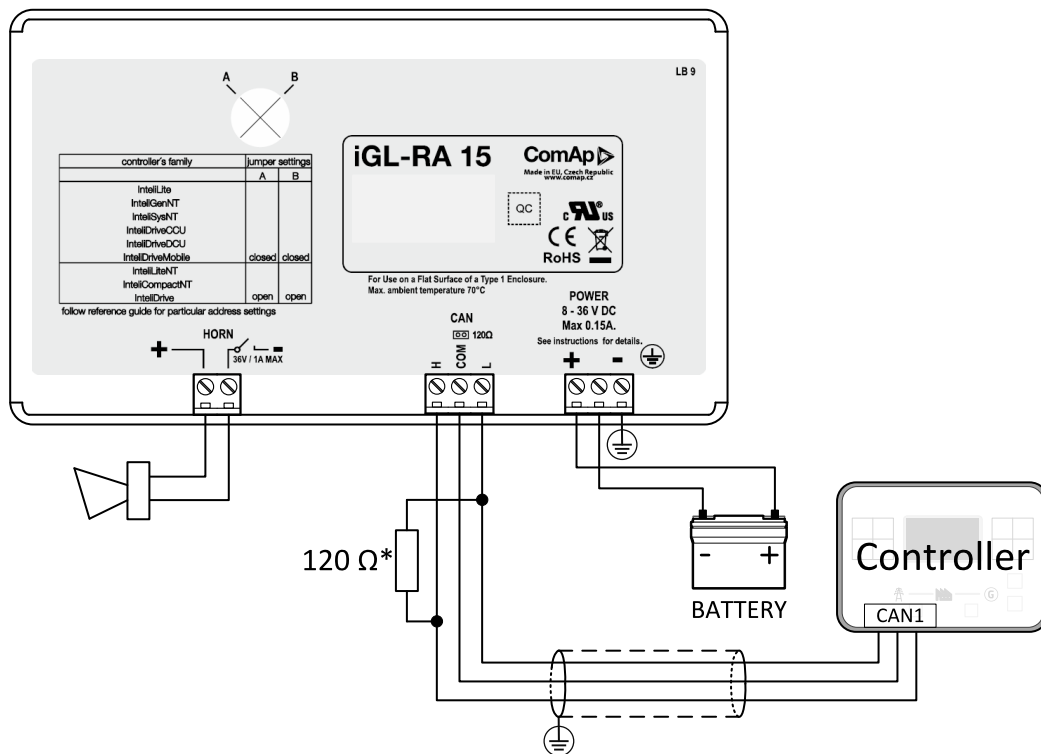
#### The horn can be silenced:

- ▶ By pressing horn reset button or
- ▶ It silences automatically after adjusted time

## Lamp and horn test

Pressing and holding lamp test button for less than 2 s execute the basic lamp test. All LEDs light up with the configured colour. If the button is hold longer than 2 s, an extended test is started. Every LED is tested step-by-step in green colour and then in red colour. The horn is activated at the end of the test. After that the unit returns to normal operation. The horn can be silenced with horn reset.

## Wiring



\* terminator resistor only when iGL-RA 15 is the last unit on the CAN1 bus.

**Note:** The shielding of the CAN bus cable has to be grounded at one point only!

**Note:** See the section *Technical data* (page 902) for recommended CAN bus cable type

## Technical data

### General data

|                       |  |
|-----------------------|--|
| Power supply          | 8 to 36 V DC   |
| Current consumption   | 0.35-0.1A (+1Amax horn output) depends on supply voltage |
| Protection            | IP65   |
| Humidity              | 85%  |
| Storage temperature   | - 30 °C to + 80 °C                                       |
| Operating temperature | - 20 °C to + 70 °C                                       |
| Dimensions (WxHxD)    | 180x120x55 mm  |
| Weight                | 950 g  |

## Horn output

|                           |         |
|---------------------------|---------|
| Maximum current           | 1.0 A   |
| Maximum switching voltage | 36 V DC |

## CAN bus interface

|   |   |
|---|---|
| Galvanic separated  |   |
| Maximal CAN bus length  | 200 m   |
| Speed   | 250 kBd   |
| Nominal impedance   | 120 $\Omega$  |
| Cable type  | twisted pair (shielded)   |
| Following dynamic cable parameters are important especially for maximal 200 meters CAN bus length |   |
| Nominal Velocity of Propagation   | min. 75 % (max. 4,4 ns/m)   |
| Wire crosscut   | min. 0,25 mm <sup>2</sup>   |
| Maximal attenuation (at 1 MHz)  | 2 dB/100m   |
| Recommended Industrial Automation & Process Control Cables  |   |
| BELDEN ( <a href="http://www.belden.com">www.belden.com</a> )                                     | <ul style="list-style-type: none"> <li>▶ 3082A DeviceBus for Allen-Bradley DeviceNet</li> <li>▶ 3083A DeviceBus for Allen-Bradley DeviceNet</li> <li>▶ 3086A DeviceBus for Honeywell SDS</li> <li>▶ 3087A DeviceBus for Honeywell SDS</li> <li>▶ 3084A DeviceBus for Allen-Bradley DeviceNet</li> <li>▶ 3085A DeviceBus for Allen-Bradley DeviceNet</li> <li>▶ 3105A Paired EIA Industrial RS485 cable</li> </ul> |
| LAPP CABLE ( <a href="http://www.lappcable.com">www.lappcable.com</a> )                           | <ul style="list-style-type: none"> <li>▶ Unitronic BUS DeviceNet Trunk Cable</li> <li>▶ Unitronic BUS DeviceNet Drop Cable</li> <li>▶ Unitronic BUS CAN</li> <li>▶ Unitronic-FD BUS P CAN UL/CSA</li> </ul>   |