ComAp
The heart of smart control

InteliMains 210 BTB

Bus Tie Breaker controller

SW version 2.0.0

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Global Guide

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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 InteliMains 210 controllers family that shall be followed during installation and maintenance of the controllers.

This manual provides general information how to install and operate InteliMains 210 controllers.

This manual is dedicated for:

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

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Pay attention to the following recommendations and measures to increase the level of security of ComAp products and services.

Please note that possible cyber-attacks cannot be fully avoided by the below mentioned recommendations and set of measures already performed by ComAp, but by following them the cyber-attacks can be considerably reduced and thereby to reduce the risk of damage. ComAp does not take any responsibility for the actions of persons responsible for cyber-attacks, nor for any damage caused by the cyber-attack. However, ComAp is prepared to provide technical support to resolve problems arising from such actions, including but not limited to restoring settings prior to the cyber-attacks, backing up data, recommending other preventive measures against any further attacks.

Warning: Some forms of technical support may be provided against payment. There is no legal or factual entitlement for technical services provided in connection to resolving problems arising from cyber-attack or other unauthorized accesses to ComAp's Products or Services.

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.

3. Controller Web interface

• The controller web interface at port TCP/80 is based on http, not https, and thus it is intended to be used only in closed private network infrastructures.

• Avoid exposing the port TCP/80 to the public Internet.

4. 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 it's 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.

5. 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.

Used Open Source Software: mBed-TLS

https://www.mbed.com/en/development/software/mbed-tls/

http://www.apache.org/licenses/LICENSE-2.0

1.4 General warnings

1.4.1 Remote control and programing

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

- EN 61000-6-2
- EN 61000-6-4
- EN 61010-1
- EN 60068-2-1 (-20 °C/16 h for std, -40 °C/16 h for LT version)
- EN 60068-2-2 (70 °C/16 h)
- EN 60068-2-6 (2÷25 Hz / ±1,6 mm; 25÷100 Hz / 4,0 g)
- EN 60068-2-27 (a=500 m/s^2; T=6 ms)
- EN 60068-2-30:2005 25/55°C, RH 95%, 48hours
- EN 60529 (front panel IP65, back side IP20)

1.6 Document history

Revision number	Related sw. version	Date	Author
2	2.0.0	21.12.2018	Lubomír Brož
1	1.0.0	12.7.2018	Lubomír Brož

1.7 Symbols in this manual

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

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2 System overview

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2.1 General description

InteliMains 210 controller is comprehensive mains supervision controller for multiple generating sets operating in parallel to the Mains. A modular construction allows upgrades to different levels of complexity in order to provide the best solution for various customer applications. Controllers are equipped with a powerful graphic display showing icons, symbols and bar-graphs for intuitive operation, which sets, together with high functionality, new standards in Mains controls.

The controller automatically connects and synchronizes two parts of bus bar and controls the bus tie circuit breaker (BTB).

The controller provides easy-to-use operation and installation. Predefined configurations for typical applications are available as well as user-defined configurations for special applications.

2.1.1 The key features of InteliMains 210

- 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 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 multiplies 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

- InteliConfig - complete configuration and single gen-set monitoring
- WebSupervisor - web-based system for monitoring and controlling
  - WebSupervisor mobile - supporting application for smart-phones
- WinScope - special graphical monitoring software

Note: *Use the InteliConfig 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
- Changing the language of the controller interface

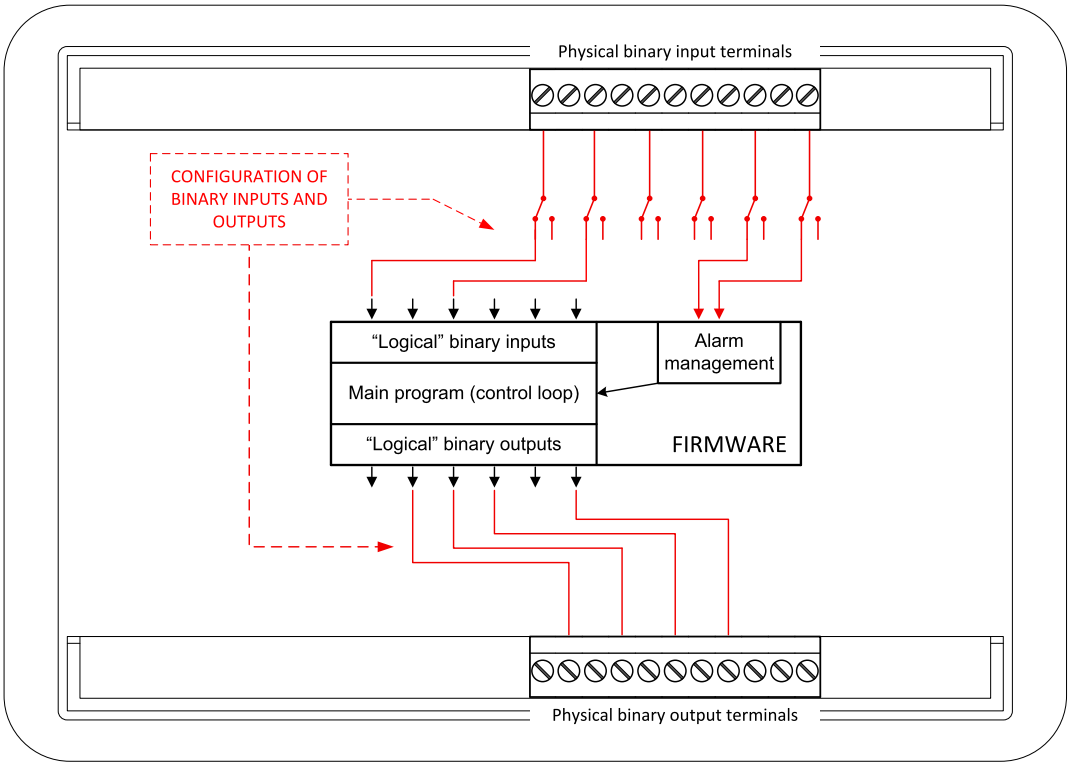


Image 2.1 Principle of binary inputs and outputs configuration

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 InteliConfig software. See InteliConfig documentation for details.

Note: *You need one of communication modules to connect the controller to a PC with InteliConfig. 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.

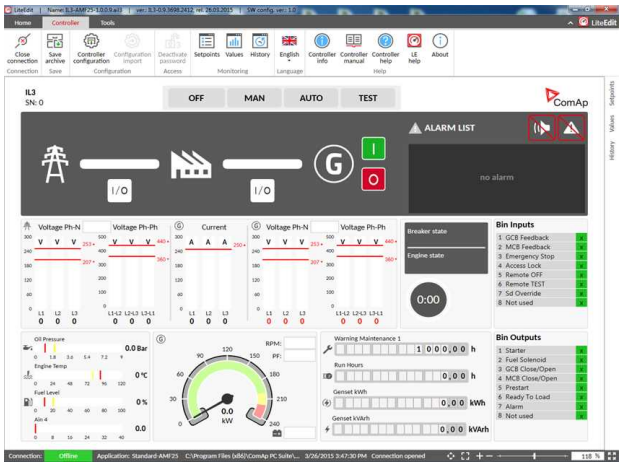
2.4 PC tools

2.4.1 InteliConfig

Configuration and monitoring tool for InteliGen controllers. See more in InteliConfig 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

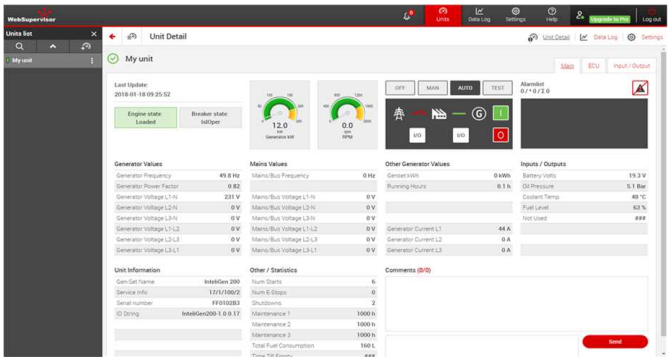


2.4.2 WebSupervisor

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

Demo account:

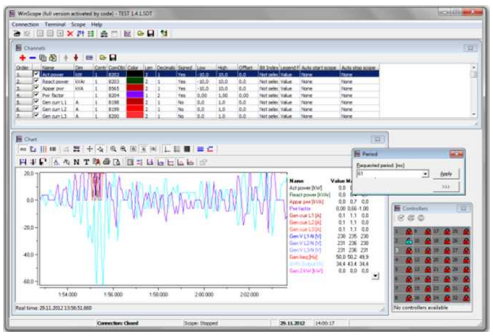
- Login: comaptest
- Password: ComAp123

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

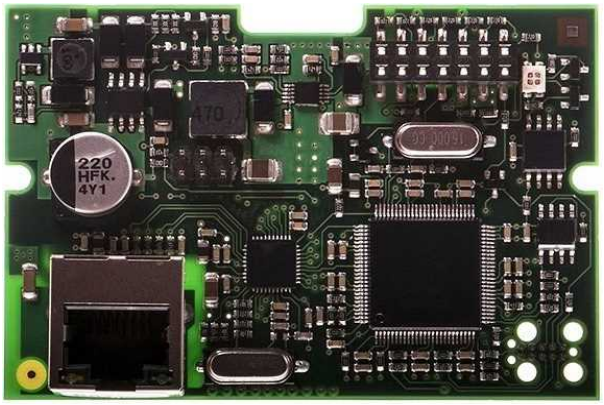


2.5 Plug-in modules

2.5.1 CM-Ethernet

Internet/Ethernet module including web server.

- 10/100 Mbit ethernet interface in RJ45 socket
- Web interface for monitoring and adjustment of the controller
- Direct IP and/or AirGate connection for remote access from InteliConfig
- MODBUS/TCP and SNMP protocols for integration of the controller into building management systems or other remote monitoring purposes
- Sending of active emails
- Simply connection via AirGate



2.5.2 CM-4G-GPS

GSM/4G Internet module and GPS locator

- Wireless integrated solution
- Quick and easy installation
- Support of WebSupervisor
- 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
- TCP/IP communication over GPRS

2.5.3 CM-GPRS

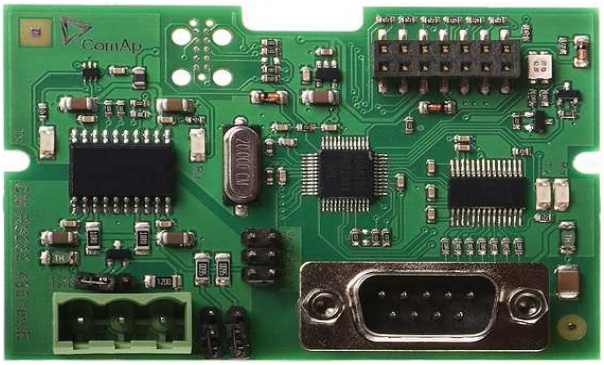
GSM/GPRS Internet module

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

2.5.4 CM-RS232-485

Communication module with two communication ports.

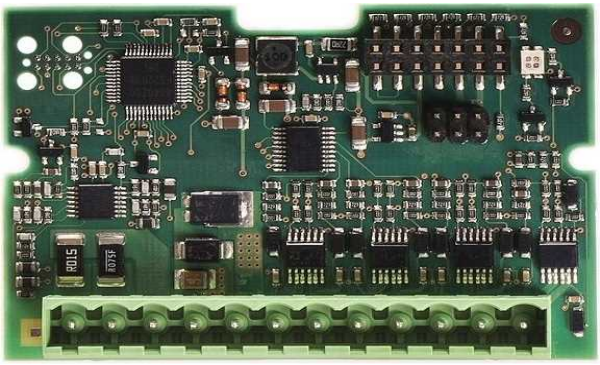
- RS232 and RS485 interface
- MODBUS
- Serial connection to InteliConfig



2.5.5 EM-BIO8-EFCP

Hybrid current input and binary input/output extension module.

- One additional AC current (CT) measuring for Earth Fault Current protection (EFCP)
- Wide range of measured current - one input for 1A and 1 input for 5A
- Up to 8 additional configurable binary inputs or outputs



2.6 CAN modules

2.6.1 Inteli 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 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))

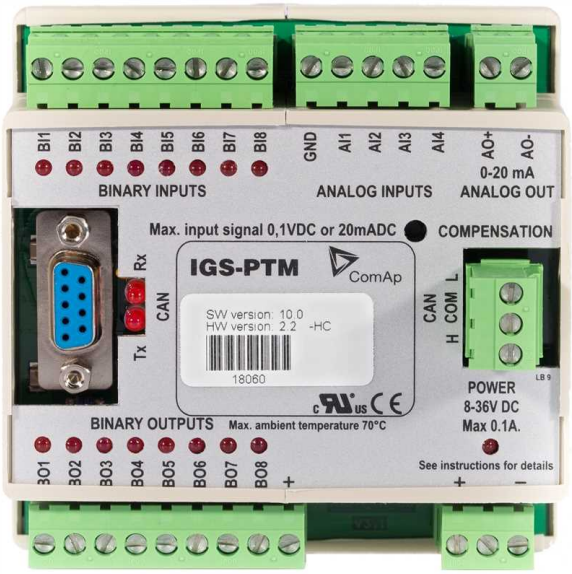
Configuration 16/0

- 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))

2.6.3 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



2.6.4 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

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3 Applications overview

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3.1 BTB

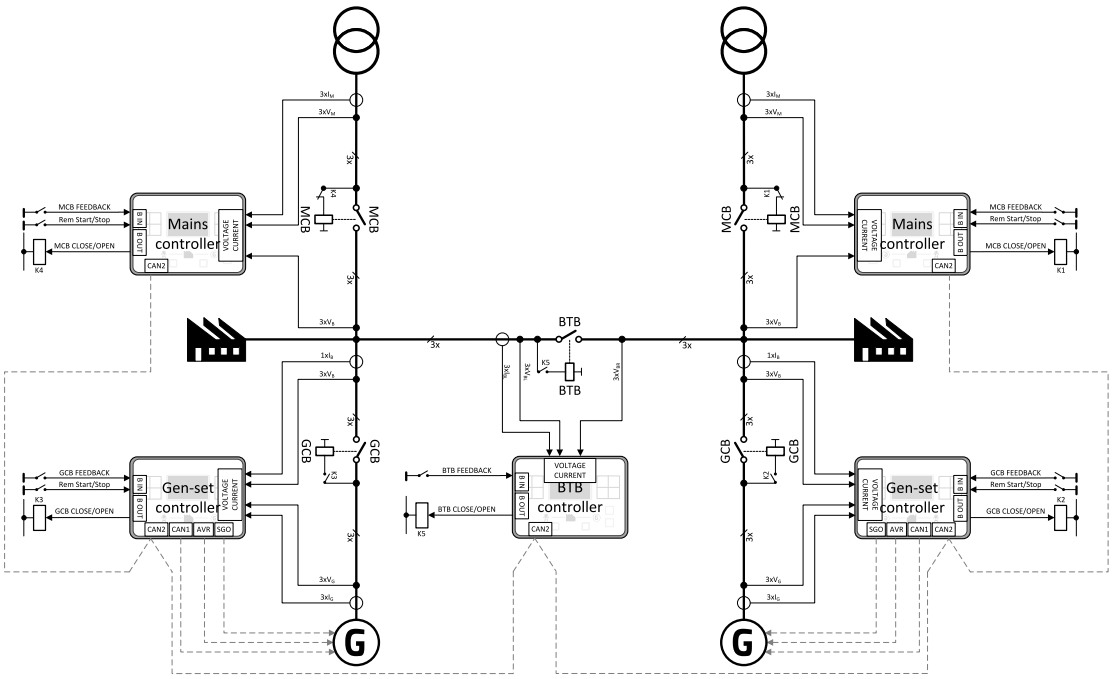

Image 3.1 BTB application overview

InteliMains 210 controller closes automatically BTB if

- bus voltages are within the limits
- there is voltage on one of the buses and closing to dead bus is enabled
- binary input BTB disable is not closed
- it is enabled by setting of setpoints

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4 Installation and wiring

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4.1 Package content

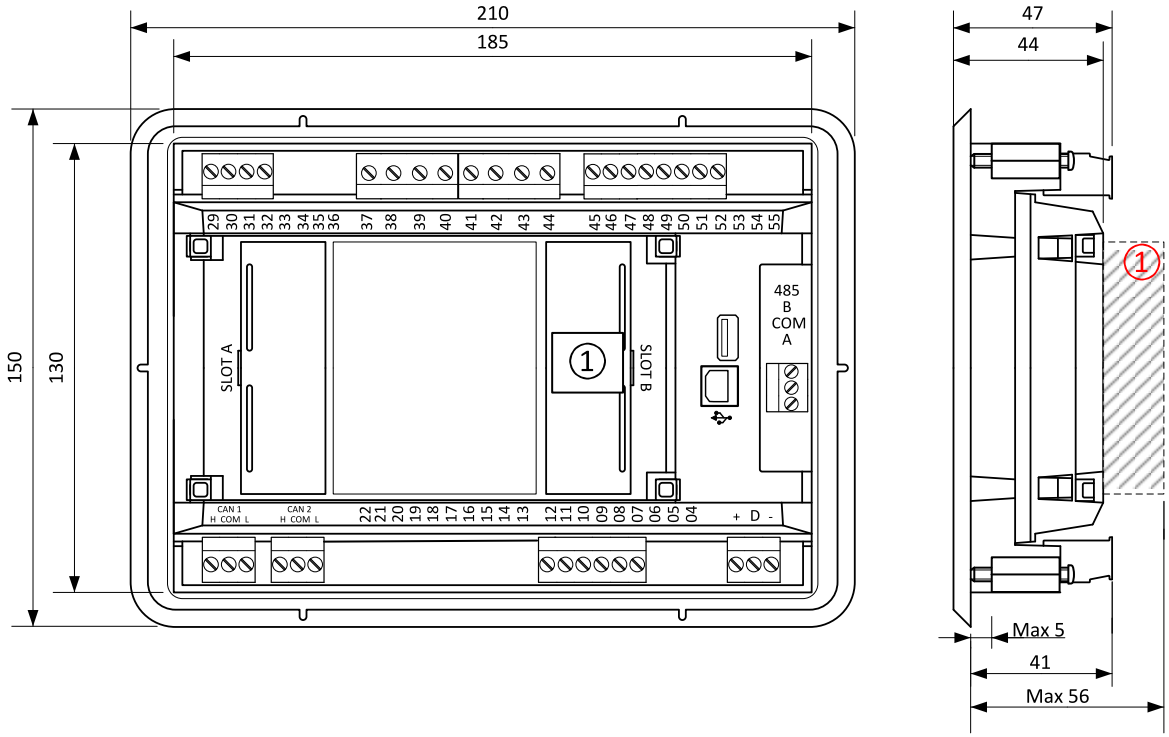
The package contains:

- 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

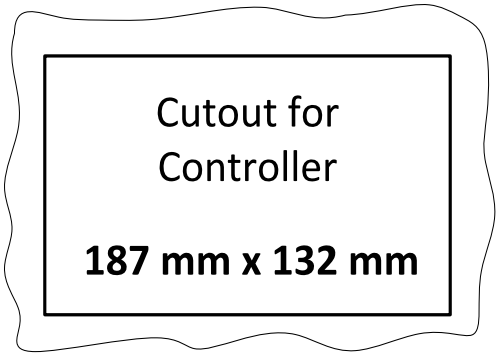
4.2.1 Dimensions



① Plug-in module

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

Note: *Dimensions are in millimeters.*

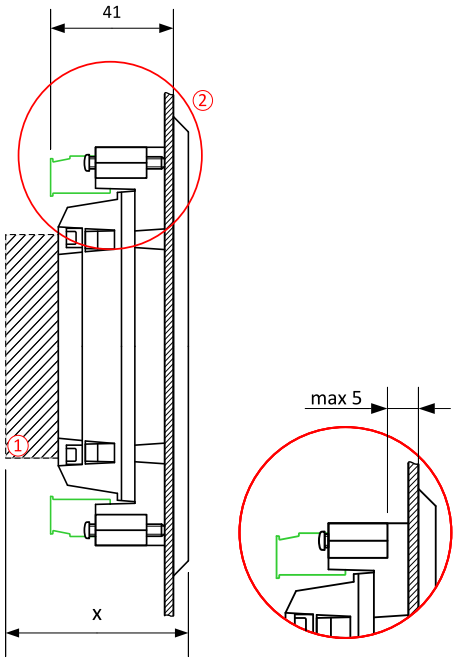


Note: *Cutout is in millimeters.*

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: *Enclosure Type rating with mounting instruction - For use on a Flat surface of a type 1 enclosure.*

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

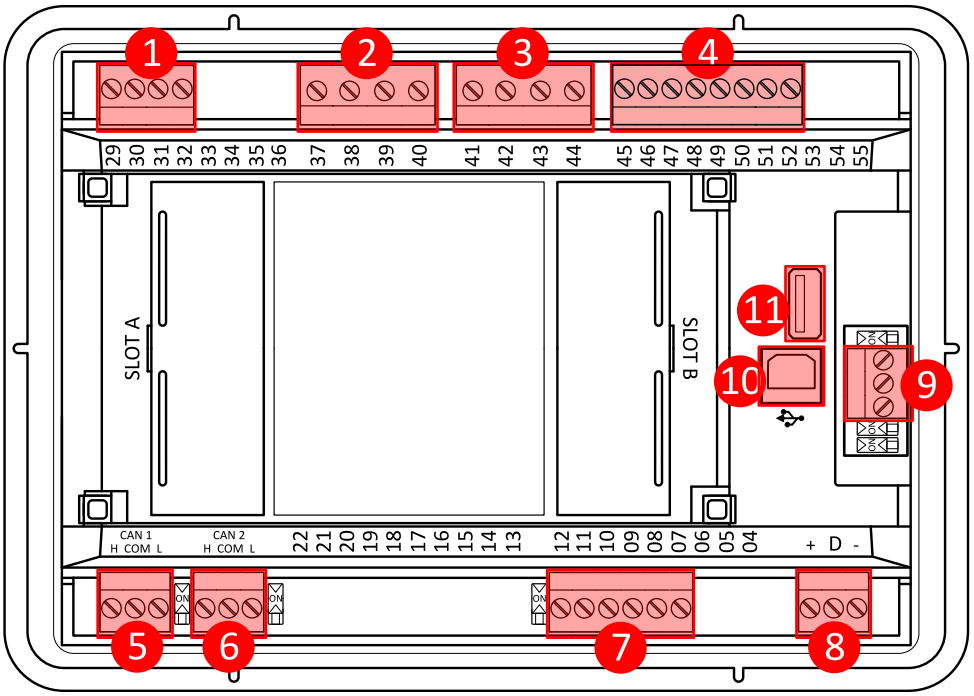
Note: *The accessibility of live parts through openings in the enclosure, reliable retention of guards or barriers for prevention of risk of electric shock, etc., shall be considered in the end product evaluation.*

Note: *These devices should be used within their electrical ratings and in an ambient temperature not exceeding 70 °C, for 4 A (BOUT 1 & 2) output or 60 °C for 5 A (BOUT 1 & 2) output.*

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

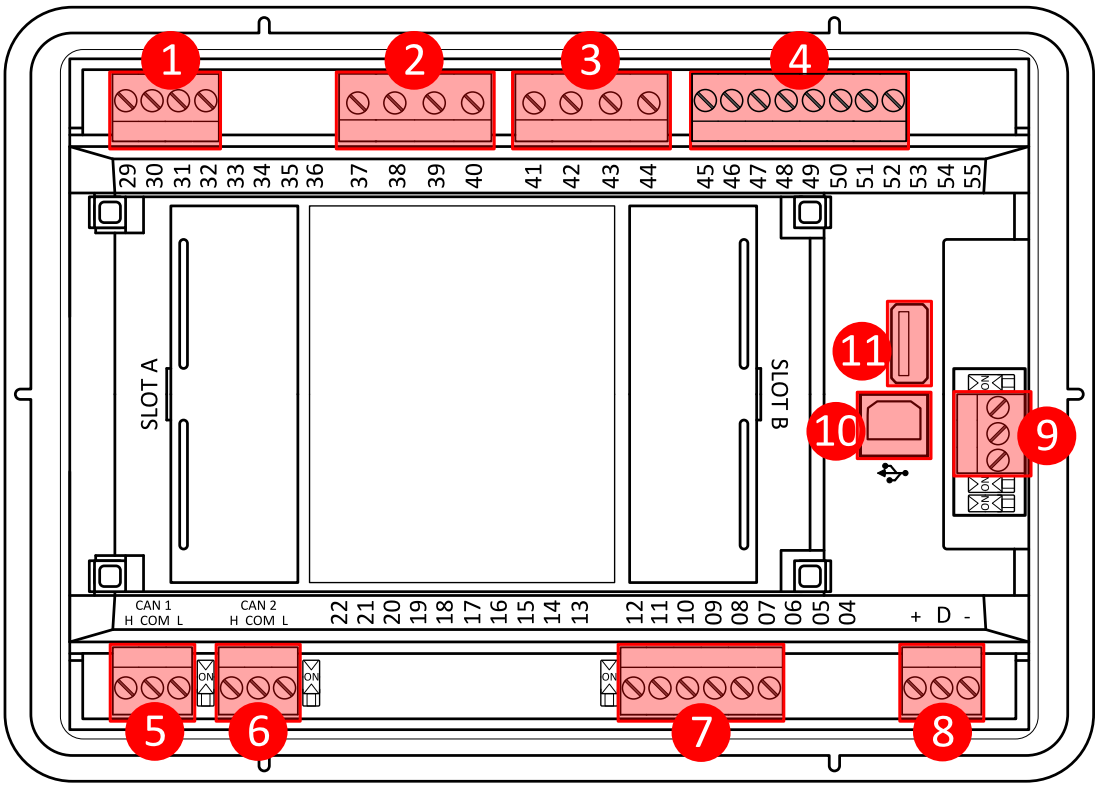
4.3 Terminal Diagram

① CURRENT MEASUREMENT		② MAINS VOLTAGE		③ BUS VOLTAGE		④ BINARY INPUTS	
T29	COM	T37	N	T41	N	T45	BIN1
T30	L1	T38	L1	T42	L1	T46	BIN2
T31	L2	T39	L2	T43	L2	T47	BIN3
T32	L3	T40	L3	T44	L3	T48	BIN4
						T49	BIN5
						T50	BIN6
						T51	BIN7
						T52	BIN8



⑤ CAN1		⑦ BINARY OUTPUTS		⑧ POWER SUPPLY, D+		⑩ USB	
T26	L	T07	BOUT1	T01	BATT -	⑪ USB HOST	
T27	COM	T08	BOUT2	T02	D+		
T28	H	T09	BOUT3	T03	BATT +		
⑥ CAN2		T10	BOUT4	⑨ RS485			
T23	L	T11	BOUT5	T56	B		
T24	COM	T12	BOUT6	T57	COM		
T25	H			T58	A		

4.4 Recommended wiring



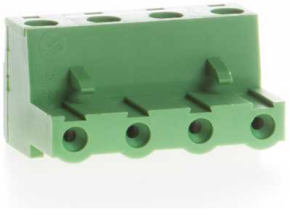
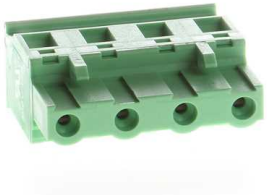
1	Current inputs	29 - 32	**Current measurement wiring (page 28)**
2	Mains voltage inputs	37 - 40	**Voltage measurement wiring (page 30)**
3	Bus voltage inputs	41 - 44	**Voltage measurement wiring (page 30)**
4	Binary inputs	45 - 52	**Binary inputs (page 33)**
5	CAN1	H, COM, L	**CAN bus and RS485 wiring (page 34)**
6	CAN2	H, COM, L	**CAN bus and RS485 wiring (page 34)**
7	Binary outputs	07 - 12	**Binary Outputs (page 34)**
8	Power supply	"+" D "-"	**Power supply (page 26)**
9	RS485	A, COM, B	**CAN bus and RS485 wiring (page 34)**
10	USB	USB B	**USB (page 39)**
11	USB HOST	USB A	**USB HOST (page 39)**

IMPORTANT: Firmware InteliMains 210 is possible to upload also in to the InteliGen 200 Hardware. Be aware that the BO1 and BO2 on the InteliGen 200 are used only combination with E-Stop input which are in InteliMains 210 not supported. Check always the terminal numbers.

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.

<table>
<tr><th colspan="2">Tightening torque, allowable wire size and type, for the Field-Wiring Terminals:</th></tr>
<tr><td colspan="2">For Mains(Bus) Voltage, Generator Voltage and Current terminals</td></tr>
<tr><td rowspan="2">  </td><td>Specified tightening torque is 0,56 Nm (5,0 In-lbs)</td></tr>
<tr><td>Use only diameter 2,0 - 0,5 mm (12 - 26 AWG) conductor, rated for 90°C minimum.</td></tr>
<tr><td colspan="2">For other controller field wiring terminals</td></tr>
<tr><td rowspan="3"> 
  </td><td>Specified tightening torque 0,79 nm (7,0 In-lb)</td></tr>
<tr><td>Use only diameter 2,0 - 0,5 mm (12 - 26 AWG) conductor, rated for 75°C minimum.</td></tr>
<tr><td>Use copper conductors only.</td></tr>
</table>

4.4.2 Grounding

The shortest possible length of wire should be used for controller grounding. Use cable min 2.5 mm^2.

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:

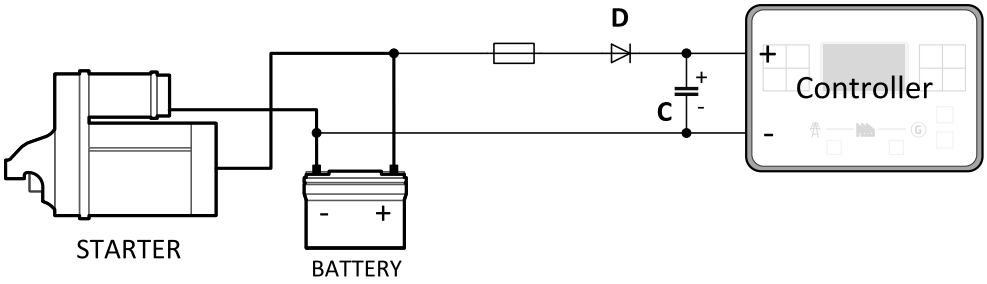
- Use power supply cable min. 1.5 mm^2

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 ± 2 V. Therefore is strongly recommended to interconnect these two terminals together.

Note: *The controller should be grounded properly in order to protect against lighting 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.

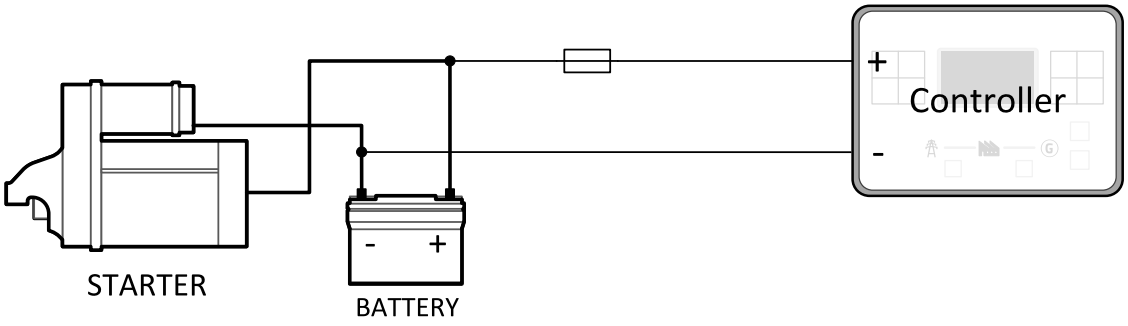
Note: *Suitable conductor protection shall be provided in accordance with NFPA 70, Article 240.*

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 µF. The capacitor size should be 5 000 µF 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^2 cables for voltage connection and 2.5 mm^2 for current transformers connection. Adjust **Connection type (page 176)**, **Nominal Voltage Ph-N (page 177)**, **Nominal Voltage Ph-Ph (page 177)**, **Nominal Current (page 175)**, **Bus VT Ratio (page 177)** 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.

Current measurement wiring

The number of CT's is automatically selected based on selected value of setpoint **Connection type (page 176)** [3Ph4Wire / High Leg D / 3Ph3Wire / Split Ph / Mono Ph].

Mains 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^2
- Use transformers to 5 A
- Connect CT according to following drawings:

3 phase application:

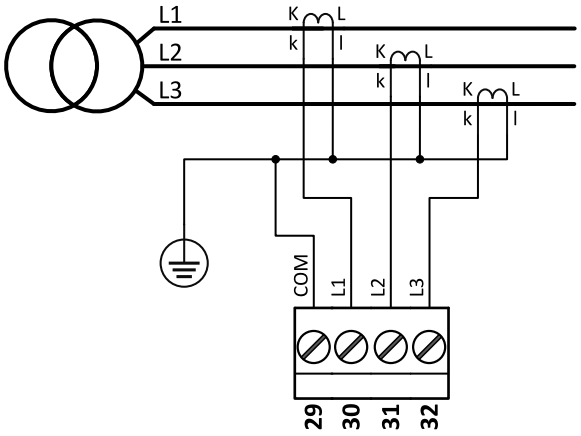


Image 4.1 3 phase application

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

Split phase application:

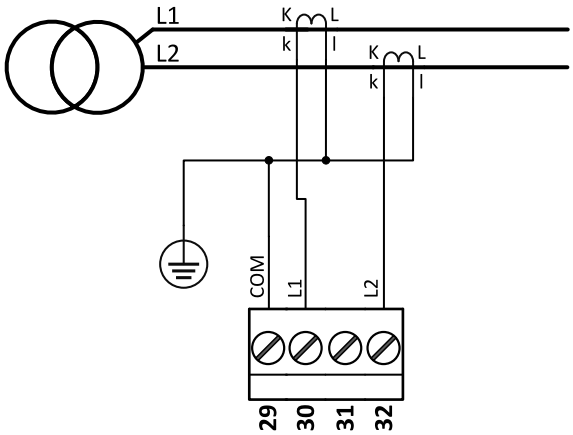


Image 4.2 Split phase application

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

Mono phase application:

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

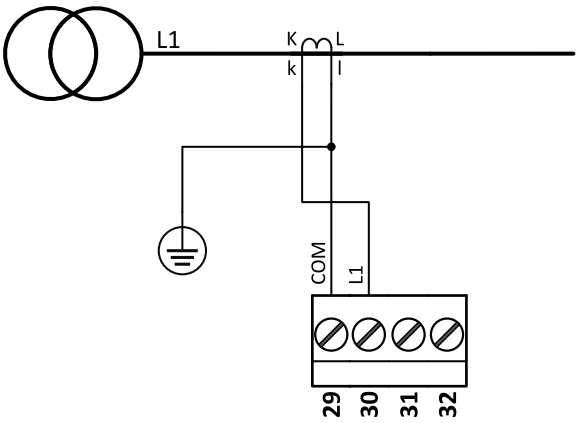


Image 4.3 Mono phase application

Voltage measurement wiring

There are 4 voltage measurement Connection Type (setpoint **Connection type (page 176)** [3Ph4Wire / High Leg D / 3Ph3Wire / Split Ph / Mono Ph]) options, every type matches to corresponding 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 176)** 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

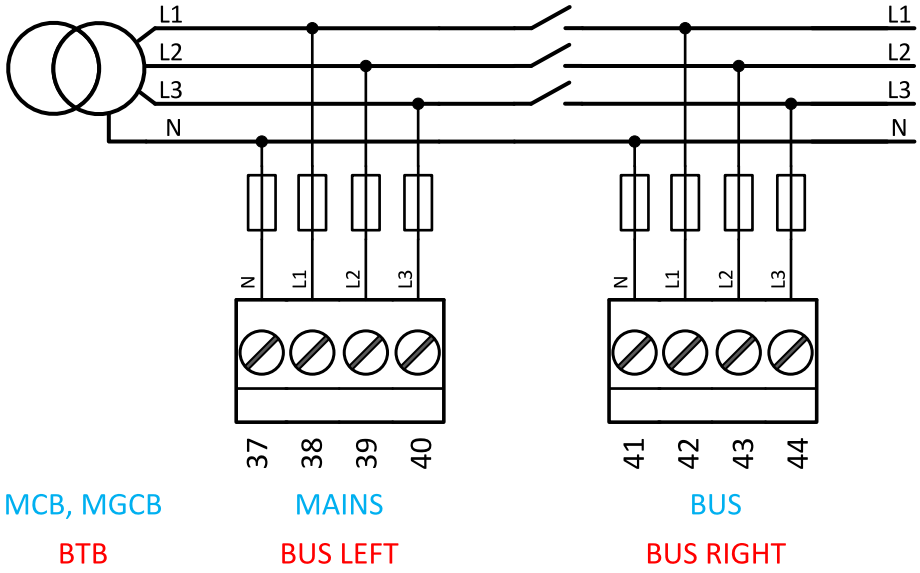


Image 4.4 3 phase application with neutral

ConnectionType: 3 Phase 3 Wires

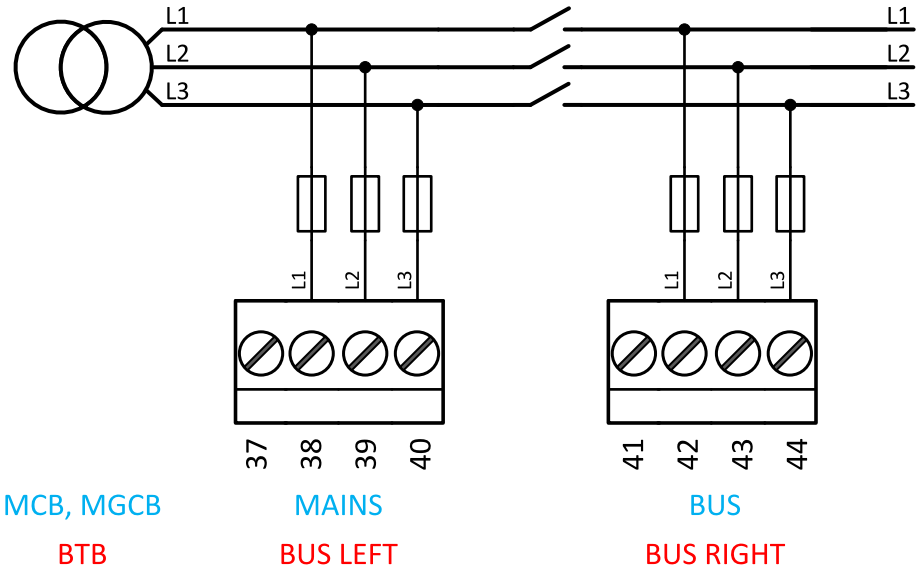


Image 4.5 3 phase application without neutral

ConnectionType: Split Phase

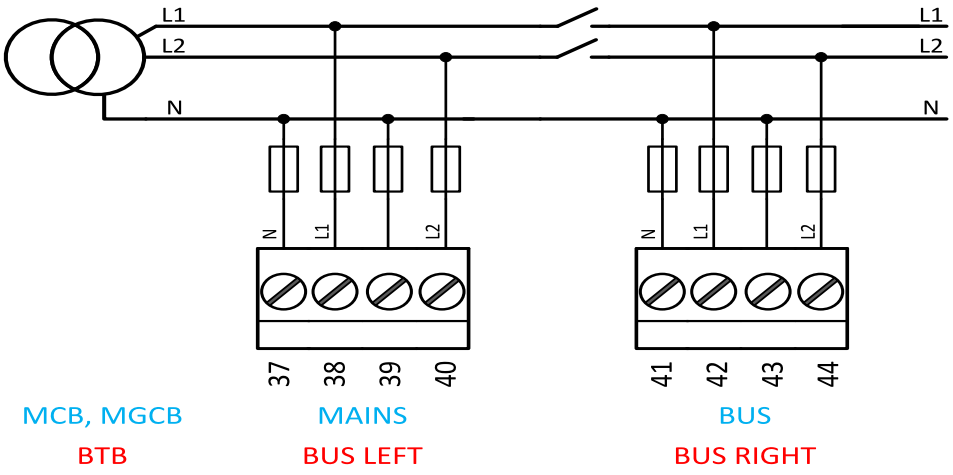


Image 4.6 Split phase application

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

ConnectionType: Mono Phase

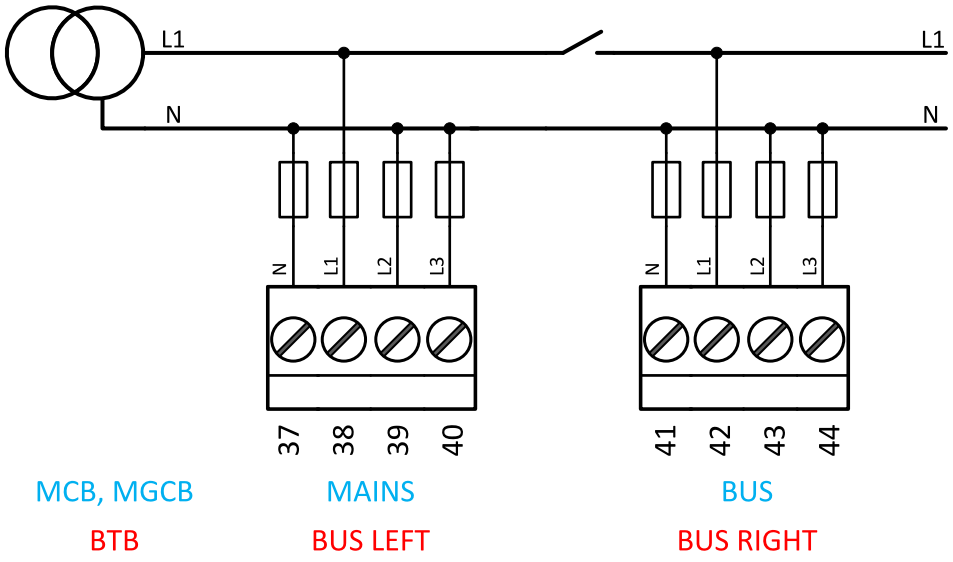


Image 4.7 Mono phase application

Voltage measurement InteliMains applications on InteliGen 200 hardware

Because there is possible to import the InteliMains 210 Firmware in to the InteliGen 200 Hardware, is important to respect the number of terminals for voltage measurement.

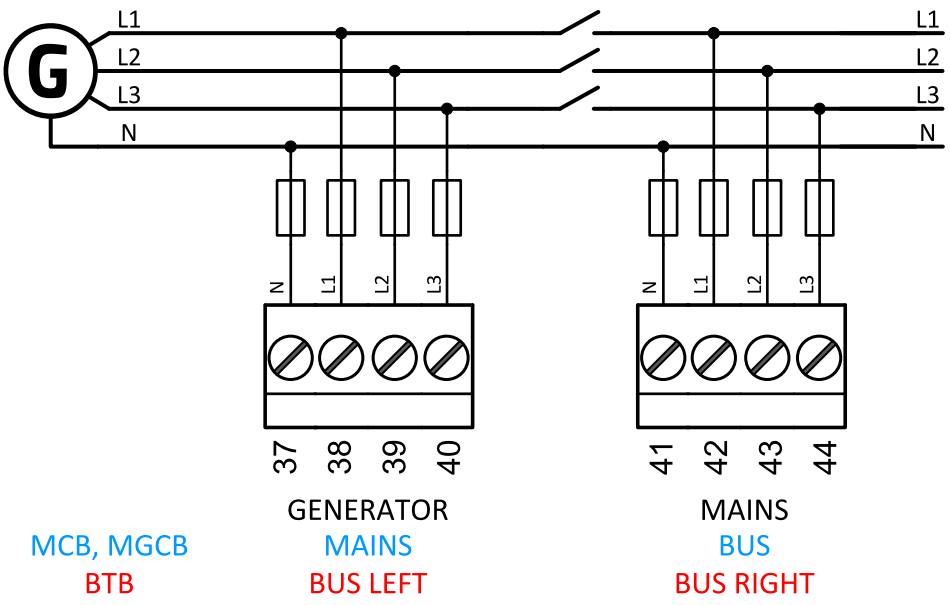


Image 4.8 Voltage measurement on InteliGen 200 Hardware

4.4.5 Binary inputs

Use minimally 1 mm^2 cables for wiring of Binary inputs.

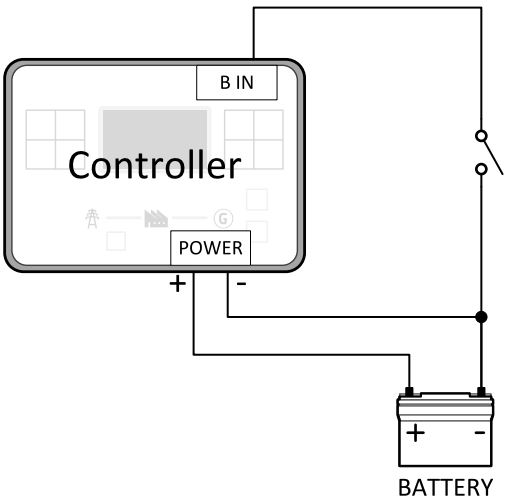


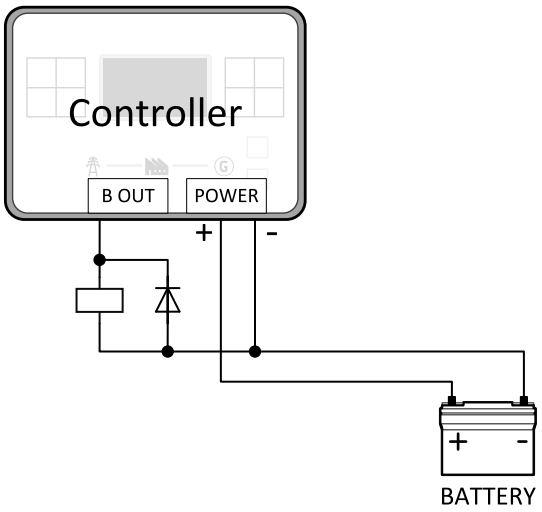
Image 4.9 Wiring binary inputs

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

4.4.6 Binary Outputs

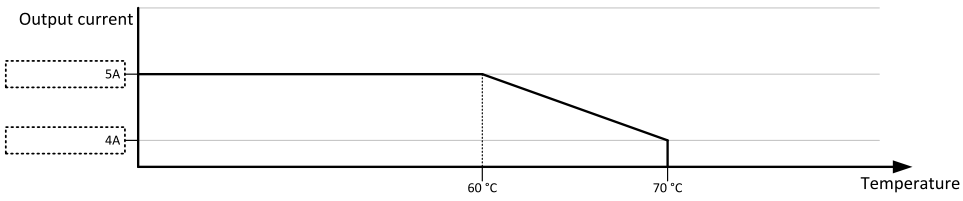
Use min. 1 mm^2 cables for wiring of binary outputs. Use external relays as indicated on the schematic below for all outputs except those where low-current loads are connected (signalization etc...).

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.*

IMPORTANT: When operating temperature is higher than 60 °C it is strongly recommended to limit output current of high current binary outputs (terminal 45 and terminal 56) to 4 A (each).



4.4.7 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) 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[1] 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:

Cable type	Shielded twisted pair
Impedance	120 Ω
Propagation velocity	≥ 75% (delay ≤ 4,4 ns/m)
Wire crosscut	≥ 0,25 mm^2
Attenuation (@1MHz)	≤ 2 dB/100 m

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.*

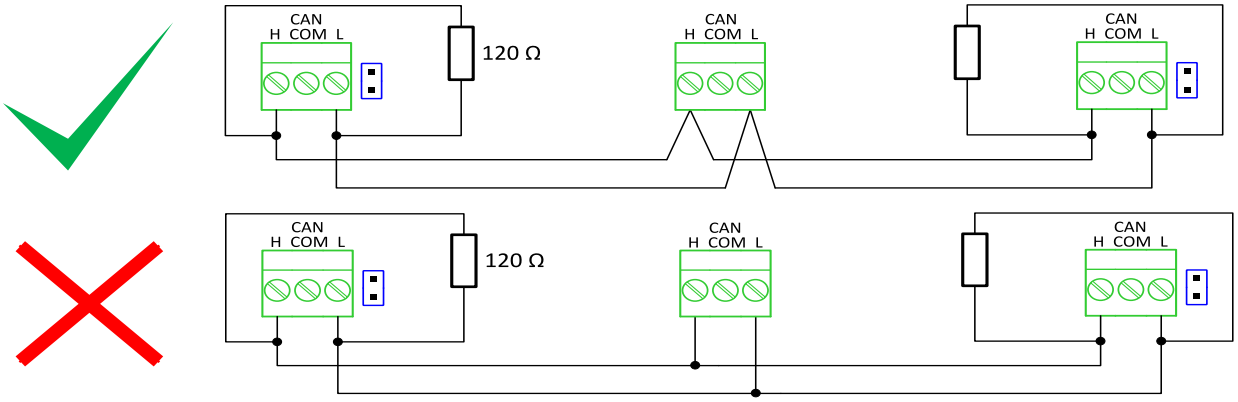


Image 4.10 CAN bus topology

[1]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 shorter distances (connection within one building)

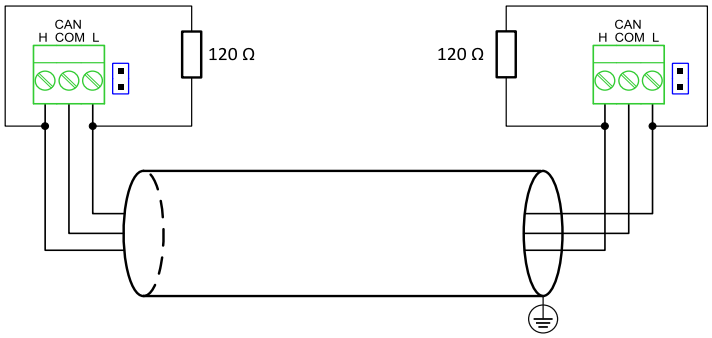


Image 4.11 CAN bus wiring for shorter distances

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.)

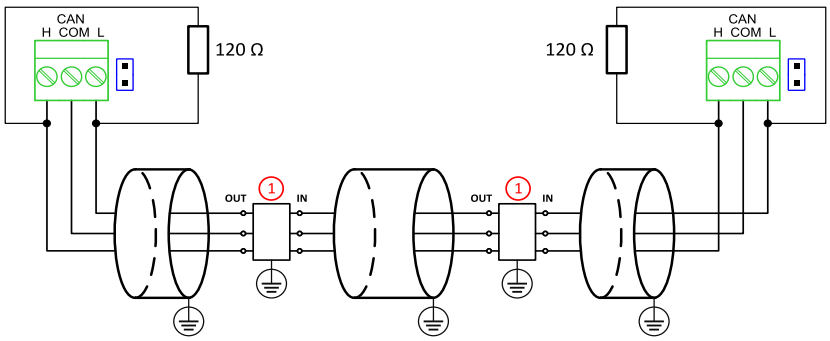


Image 4.12 CAN bus wiring for longer distances

① Recommended PT5-HF-12DC-ST[1]

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[2] 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.

---

[1]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

[2]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 shorter distances (connection within one building).

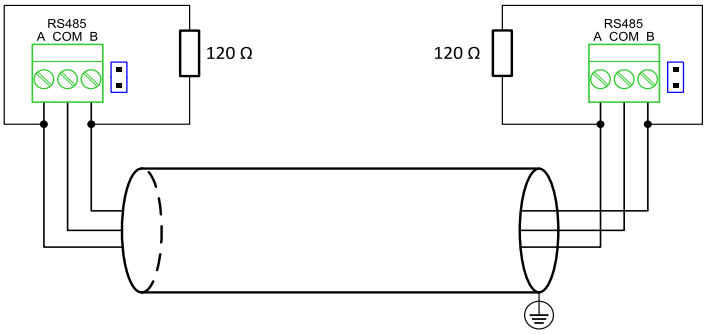


Image 4.13 RS485 wiring for shorter distances

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

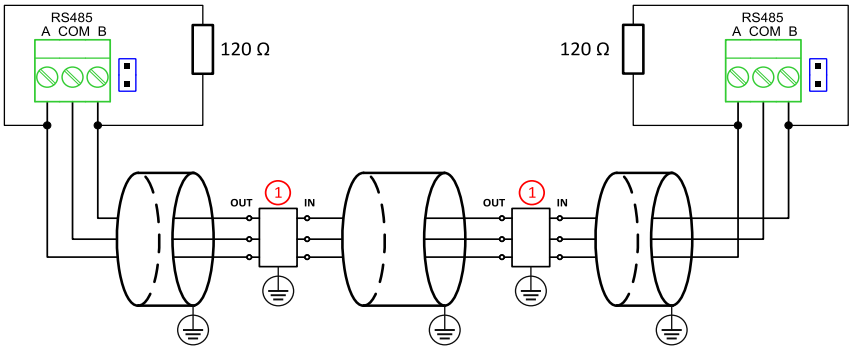


Image 4.14 RS485 wiring for longer distances

① Recommended PT5HF-5DC-ST[1]

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

[1]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

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 mili-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. Balancíng resistors are placed directly on the PCB of controller. Use jumpers PULL UP/PULL DOWN to connect the balancing resistors.

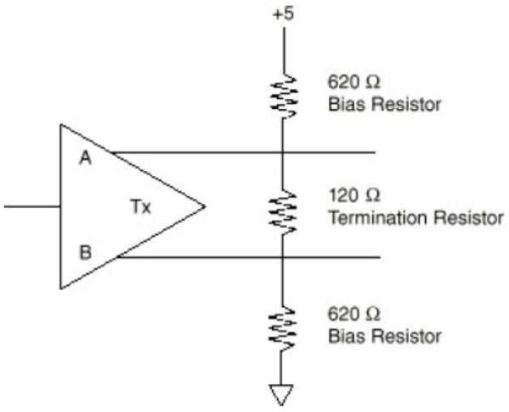


Image 4.15 Balancing resistors

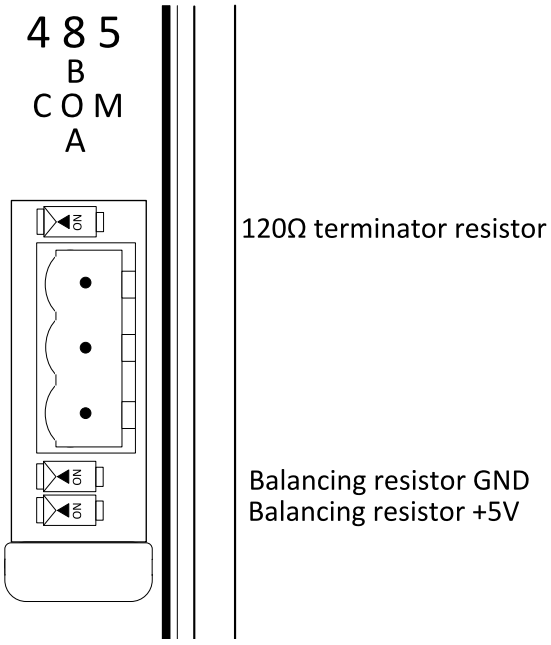


Image 4.16 RS485 on board

4.4.8 USB

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

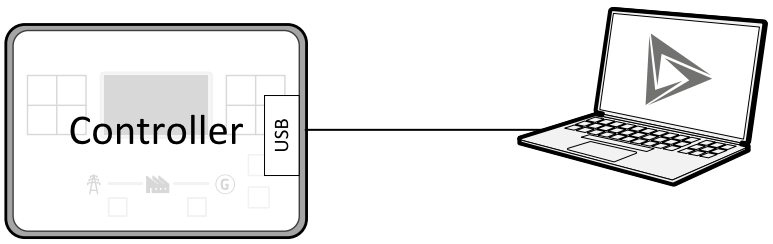


Image 4.17 USB connection

Controller can by also power by USB (only for service purpose like a uploading firmware, change of configuration etc.).

> **IMPORTANT: Power supply by USB is only for service purpose. Binary inputs and outputs are in logical 0. Also plug-in modules are not working.**

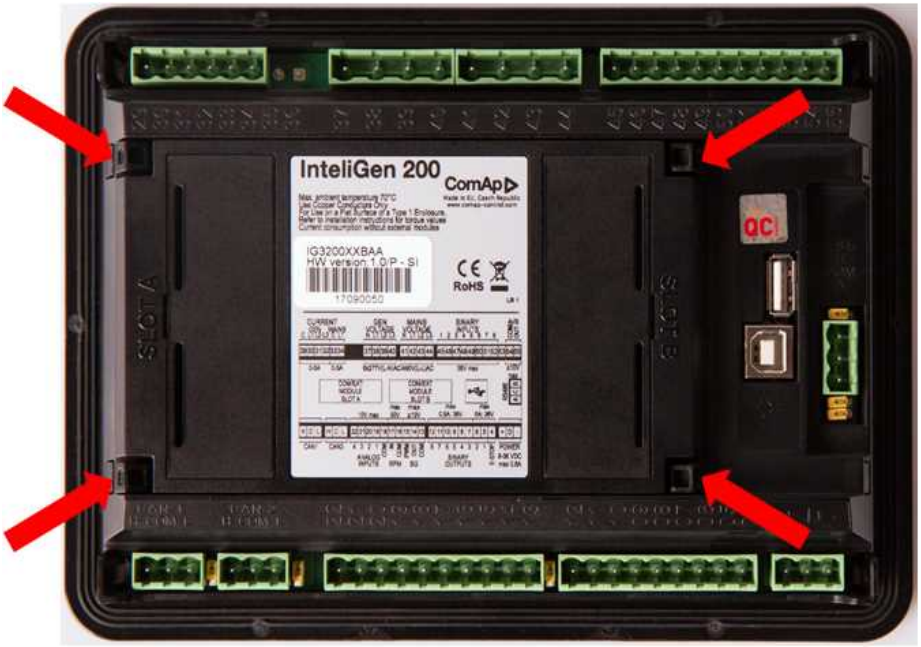
4.4.9 USB HOST

USB Flash Drive can be connected into USB A connector.

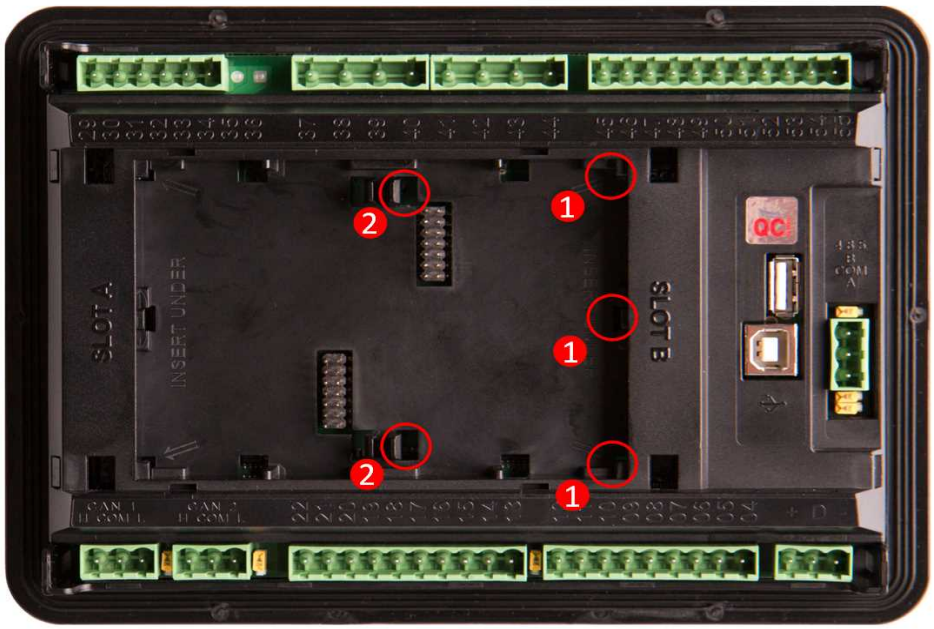
4.5 Plug-in module installation

4.5.1 Installation

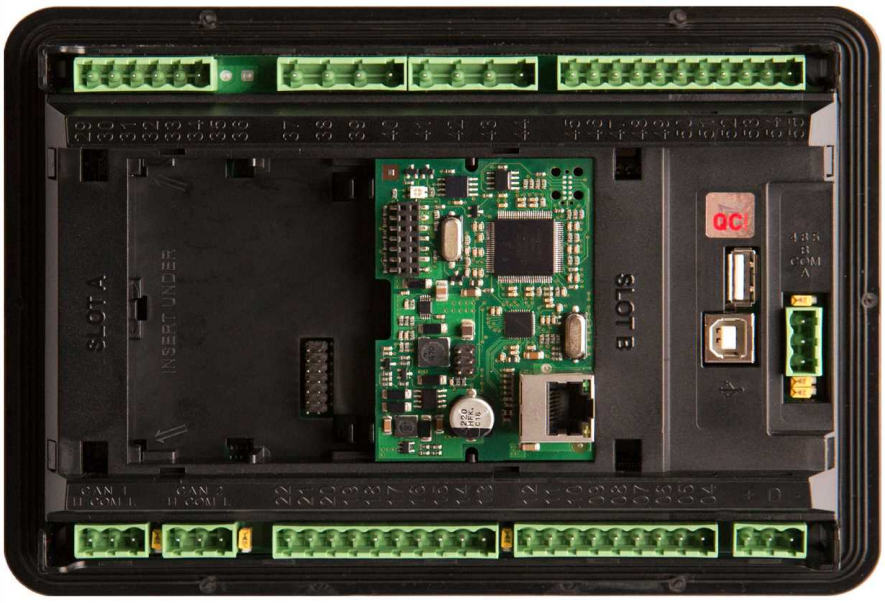
Remove the back cover. To do this, press four holders which are located in corners.



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.

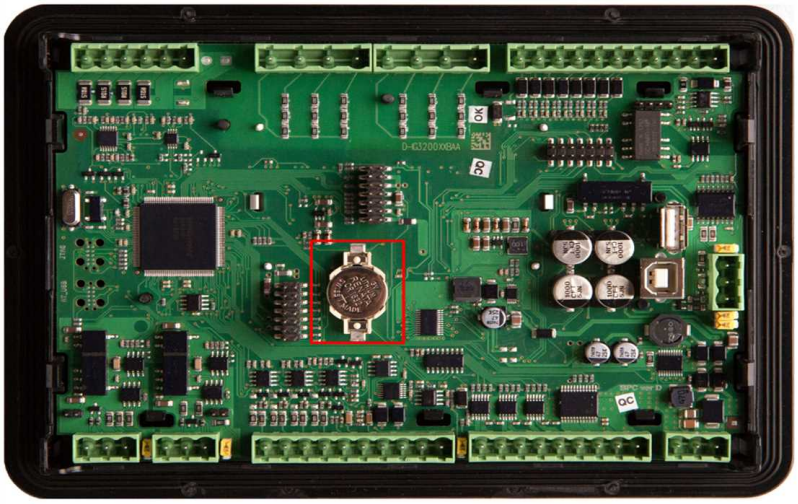
4.6 Maintenance

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

back to Table of contents

5.1 Default configuration

5.1.1 Default configuration

Binary inputs

Number	Description	Configured function
BIN1	Bus tie breaker feedback	BTB Feedback
BIN2	Access lock keyswitch	Access lock
BIN3	Spare	Not used
BIN4	Manual closing of BTB	Force BTB Close
BIN5	Spare	Not used
BIN6	Spare	Not used
BIN7	Spare	Not used
BIN8	Spare	Not used

Binary outputs

Number	Description	Function
BOUT1	Control of BTB	BTB Close/Open
BOUT2	Status of system reserve	System Reserve OK
BOUT3	Spare	Not used
BOUT4	Spare	Not used
BOUT5	Spare	Not used
BOUT6	Spare	Not used

5.2 Controller configuration and PC tools connection

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 InteliConfig

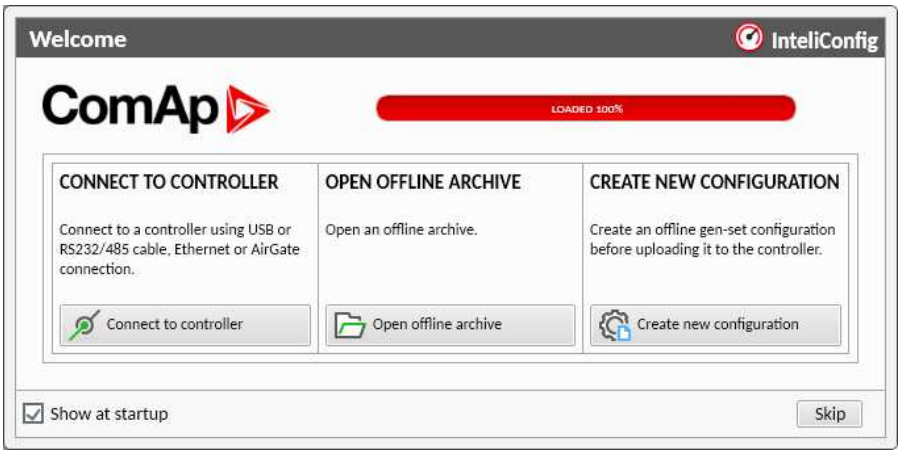


Image 5.1 First screen of InteliConfig - select connect to controller

Image 5.2 Second screen of InteliConfig - select detected controllers

Connection using WinScope

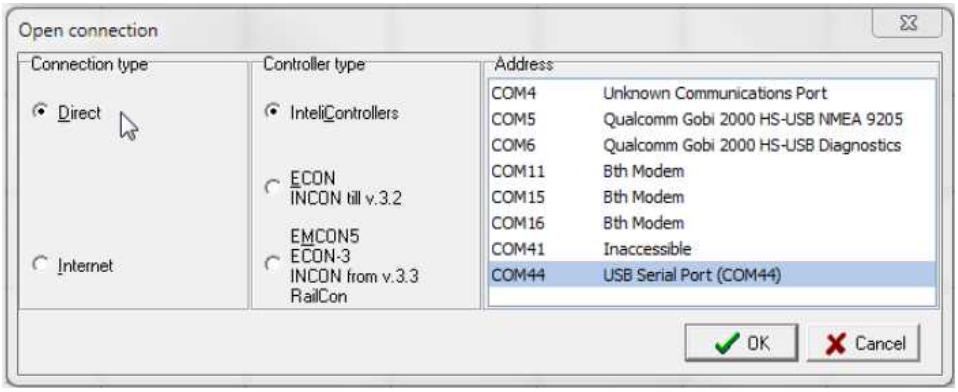


Image 5.3 WinScope screen - select direct connection

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 263)** = Direct
- **Controller Address (page 181)** has to be set to the same value as in the PC tool

Connection using InteliConfig

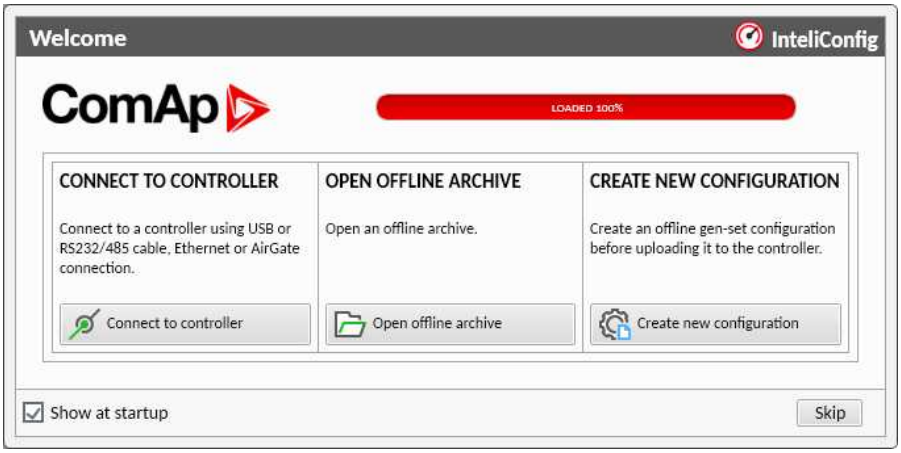


Image 5.4 First screen of InteliConfig - select connect to controller

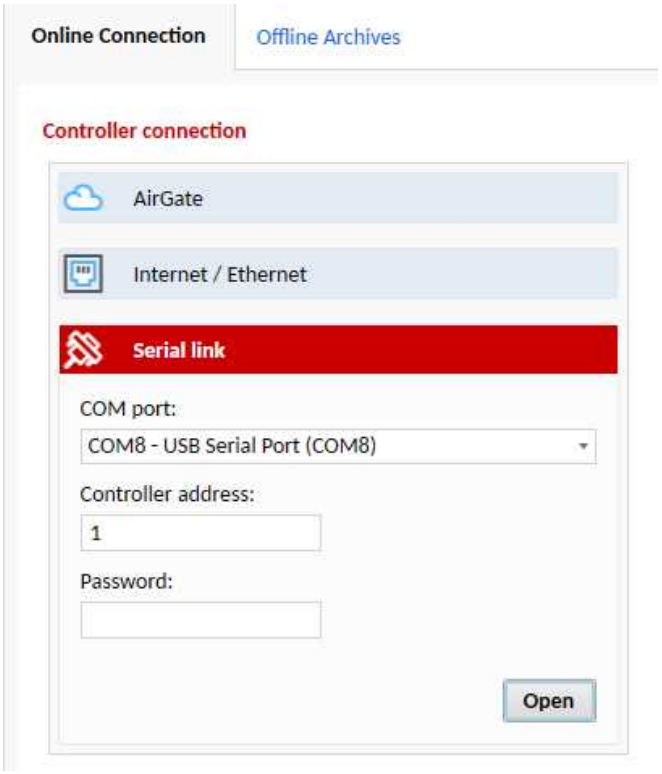


Image 5.5 Second screen of InteliConfig - select Serial link

Connection using WinScope

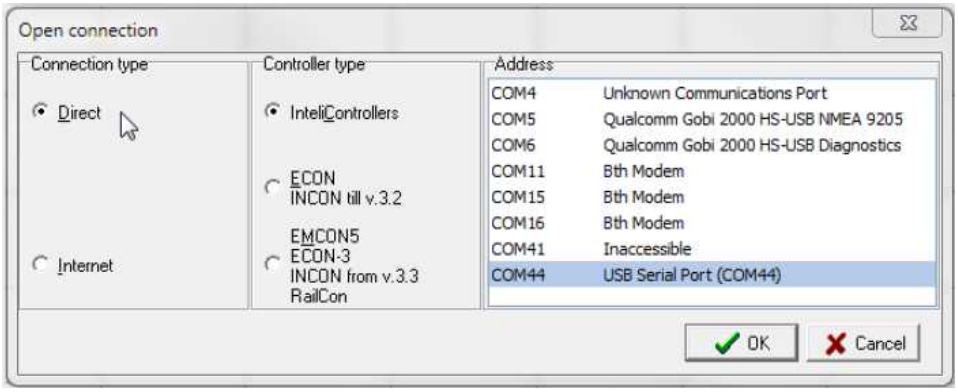


Image 5.6 WinScope screen - select direct connection

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

5.2.3 Ethernet

It is possible to connect to the controller using ethernet port either directly or using ComAp's AirGate service.

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 181)** has to be set to the same value as in the PC tool.
- **IP Address Mode (page 289)** can be set to AUTOMATIC when there is DHCP service is available. Otherwise it needs to be set to FIXED.
- **IP Address (page 290)** is either set automatically or it can be adjusted to a specific requested value.
- **Subnet Mask (page 290)** is either set automatically or it can be adjusted to a specific requested.
- **Gateway IP (page 290)** can be set here when it is used.
- **ComAp TCP Port (page 294)** number is 23. Make sure that this port is open for communication in your network.

Connection using InteliConfig

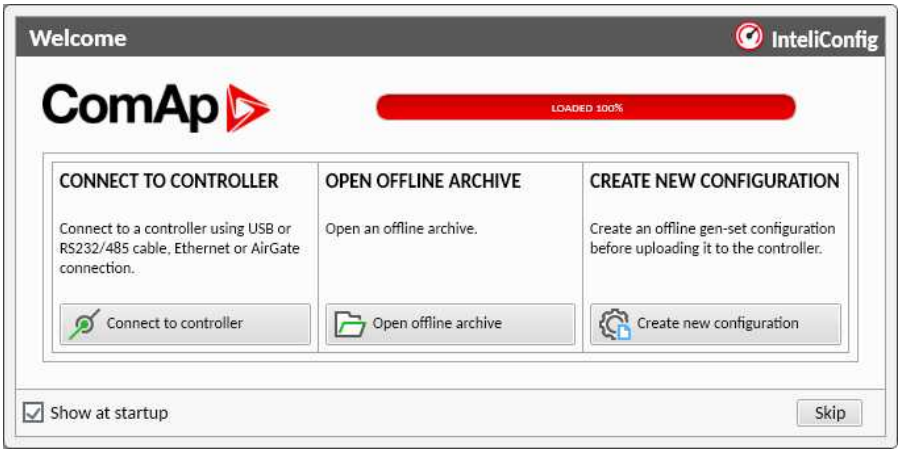


Image 5.7 First screen of InteliConfig - select connect to controller

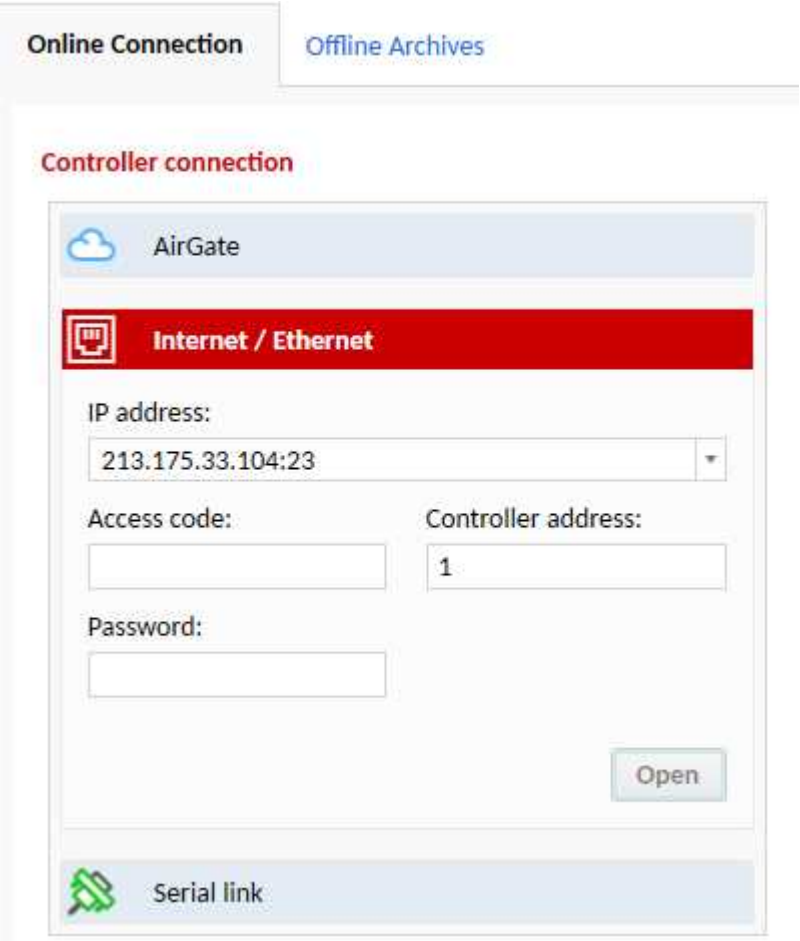


Image 5.8 Second screen of InteliConfig - select Internet/Ethernet

Connection using WinScope

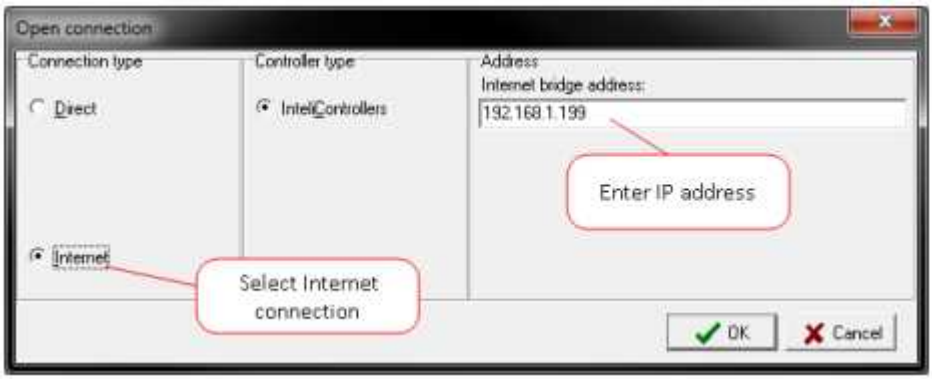


Image 5.9 WinScope screen

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 181)** has to be set to the same value as in the PC tool.
- **IP Address Mode (page 289)** can be set to AUTOMATIC when there is DHCP service is available. Otherwise it needs to be set to FIXED.
- **IP Address (page 290)** is either set automatically or it can be adjusted to a specific requested value.
- **Subnet Mask (page 290)** is either set automatically or it can be adjusted to a specific requested.
- **Gateway IP (page 290)** can be set here when it is used.
- **AirGate Connection (page 293)** has to be set to Enabled.
- **AirGate Address (page 293)** currently there is one AirGate server running at URL airgate.comap.cz (enter this URL into the setpoint).

Connection using InteliConfig

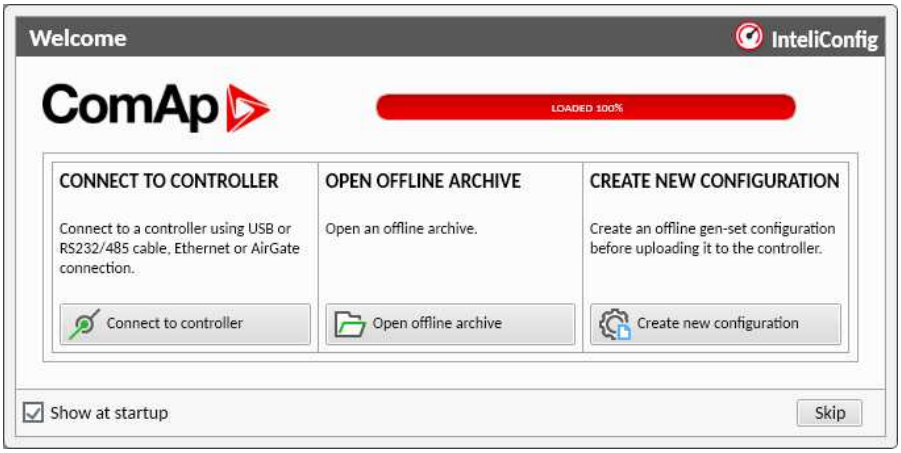


Image 5.10 First screen of InteliConfig - select connect to controller

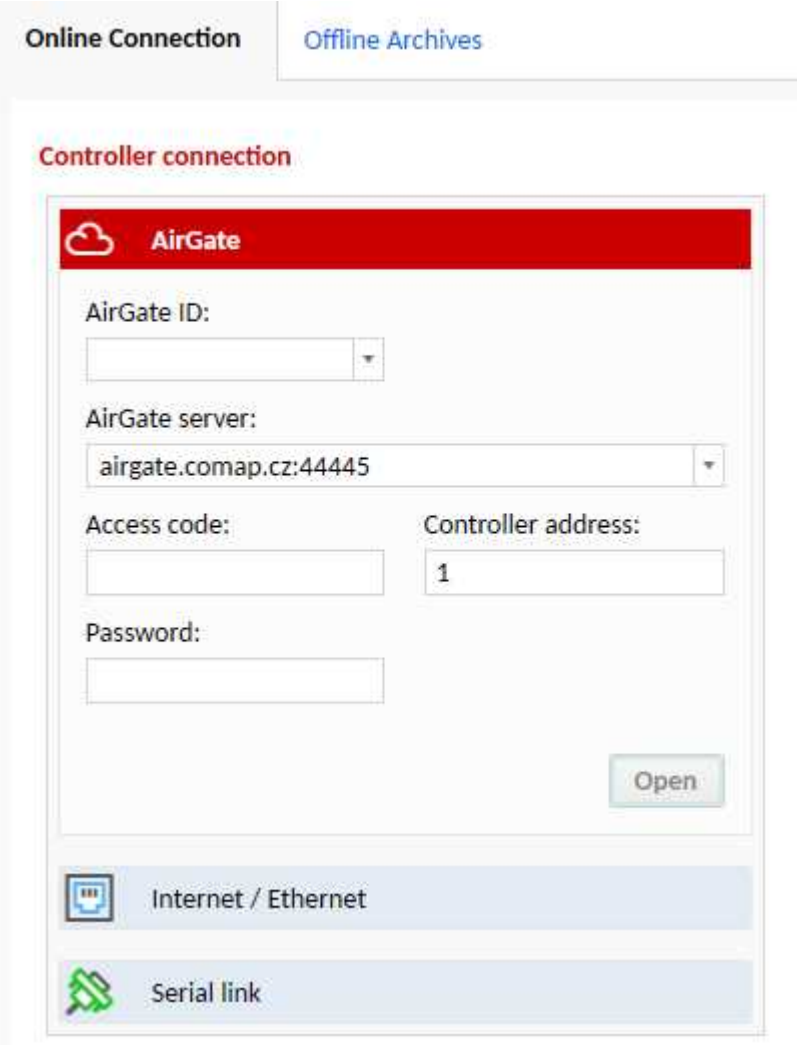


Image 5.11 Second screen of InteliConfig - select AirGate

Connection using WinScope

WinScope doesn't support connection via AirGate.

5.2.4 Firmware upgrade

Firmware upgrade is provided through InteliConfig pc software. For more information please download the manual from websites.

https://www.comap-control.com/products/detail/inteliconfig

Firmware upgrade in IG200 hardware

> **IMPORTANT: InteliMains 210 firmware is possible to use also with InteliGen 200 hardware. But because there are some important differences between both hardwares, please pay always attention by configuration of InteliMains 210.**

The main issue is based on Binary outputs on InteliGen 200.

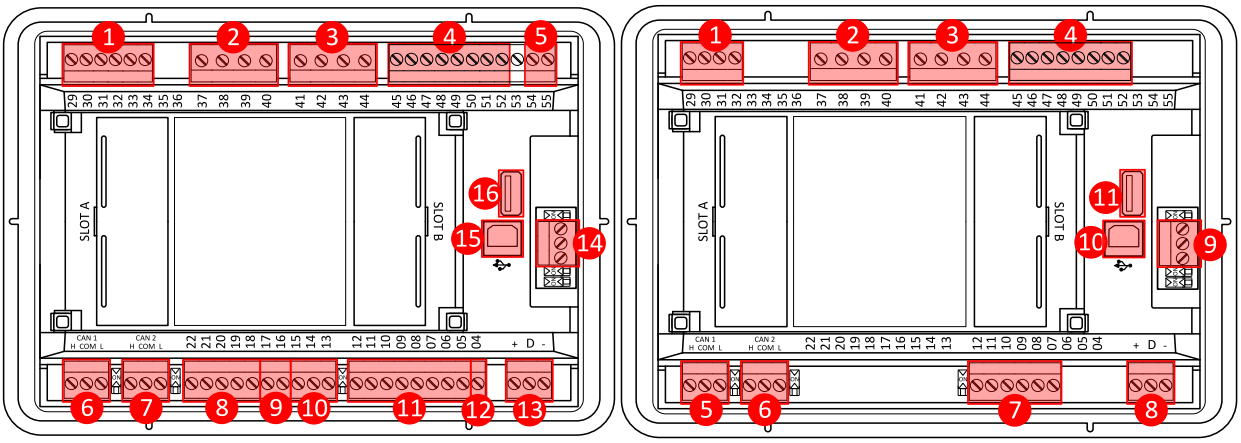


Image 5.12 Terminal diagram InteliGen 200 and InteliMains 210

InteliMains 210 doesn't use the terminals 04, 05, 06 **see Terminal Diagram on page 24**. This leads to very specific condition which has to be remembered during configuration.

From the configuration point of view is that you configure always binary outputs BO1-BO6 and on InteliGen 200 hardware is it in fact BO3-BO8.

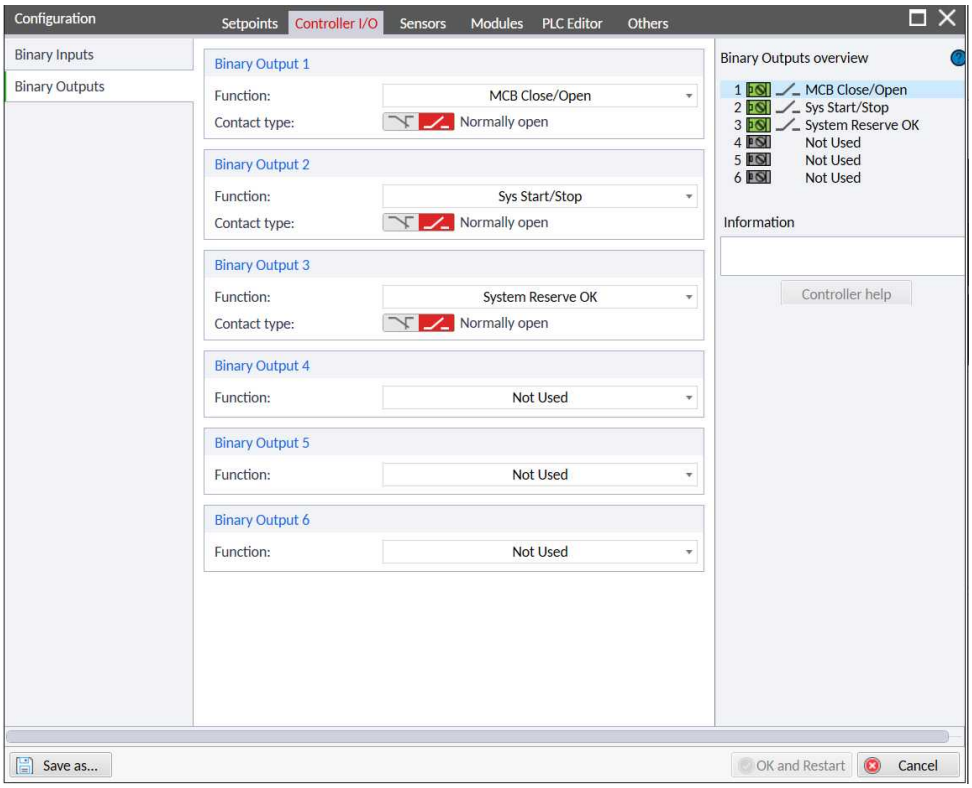


Image 5.13 Binary outputs configuration IM210

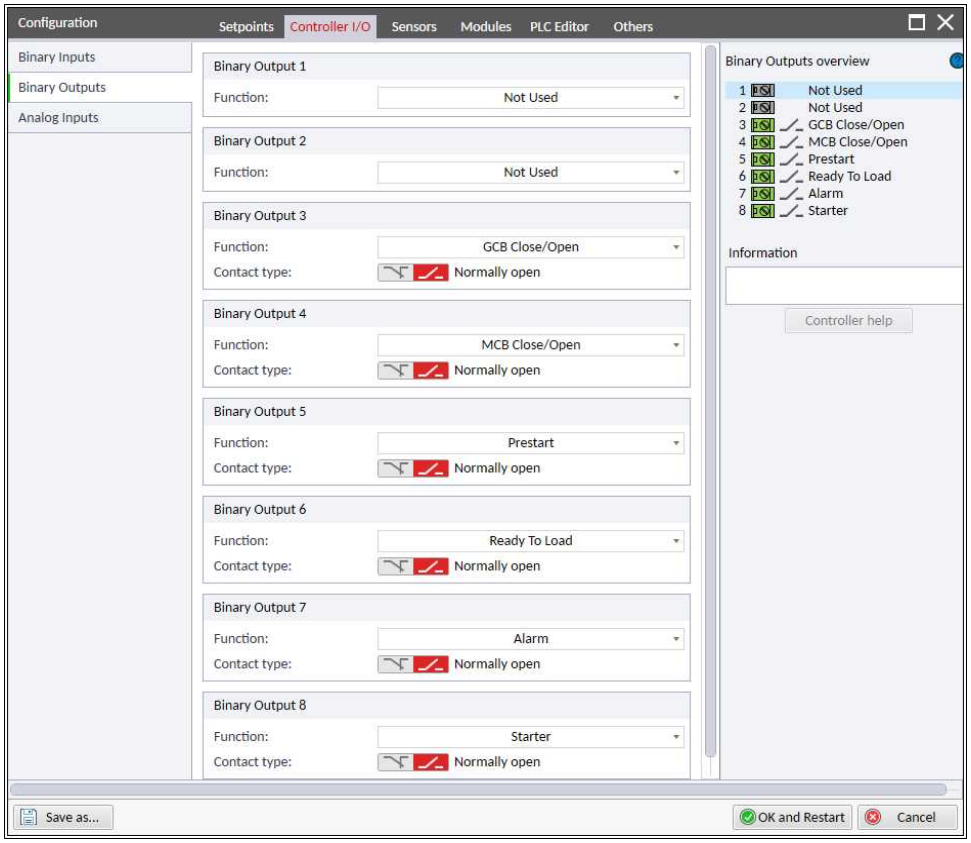


Image 5.14 Binary outputs configuration IG200

IMPORTANT: During configuration of binary outputs either for InteliMains 210 or InteliGen 200 hardware is always required to keep the same terminal numbers BO1=07...BO6=12!

5.3 Operator Guide

5.3.1 Front panel elements

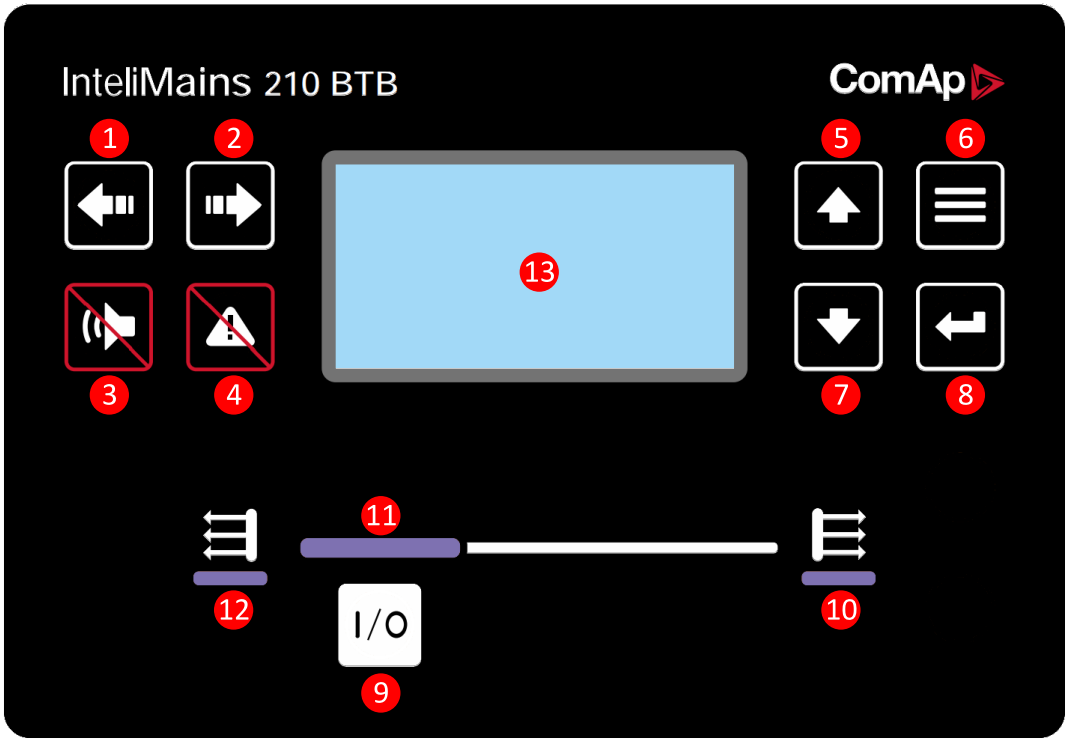


Image 5.15 Operator interface of InteliMains 210

Control buttons		
Position	**Picture**	**Description**
1		**LEFT** button. Use this button to move left or to change the mode. The button can change the mode only if the main screen with the indicator of currently selected mode is displayed. ***Note:*** *This button will not change the mode if the controller mode is forced by one of binary inputs listed in the Reference Guide – "Operating modes" chapter.*
2		**RIGHT** button. Use this button to move right or to change the mode. The button can change the mode only if the main screen with the indicator of currently selected mode is displayed.

		Note: *This button will not change the mode if the controller mode is forced by one of binary inputs listed in the Reference Guide – "Operating modes" chapter.*
3		**HORN RESET** button. Use this button to deactivate the horn output without acknowledging the alarms.
4		**FAULT RESET** button. Use this button to acknowledge alarms and deactivate the horn output. Inactive alarms will disappear immediately and status of active alarms will be changed to "confirmed" so they will disappear as soon as their reasons dismiss.
5		**UP** button. Use this button to move up or increase value.
6		**PAGE** button. Use this button to switch over display pages.
7		**DOWN** button. Use this button to move down or decrease value.
8		**ENTER** button. Use this button to finish editing a setpoint or moving right in the history page.
9		**BTB** button. Works in MAN mode only. Press this button to open or close the BTB or start the synchronization manually.
Indicators and others		
Position	**Description**	
10	**Bus Right** status indicator. There are two states - Bus Right OK (indicator is green) and Bus Right failure (indicator is red). Green LED is on if the Bus Right voltage is present and within limits. Red LED starts flashing when Bus Right failure occurs. After FAULT RESET button is pressed, goes to steady light (if an alarm is still active) or is off (if no alarm is active).	

11	**BTB ON**. Green LEDs are on if BTB is closed and Bus is healthy. If Bus is not healthy and BTB is closed than middle LED is on. It is driven by BTB CLOSE/OPEN output or by BTB feedback signal.
12	**Bus Left** status indicator. There are two states - Bus Left OK (indicator is green) and Bus Left failure (indicator is red). Green LED is on if Bus Left is present and within limits. Red LED starts blinking when the Bus Left failure occurs. After FAULT RESET button is pressed, goes to steady light (if an alarm is still active) or is off (if no alarm is active).
13	Graphic B/W display, 132x64 pixels.

5.3.2 Display screens and pages structure

The displayed information is structured into "pages" and "screens". Use PAGE button to switch over the pages.

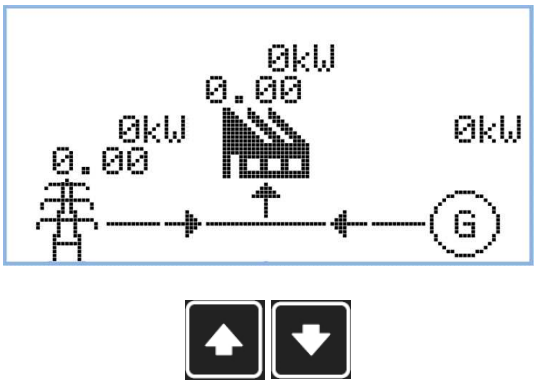
- The page Measurement consists of screens which display measured values like voltages, current, oil pressure etc., computed values like i.e. gen-set power, statistic data and the alarm list on the last screen.
- The page Setpoints contains all setpoints organized to groups and also a special group for entering password.
- The page History log shows the history log in the order that the last record is displayed first.

Main Screen

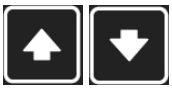
Symbols

- Padlock - active when LBI ACCESS LOCK is active
- R - active when there is active remote connection to controller
- Exclamation mark - active when there is any alarm in alarmlist

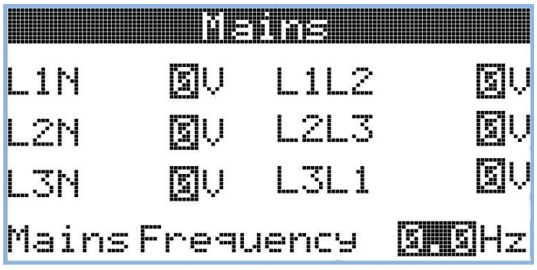
Measurement Screens

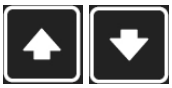


Note: *Use Up and Down button to move between measurement pages.*

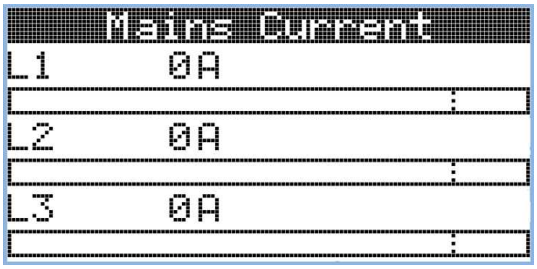


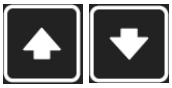
Note: *Use Up and Down button to move between measurement pages.*



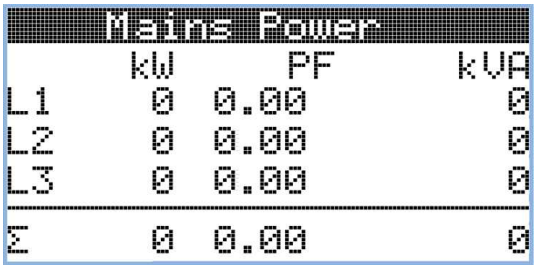


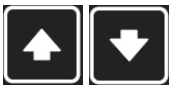
Note: *Use Up and Down button to move between measurement pages.*



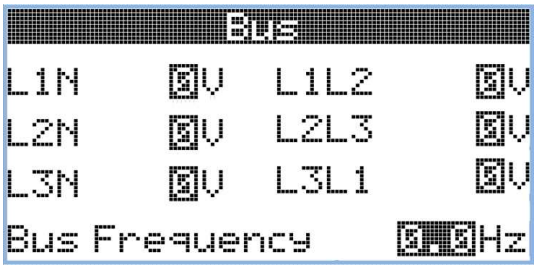


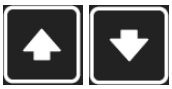
Note: *Use Up and Down button to move between measurement pages.*



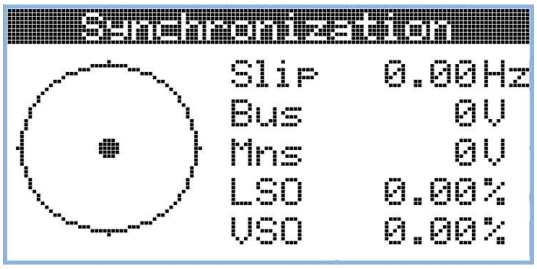


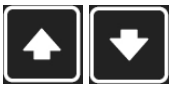
Note: *Use Up and Down button to move between measurement pages.*



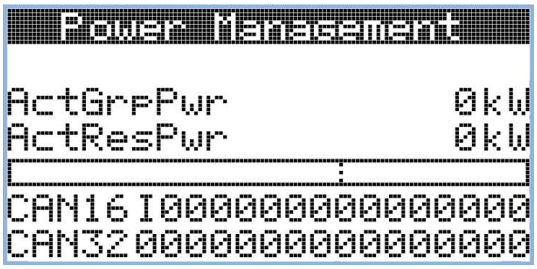


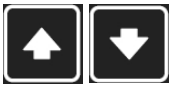
Note: *Use Up and Down button to move between measurement pages.*



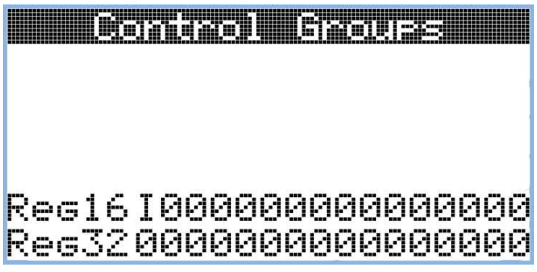


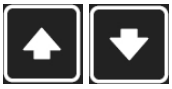
Note: *Use Up and Down button to move between measurement pages.*



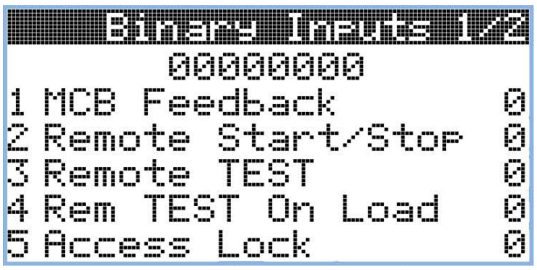


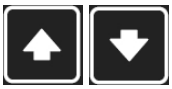
Note: *Use Up and Down button to move between measurement pages.*



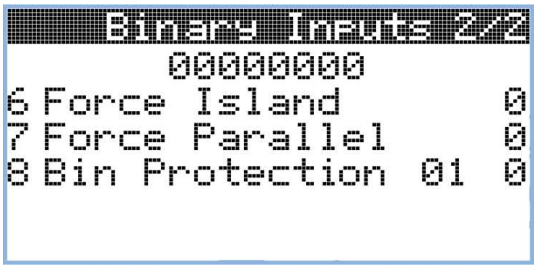


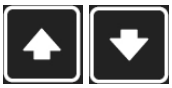
Note: *Use Up and Down button to move between measurement pages.*



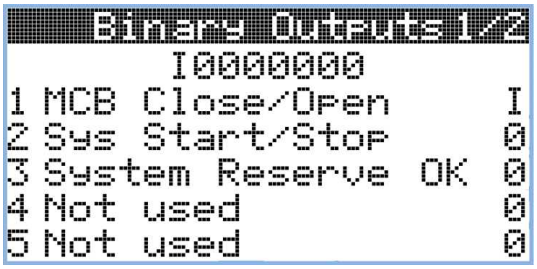


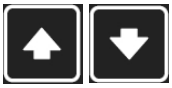
Note: *Use Up and Down button to move between measurement pages.*



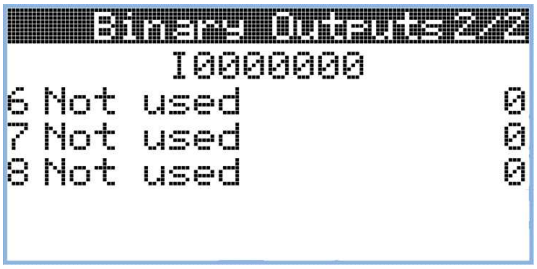


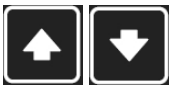
Note: *Use Up and Down button to move between measurement pages.*



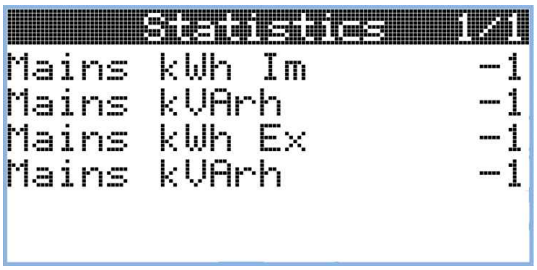


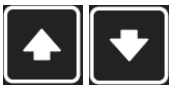
Note: *Use Up and Down button to move between measurement pages.*



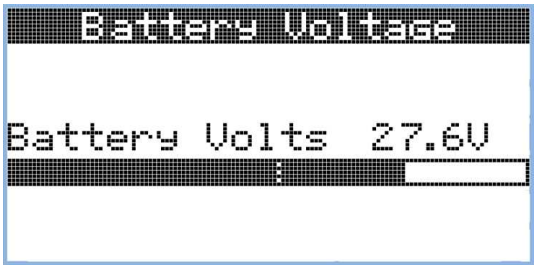


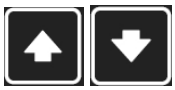
Note: *Use Up and Down button to move between measurement pages.*



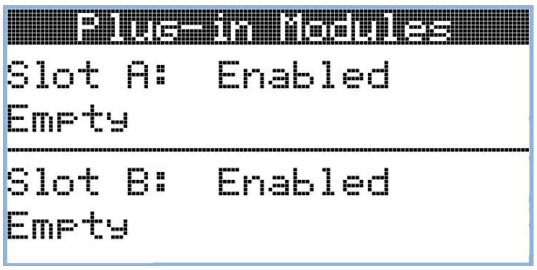


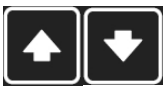
Note: *Use Up and Down button to move between measurement pages.*



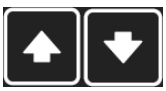


Note: *Use Up and Down button to move between measurement pages.*





Note: *Use Up and Down button to move between measurement pages.*

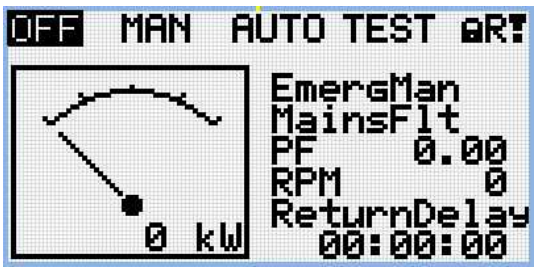


Note: *Use Up and Down button to move between measurement pages.*

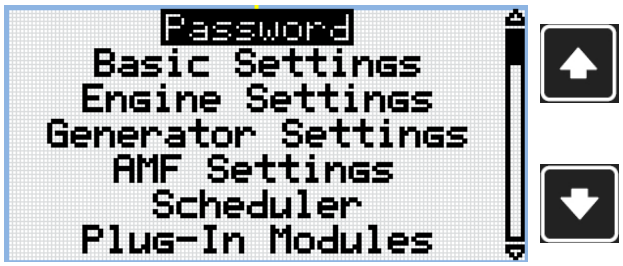
Note: *From all of these pages it is possible to switch seamlessly to the setpoint group page by pressing Page button.*

Note: *There can be some additional screens and also some screens can be hidden. Screen's visibility depends on actual configuration (usage of extension or communication modules, etc.).*

Setpoint Screens

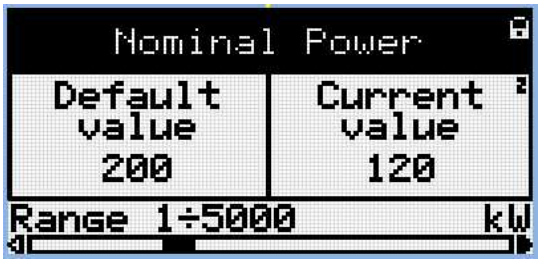


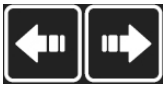
Note: *From all measurement pages we can fluently go to the setpoint group page by pressing Page button.*



Note: *Use Up and Down button to select required setpoint group.*

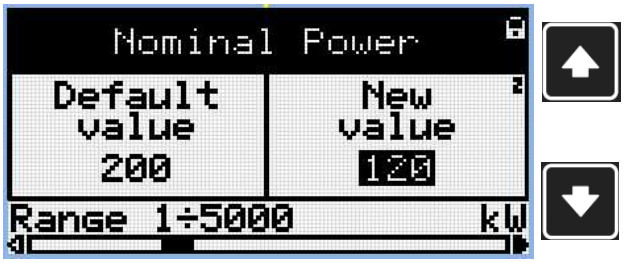
Note: *Use Enter button to enter selected setpoint group.*





Note: *Use Left and Right button to select required setpoint.*

Note: *Use Enter button to enter selected setpoint.*



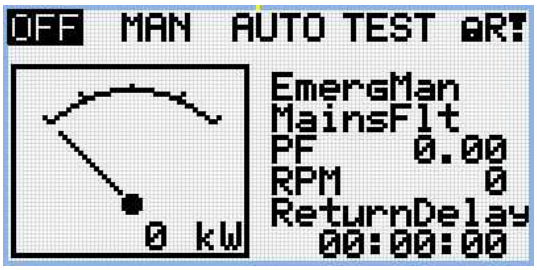
Note: *Use Up and Down button to set required value of selected setpoint.*

Note: *Use Enter button to confirm adjusted value of setpoint.*

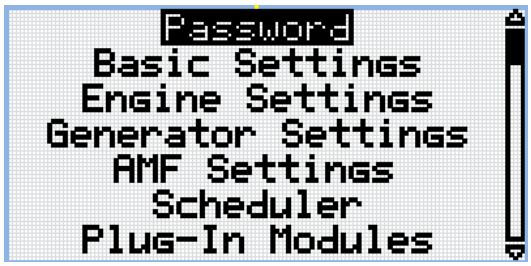
Note: *Use Page button to discard changes, to set setpoint to previous value and to return to the list of setpoints of selected group.*

IMPORTANT: Cannot change setpoint? Setpoints marked with an padlock are password protected. Enter password as described in the chapter Password (page 65)**.**

History Log



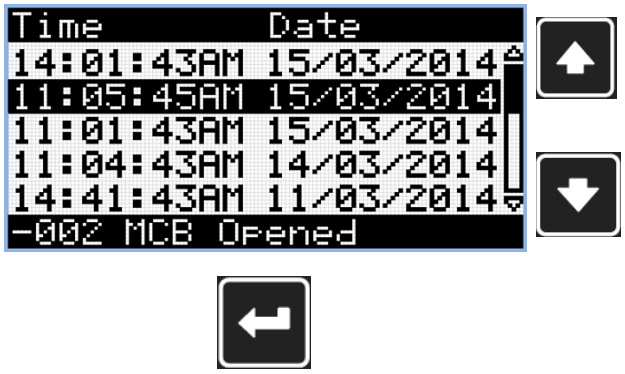
Note: *From all measurement pages we can fluently go to the setpoint group page by pressing Page button.*



Note: *From setpoint group page we can fluently go to the history log pages by pressing Page button.*

Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*



Note: *Use Up and Down button to select required alarm reason.*

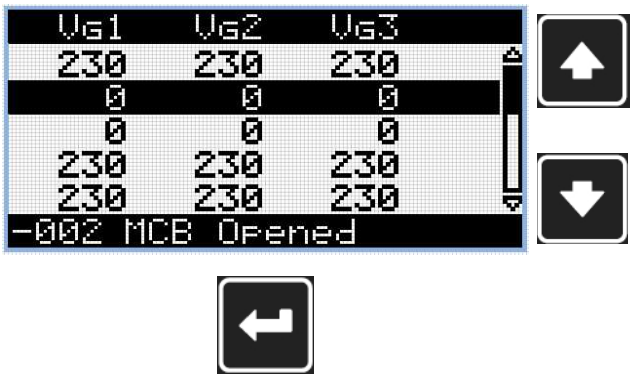
Note: *Use Enter button to move to the next page of history log.*

Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*

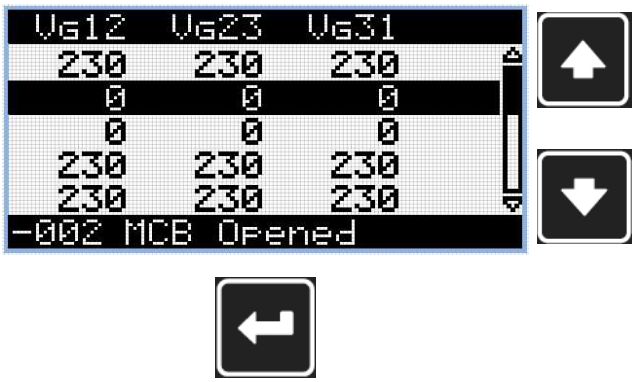
Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*



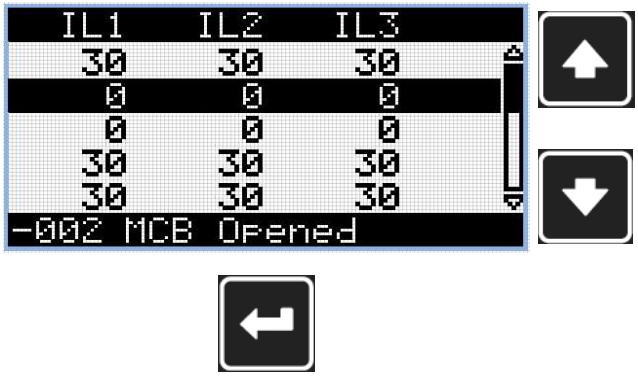
Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*



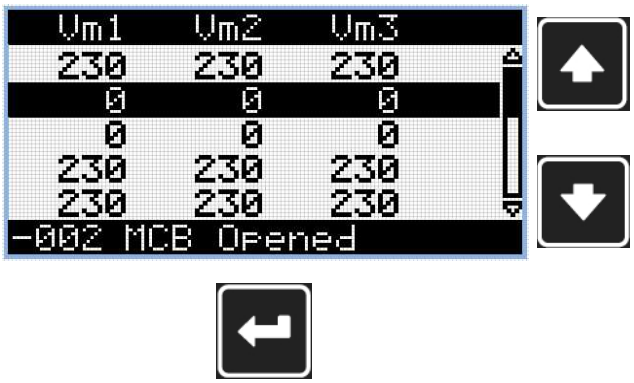
Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*



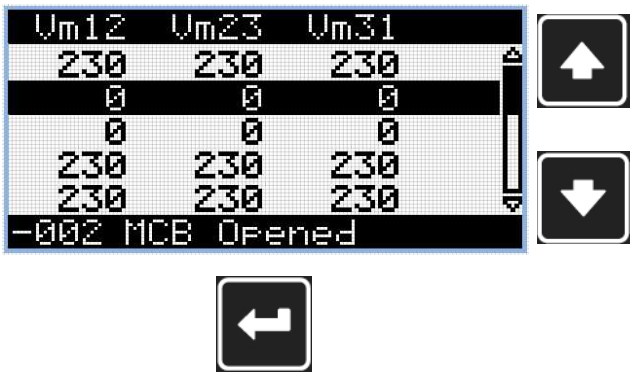
Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*



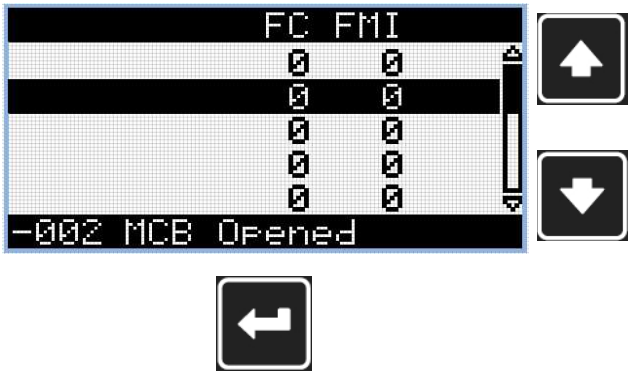
Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*



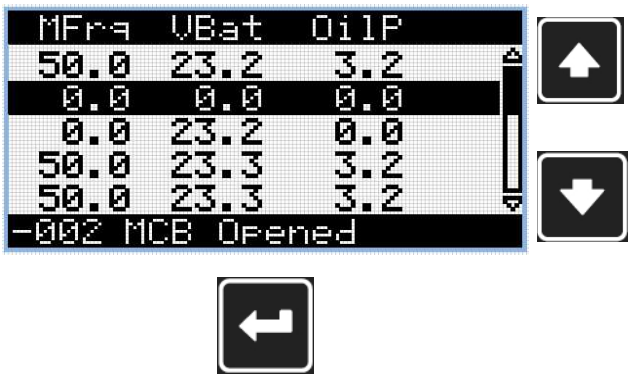
Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*



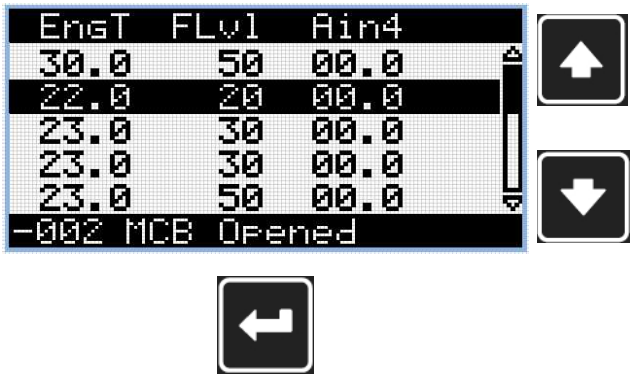
Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*



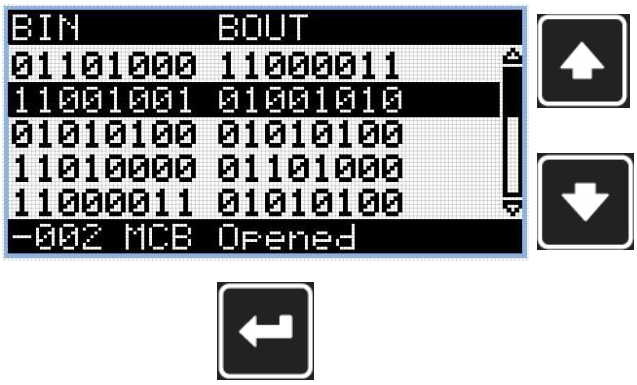
Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*



Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*



Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the next page of history log.*

Note: *Use Up and Down button to select required alarm reason.*

Note: *Use Enter button to move to the first page of history log.*

IMPORTANT: The records are numbered in reverse order, i.e. the latest (newest) record is "0" and older records have "-1", "-2" etc.

Note: *This is only basic history record. There can be some additional screens in case that in controller is extension module is configured. Also it depends on connection type.*

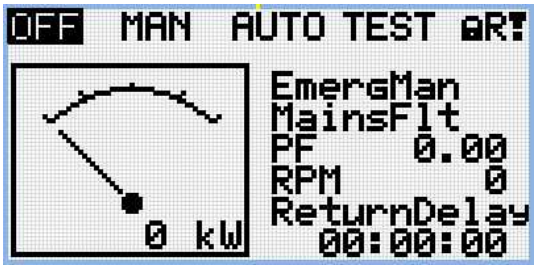
5.3.3 Browsing alarms

Note: *Use Up button to move to alarmlist from main measurement screen.*

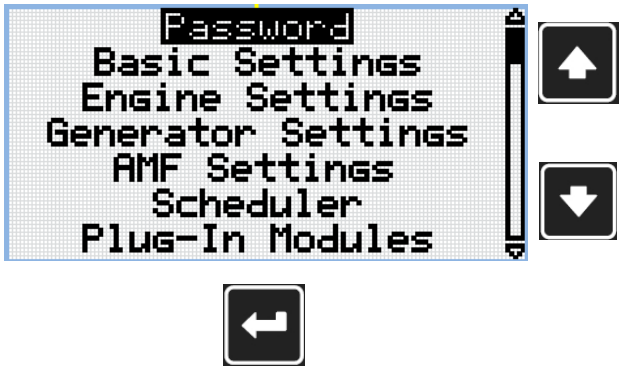
- Active alarms are displayed as white text on black background. It means the alarm is still active, i.e. the appropriate alarm conditions are still present.
- Inactive alarms are displayed as black text on white background. It means the alarm is no more active, i.e. the appropriate alarm conditions are gone.
- Not confirmed alarms are displayed with an asterisk. It means the alarm is still not acknowledged (confirmed).

5.3.4 Password

Enter password



Note: *From all measurement pages we can fluently go to the setpoint group page by pressing Page button.*



Note: *Use Up and Down button to select setpoint group Password.*

Note: *Use Enter button to enter setpoint group Password.*

Note: *Use Up and Down button to select Enter Password.*

Note: *Use Enter button to enter selected setpoint.*

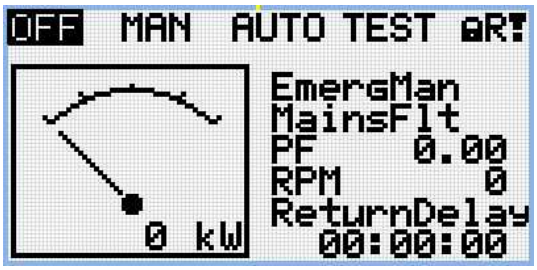
Note: *Use Up and Down button to set required value of selected setpoint.*

Note: *Use Left and Right button to move between digits.*

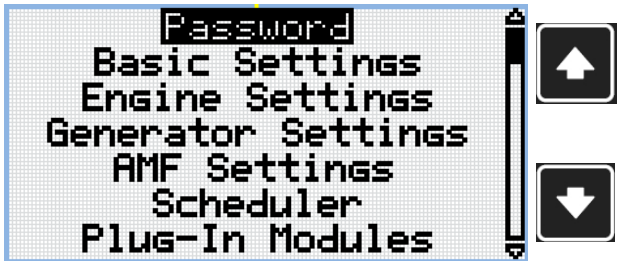
Note: *Use Enter button to confirm the password or Page button to cancel entering the password.*

Note: *In case that invalid password is entered, the controller shows Invalid password screen. Use Page button to go back to menu.*

Change password



Note: *From all measurement pages we can fluently go to the setpoint group page by pressing Page button.*

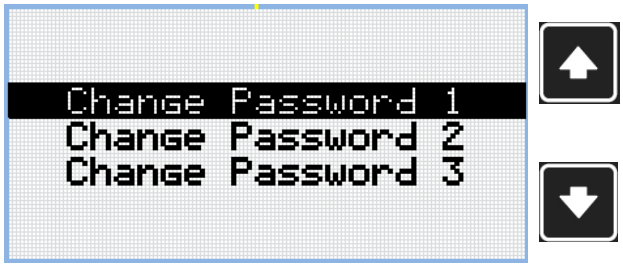


Note: *Use Up and Down button to select setpoint group Password.*

Note: *Use Enter button to enter setpoint group Password.*

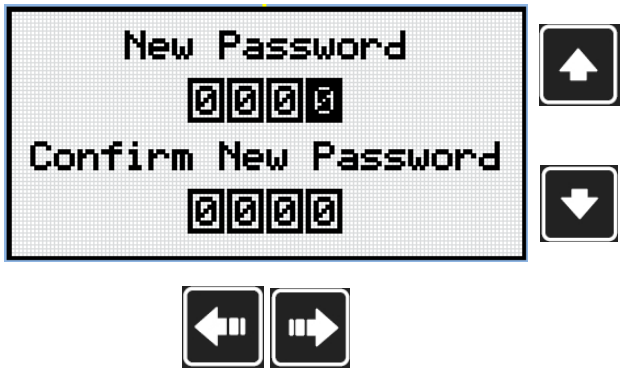
Note: *Use Up and Down button to select Change Password.*

Note: *Use Enter button to enter selected setpoint.*



Note: *Use Up and Down button to select required level of password.*

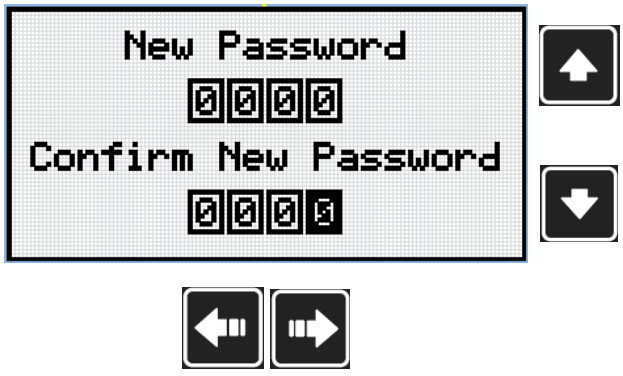
Note: *Use Enter button to enter selected setpoint.*



Note: *Use Up and Down button to set required value of password.*

Note: *Use Left and Right button to move between digits.*

Note: *After setting new password use Enter button to confirm adjusted password.*



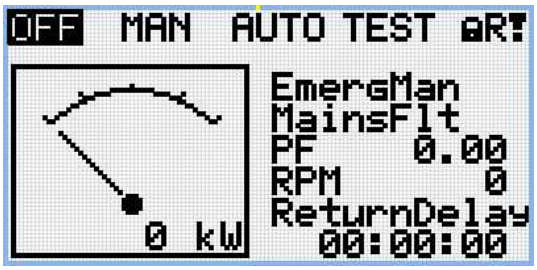
Note: *Use Up and Down button to set required value of password again.*

Note: *Use Left and Right button to move between digits.*

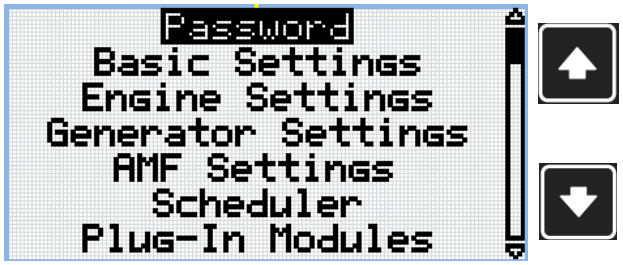
Note: *After setting new password again use Enter button to confirm adjusted password or Page button to discard changes and to cancel changing password.*

Note: *Before changing the password controller has to be unlocked. In case that controller is locked, the controller shows Password required screen. In that case the password has to be entered before changing the password.*

Log out from controller



Note: *From all measurement pages we can fluently go to the setpoint group page by pressing Page button.*

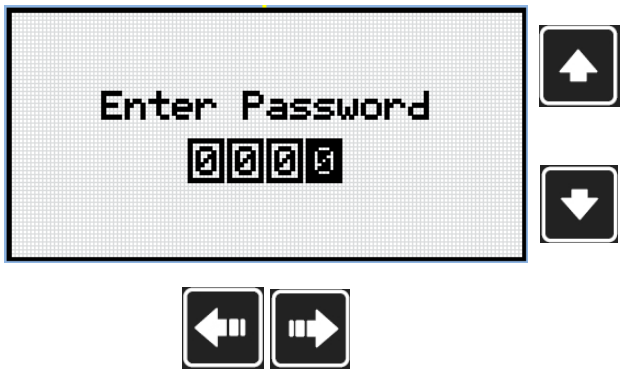


Note: *Use Up and Down button to select setpoint group Password.*

Note: *Use Enter button to enter setpoint group Password.*

Note: *Use Up and Down button to select Enter Password.*

Note: *Use Enter button to enter selected setpoint.*



Note: *Use Up and Down button to set required value of selected setpoint.*

Note: *Use Left and Right button to move between digits.*

Note: *Enter invalid password to log out from controller.*

Note: *In case that invalid password is entered, the controller shows Invalid password screen. Use Page button to go back to menu.*

Lost Password

If you lost the administrator-level (level 3) password, proceed according to following steps.

1. Connect to the controller with InteliConfig, go to "Password reset" window and proceed according to the instructions there. You will obtain unique one-time request code which must be sent to ComAp technical support.
2. ComAp technical support will send an unique one-time action code to the backup e-mail address specified in the controller.
3. Copy the received action code to InteliConfig and reset the administrator-level password to default.

IMPORTANT: It is extremely important to adjust the backup e-mail address in the controller. Otherwise you will not be able to receive the action code!

IMPORTANT: If the backup email was not setup. Display the information screen containing the serial number and password decode number as described in the chapter Information screen (page 71) and send them to your local distributor.

Password break protection

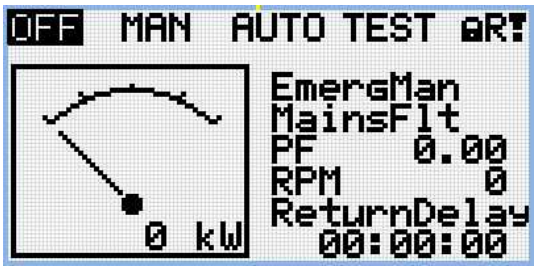
The controller password is protected against breaking by brute force. The protection works at every controller interface separately.

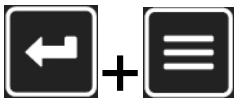
1. When an invalid password is entered 5 times after each other, independently on the time period elapsed between the attempts, the controller will be blocked after the 5th unsuccessful attempt for 1 minute at the

particular interface.

2. While the controller is blocked it refuses any further attempts to enter password.
3. When unblocked again the controller accepts one attempt to enter password. If the password is incorrect again the controller will be blocked for 2 minutes.
4. Each further attempt to enter invalid password will double the blocking time, but maximum blocking time is 20 minutes.
5. When incorrect password is entered 100-times after each other the controller is blocked forever and the password reset procedure is required to unblock it.

5.3.5 Information screen

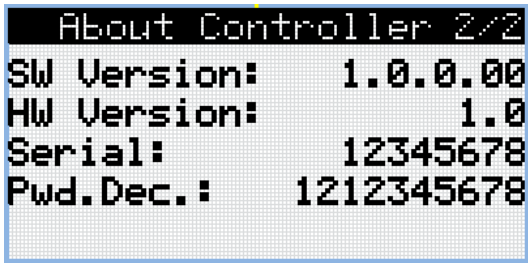




Note: *On Main measurement screen press Enter and Page button together. Enter button has to be pressed first.*

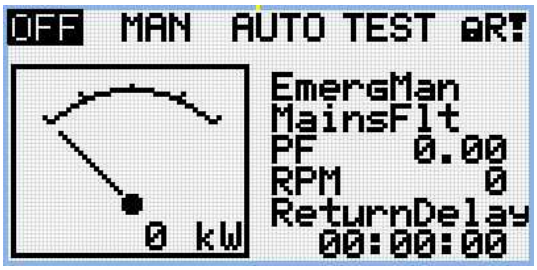
Note: *Use Page button to move to the next page.*

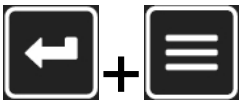
Note: *Use Page button to move to the next page.*



Note: *Use Up button to move back to main measurement screen.*

5.3.6 Language selection

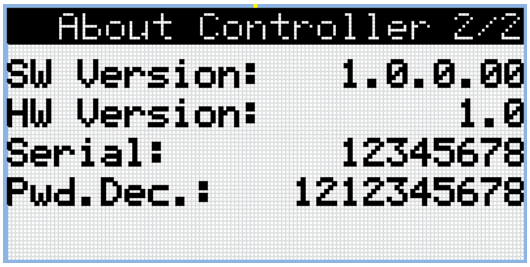




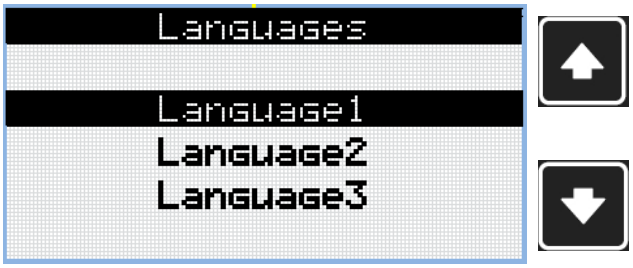
Note: *On Main measurement screen press Enter and Page button together. Enter button has to be pressed first.*

Note: *Use Page button to move to the next page.*

Note: *Use Page button to move to the next page.*



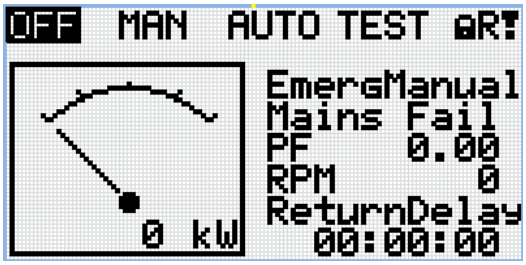
Note: *Use Page button to move to the next page.*



Note: *Use Up and down button to select required language.*

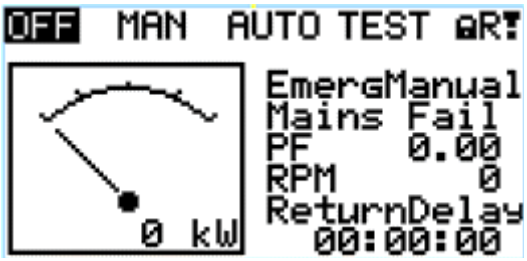
Note: *Use Enter button to confirm selected language.*

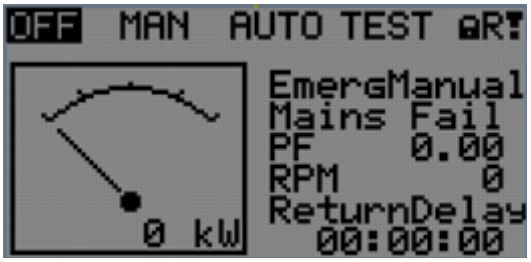
5.3.7 Display contrast adjustment



Note: *On any measurement screen press Enter and Down button together for lower contrast.*

Note: *On any measurement screen press Enter and Up button together for higher contrast.*





Note: *After setting a contrast, no another action is needed.*

back to Controller setup

5.4 Functions

back to Controller setup

5.4.1 Operating Modes

Selecting the operating mode is done through Left and Right buttons on the front panel or by changing the **Controller mode (page 178)** 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 432)**
- **Remote MAN (page 432)**
- **Remote AUTO (page 431)**

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

All regulations are switched off. Switching to OFF mode causes opening of BTB regardless of the settings.

MAN

It is possible to close/open BTB manually under supervision of InteliMains controller (automatic synchronization is started if there are voltages on both sides).

AUTO

Controller closes automatically BTB if:

- bus voltages are within the limits
- there is voltage on both, one or none of the buses and closing to dead bus is enabled

5.4.2 Connecting to load

Connecting to dead bus

BTB

Behavior of connecting to dead bus is adjusted by setpoint **Dead Bus Closing (page 174)**.

Note: *There is also a protection of "Bus power loss sensing". The "Bus Measurement Error" is detected when the BTB is closed and the bus parameters are out of limit for 20s. Bus Measurement Error can be disabled by setpoint.*

Synchronization

Synchronization process

It is possible to influence the behavior of the controller in MAN and AUTO mode and limit the process of synchronization. Following setpoints have influence to synchronization process:

- **Mains Coupling (page 171)**
- **Synchronization R To Mains (page 172)**
- **Synchronization L To Mains (page 173)**
- **Synchronization R To L (page 173)**
- **Synchronization L To R (page 173)**
- **Dead Bus Closing (page 174)**
- **BTB Opening (page 174)**

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 BTB in AUTO mode

BTB controller controls the synchronization process. Behavior of synchronization depends on power sources of bus left and bus right.

	Dead bus	Gen-sets	Mains	Gen-sets + Mains
Dead bus	BTB Opening (page 174)	Dead Bus Closing (page 174)	Dead Bus Closing (page 174)	Dead Bus Closing (page 174)
Gen-sets	Dead Bus Closing (page 174)	Synchronization R To L (page 173) Synchronization L To R (page 173)	Synchronization L To R (page 173) Synchronization L To Mains (page 173)	Synchronization L To R (page 173) Synchronization L To Mains (page 173)
Mains	Dead Bus Closing (page 174)	Synchronization R To L (page 173) Synchronization R To Mains (page 172)	Mains Coupling (page 171)	Mains Coupling (page 171)
Gen-sets + Mains	Dead Bus Closing (page 174)	Synchronization R To L (page 173) Synchronization R To Mains (page 172)	Mains Coupling (page 171)	Mains Coupling (page 171)

Note: *Power sources in left column are on left side and power sources in top row are on right side.*

Synchronization without Mains

In situation when on both sides are only gen-sets, setpoint **Synchronization R To L (page 173)** or **Synchronization L To R (page 173)** has to be enabled.

Synchronization with Mains on one side

In situation when one one side are only gen-sets and on second side is Mains or Gen-sets wirh Mains, setpoint **Synchronization R To L (page 173)** or **Synchronization L To R (page 173)** or **Synchronization R To Mains (page 172)** or **Synchronization L To Mains (page 173)** has to be enabled.

Synchronization with Mains on both sides

In situation when on both sides is Mains or Mains with Gen-sets, setpoint **Mains Coupling (page 171)** has to be enabled.

Synchronization via BTB in MAN mode

BTB controller controls the synchronization process.

- Behavior is exactly the same as in AUTO mode - but the synchronization does not start again automatically when parameters of the Bus gets out of limits and back. The breaker control button must be pressed again.
- When the BTB 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 204)**.

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 204)**. If the synchronization is not successful within this period of time, the **Synchronization Fail (page 512)** alarm will be issued.

Voltage matching

The bus voltage is regulated to match the mains voltage with tolerance given by the setpoint **Voltage Window (page 205)**. The regulation is adjusted by the setpoints **Voltage Gain (page 203)** and **Voltage Int (page 203)**.

Frequency/angle matching

The bus frequency is regulated to match the mains frequency first. The frequency regulation loop is active (setpoints **Frequency Gain (page 202)** and **Frequency Int (page 202)**). Once the frequency is matched, the regulation loop is switched to match the angle (setpoint **Angle Gain (page 203)**). When the angle is matched with tolerance +/- **Phase Window (page 205)** for a time given by the setpoint **Dwell Time (page 205)** and the voltage is matched too, then the BTB is closed.

Note: *The matching loops will continue to run even if the BTB close command has been already issued until the controller receives* ***BTB FEEDBACK (PAGE 427)*** *or a BTB 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 synchronization is based on frequency/angle matching. The maximum duration of synchronization is given by the setpoint **Synchronization Timeout (page 204)**. If the synchronization is not successful within this period of time, the **Synchronization Fail (page 512)** alarm will be issued.

Frequency/angle matching

The bus frequency is regulated to match the mains frequency + **Slip Frequency (page 205)**. The frequency regulation loop is active (setpoints **Frequency Gain (page 202)** and **Frequency Int (page 202)**). Once the frequency is matched, the regulation loop gets frozen immediately and the command for breaker closing is unblocked after the delay given by setpoint **Dwell Time (page 205)**. However the closing breaker command is issued later in advance before the expected phase match. The proper "angle of advance" is calculated from setpoints **MGCB Latency (page 206)** or **MCB Latency (page 206)**.

Whenever the bus frequency leaves off the **Slip Frequency Window (page 206)**, the command for breaker closing gets blocked and regulation of frequency is activated again. The same procedure starts again.

5.4.3 Power management

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 192)** 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

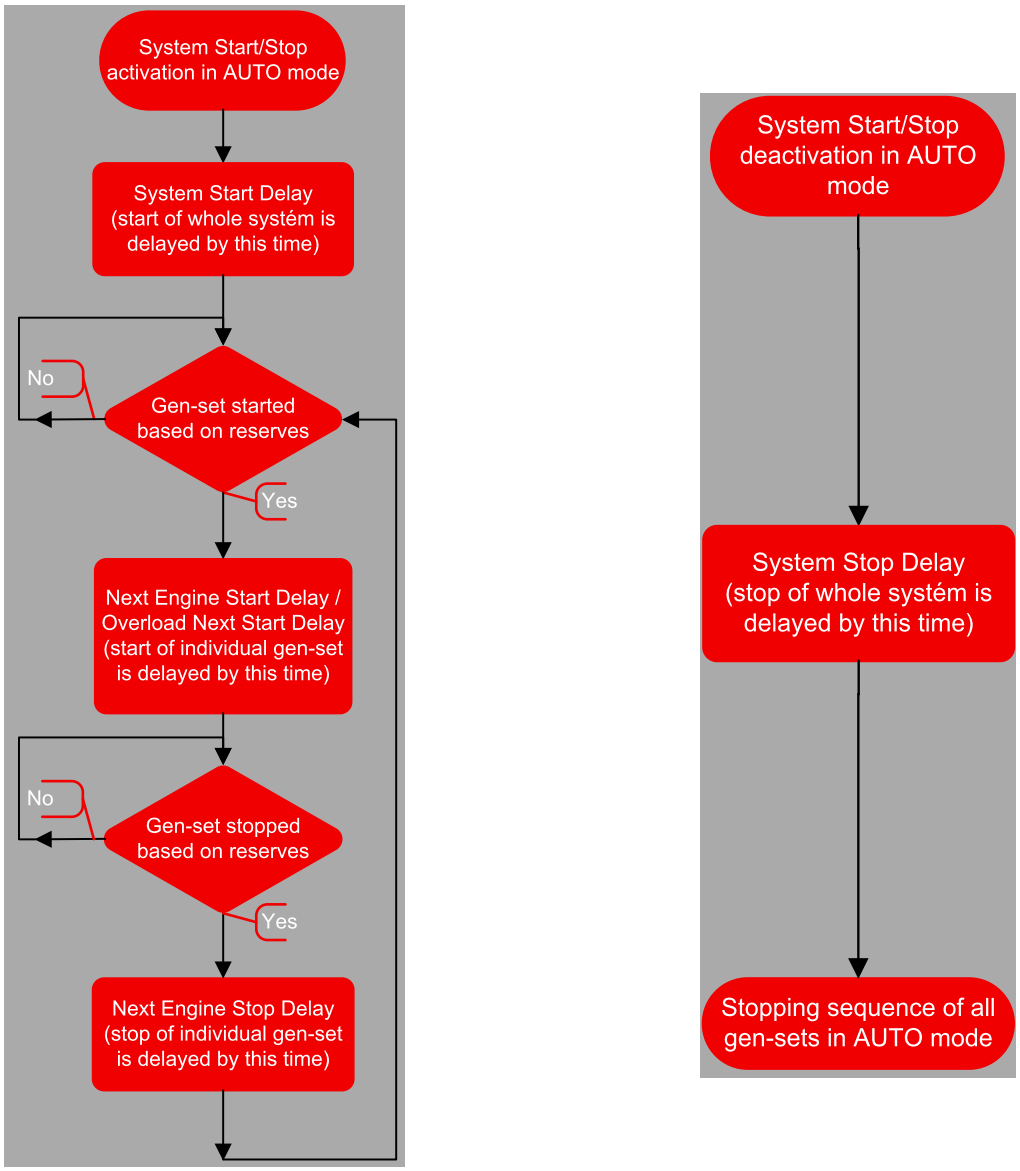
The Logical binary inputs **REMOTE START/STOP (PAGE 433)** requests the system to start or stop. If the input is not active, the system stops with delay **#System Stop Delay (page 193)** after the input has been deactivated and will not start again if in AUTO mode. If the input is activated again, the delay **#System Start Delay (page 193)** 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 433)** is activated.

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.*

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**

198) 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 198)** is elapsed. All the time the system stop condition – i.e. the Logical binary inputs **REMOTE START/STOP (PAGE 433)** deactivated – is evaluated as well. Once the delay given by the setpoint **#System Stop Delay (page 193)** 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 199)** is used in case that **#Overload Next Start Protection (page 199)** is enabled and gen-sets are running at **#Overload Next Start Level (page 199)** 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	ARstrt = $\sum Pg_{Nom} - \sum Pg_{Act}$ ARstp = $\sum Pg^*_{Nom} - \sum Pg_{Act}$	ARstrt < #LoadResStrt	ARstp > #LoadResStop
Relative %	RRstrt = $[(\sum Pg_{Nom} - \sum Pg_{Act}) / \sum Pg_{Nom}].100\%$ RRstp = $[(\sum Pg^*_{Nom} - \sum Pg_{Act}) / \sum Pg^*_{Nom}].100\%$	RRstrt < #%LdResStrt	RRstp > #%LdResStop

Case #2

This case is used in parallel to mains operation.

Reserve	Actual Reserve	Start condition	Stop condition
Absolute kW	ARstrt = $\sum Pg_{Nom}$ - BaseLoad ARstp = $\sum Pg^*_{Nom}$ - BaseLoad	ARstrt < #LoadResStrt	ARstp > #LoadResStop
Relative %	RRstrt = $[(\sum Pg_{Nom}$ - BaseLoad) / $\sum Pg_{Nom}].100\%$ RRstp = $[(\sum Pg^*_{Nom}$ - BaseLoad) / $\sum Pg^*_{Nom}].100\%$	RRstrt < #%LdResStrt	RRstp > #%LdResStop

List of abbreviations:

- ARstrt .. Actual Absolute reserve in kW or kVA - for engine start calculation.
- ARstp .. Actual Absolute reserves in kW or kVA - for engine stop calculation.
- RRstrt .. Actual Relative reserve in % - for engine start calculation.
- RRstp .. Actual Relative reserves in % - for engine stop calculation.
- ΣPgNom .. Sum of Nominal power of all gen-sets on the bus.
- ΣPg*Nom .. Sum of Nominal power of all gen-sets on the bus apart of the one, which is going to be stopped.
- ΣPgAct .. Sum of Actual power of all gen-sets on the bus = system load.
- BaseLd .. Baseload is given by the setpoint **#System BaseLoad (page 171)**

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.

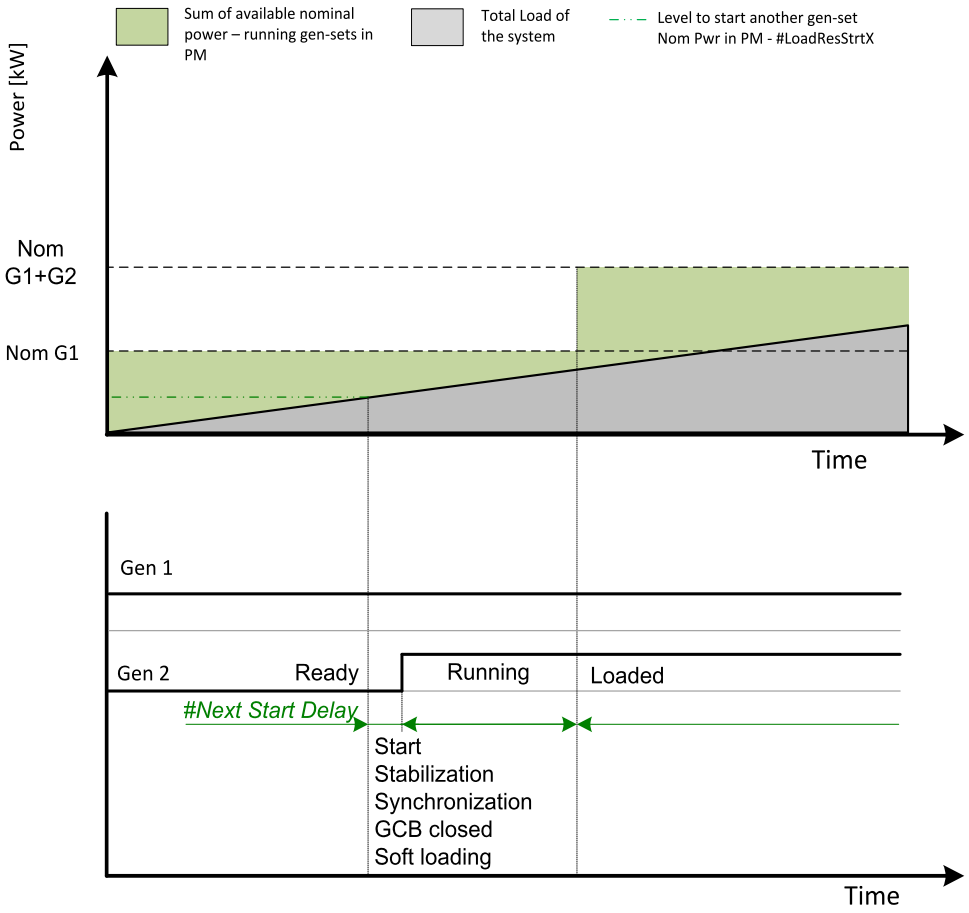


Image 5.16 Start sequence of power management

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 82)** and **Relative power management (page 85)**.

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 198)**, 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.

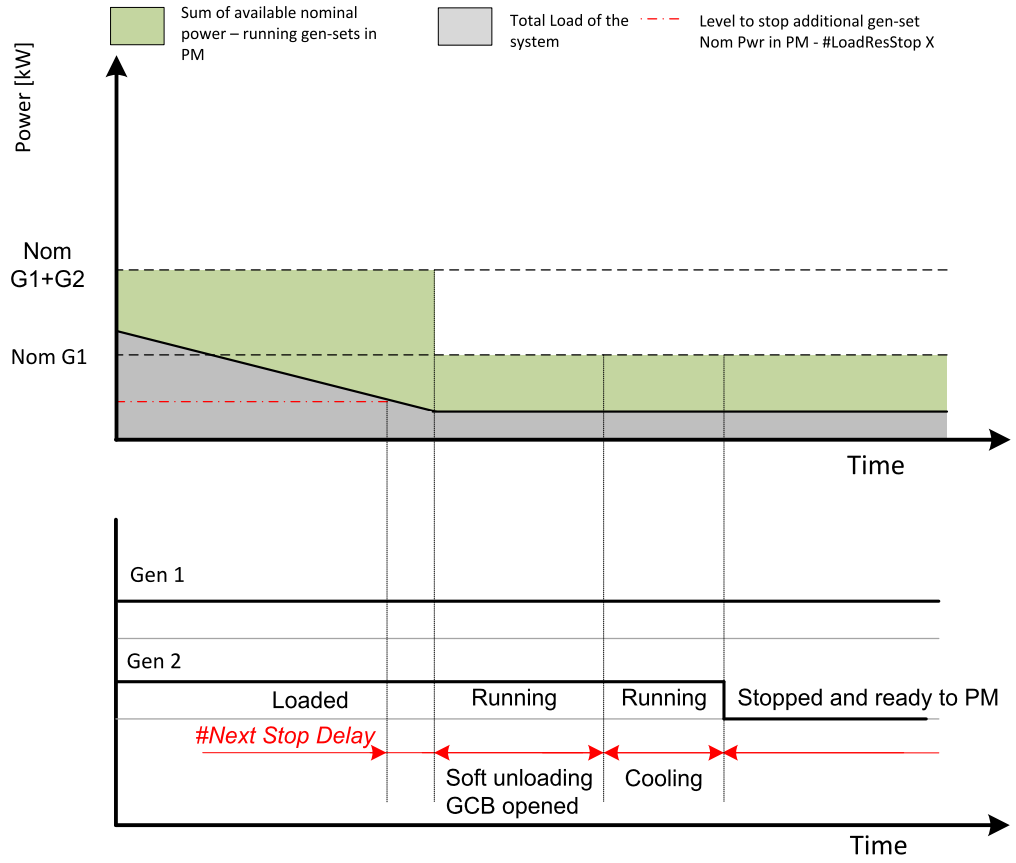


Image 5.17 Stopping sequence of power management

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 82)** and **Relative power management (page 85)**.

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 198)**, 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 192)** is set to ABS [kW] mode.

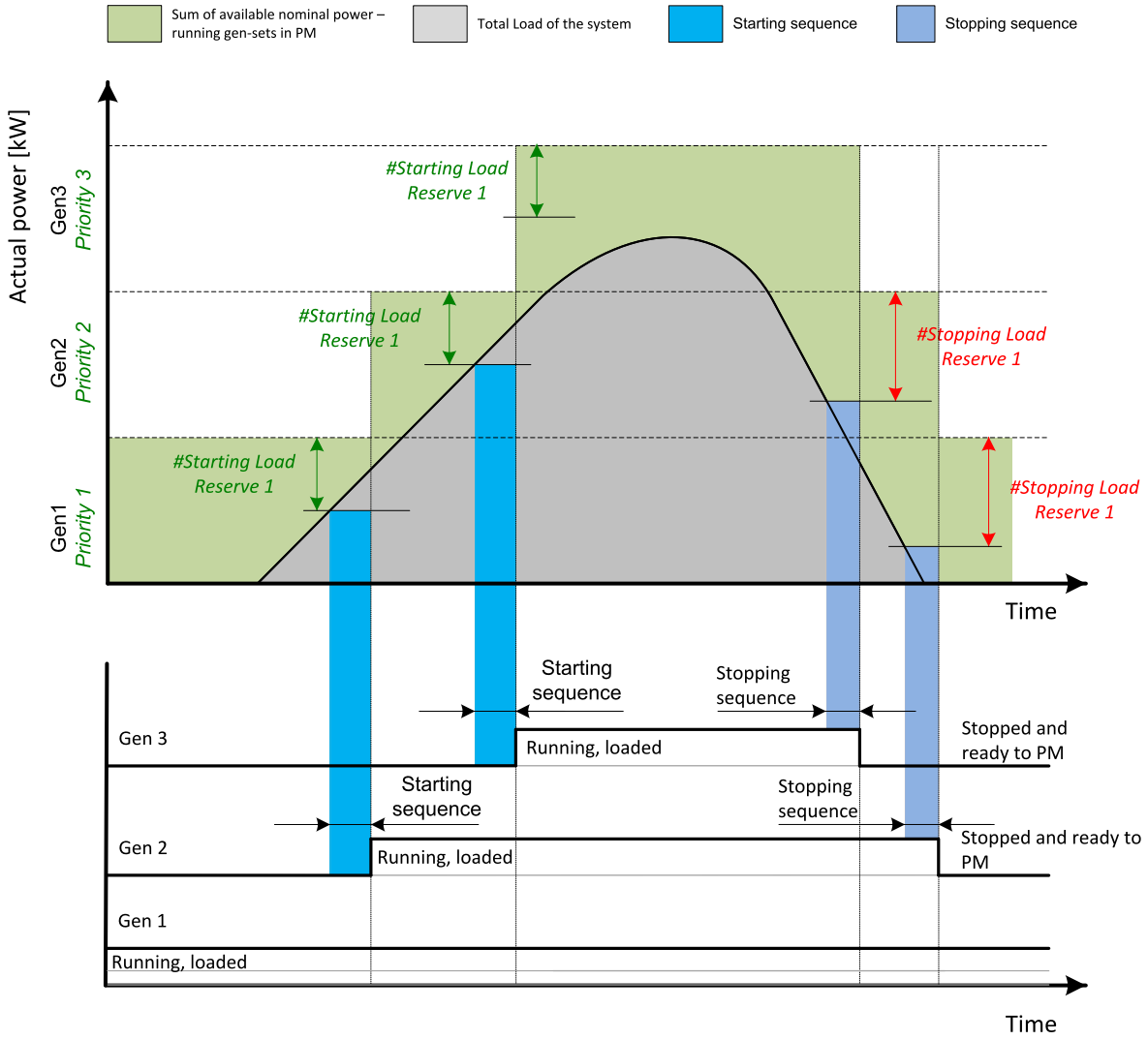


Image 5.18 Power management based on absolute load reserve

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

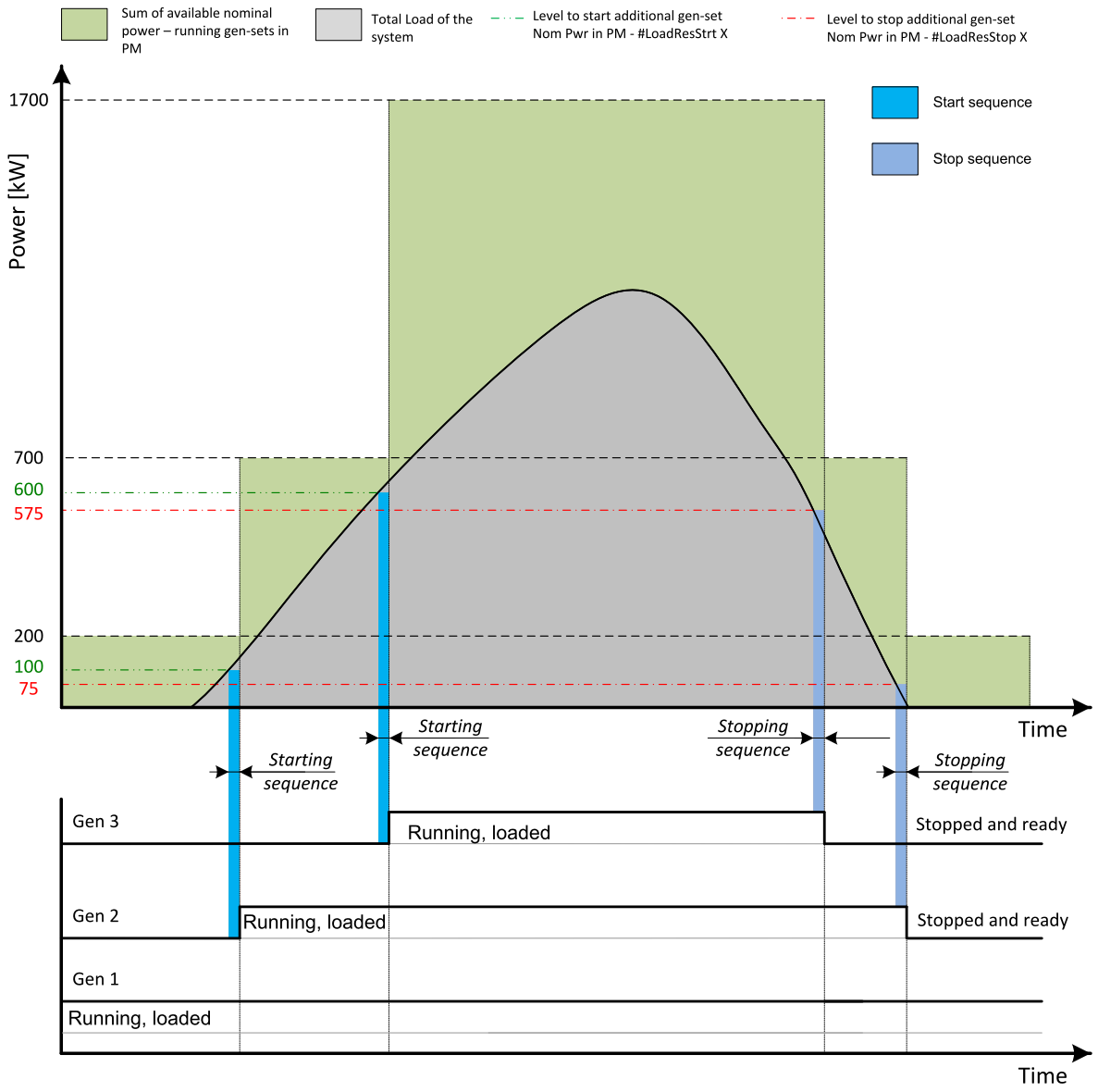


Image 5.19 Absolute power management example

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 193)** (or other selected reserve set) in following way:

Sum of nominal power for start - **#Starting Load Reserve 1 (page 193)** (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 194)** (or other selected reserve set) in following way:

Sum of nominal power for stop - **#Stopping Load Reserve 1 (page 194)** (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 193)** and **#Stopping Load Reserve 1 (page 194)**
- **#Starting Load Reserve 2 (page 195)** and **#Stopping Load Reserve 2 (page 196)** considered if binary input **LOAD RES 2 ACTIVE (PAGE 430)** 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 192)** is set to REL [%] mode.

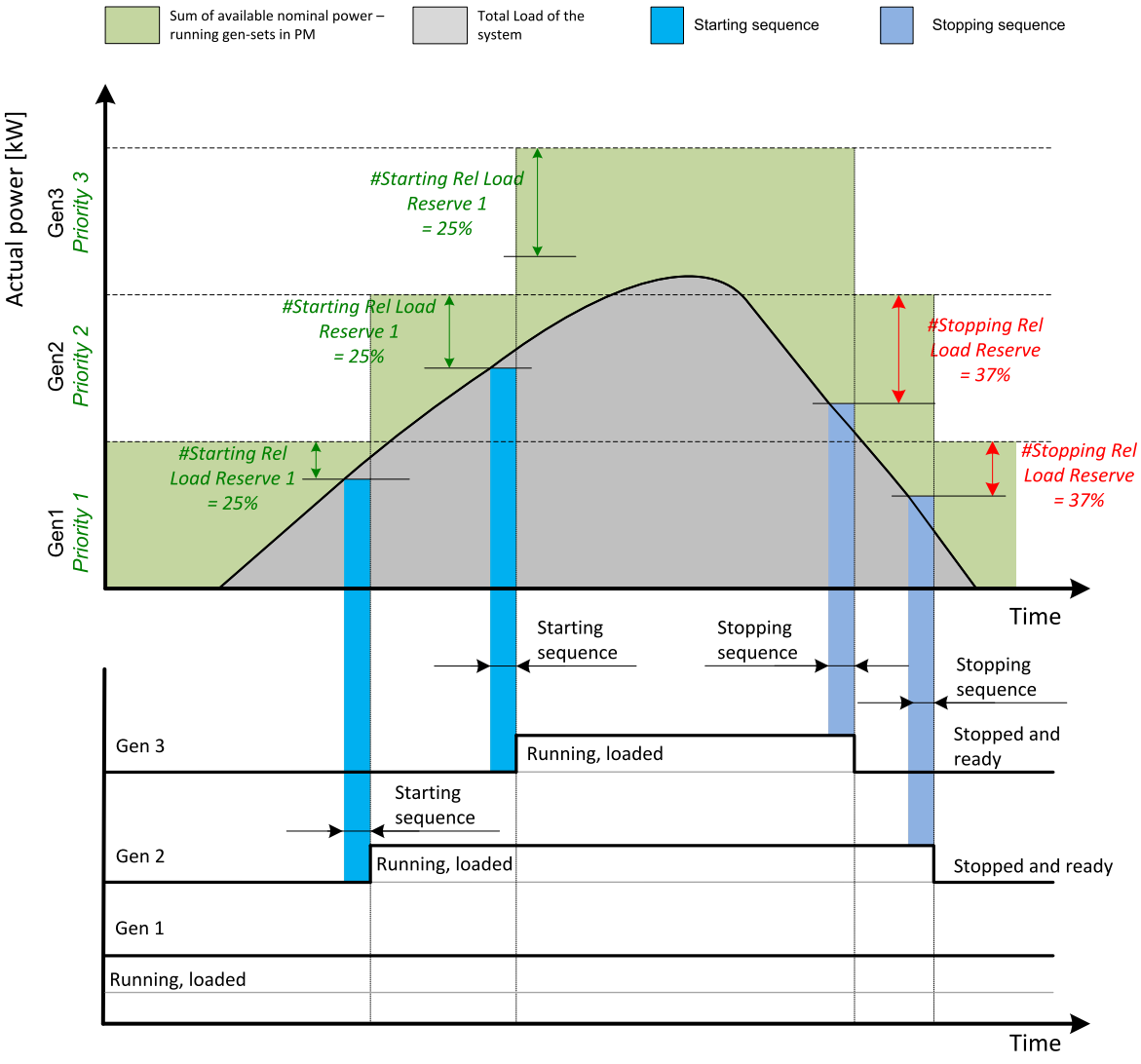


Image 5.20 Power management based on relative load reserve

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 %

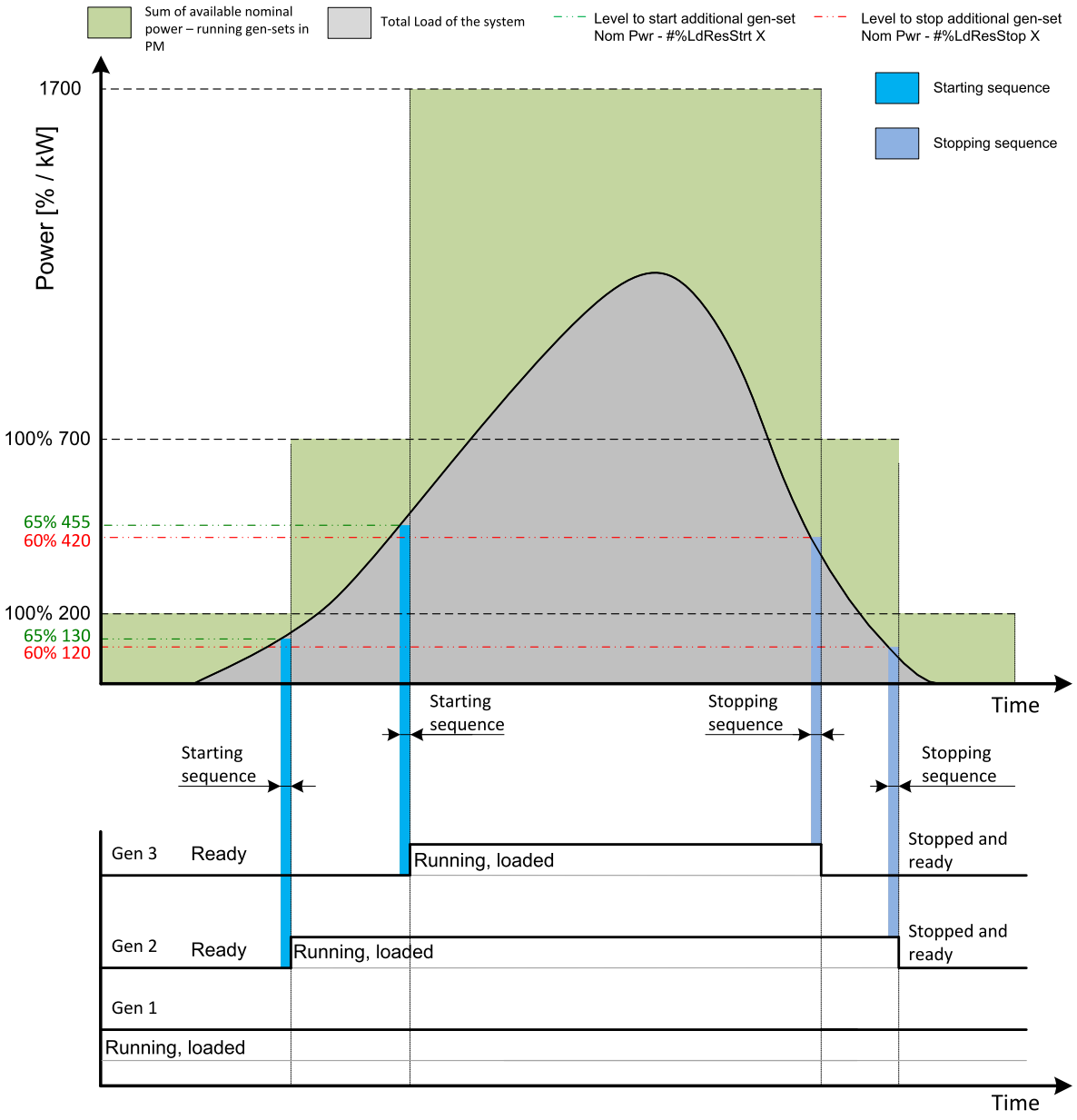


Image 5.21 Relative power management example

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 194)** (or other selected reserve set) in following way:

(100 % - **#Starting Rel Load Reserve 1 (page 194)** (or other selected reserve set)) * 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 kW = 455 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 195)** (or other selected reserve set) in following way:

(100 % - **#Stopping Rel Load Reserve 1 (page 195)** (or other selected reserve set)) * 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 kW = 420 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 194)** and **#Stopping Rel Load Reserve 1 (page 195)**
- **#Starting Rel Load Reserve 2 (page 196)** and **#Stopping Rel Load Reserve 2 (page 197)** considered if binary input **LOAD RES 2 ACTIVE (PAGE 430)** is activated

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

Priority auto swap

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 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 192)** = RUN HOURS.

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

RHE = **Running Hours (page 380) - Run Hours Base (page 200)**

RHE is considered value for running hours equalization, **Running Hours (page 380)** is a cumulative sum of run hours available in statistic values of the controller, **Run Hours Base (page 200)** 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 200)** (i.e. **#Run Hours Max Difference (page 200)** + 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.

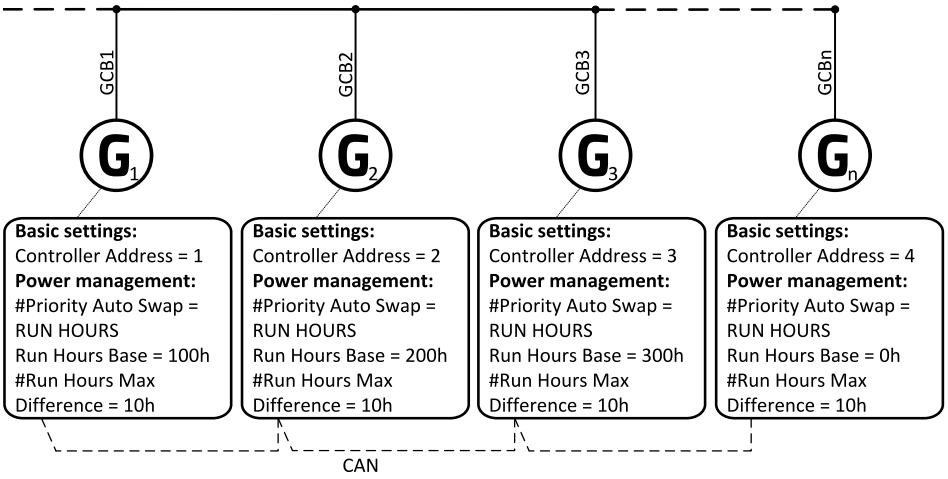


Image 5.22 Example of the system

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

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 200)** 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 200)** (i.e. 10h). The gen-set 1 runs 100 + **#Run Hours Max Difference (page 200)** + 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 200)**. The gen-set 2 runs 11 hours to equalize the RHE of both gen-sets and then additional **#Run Hours Max Difference (page 200)** + 1 hours (i.e. 11 + 10 + 1 = 22 hours). The evolution of RHE1 and RHE2 is shown on the figure below.

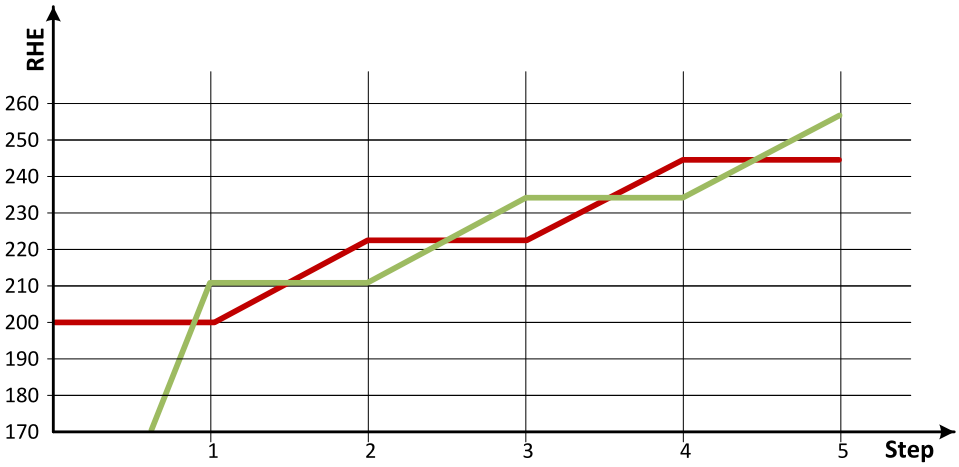


Image 5.23 Run hours equalization - case #1

Step	0	1	2	3	4	5
RHE1	100	211	211	233	233	255
RHE2	200	200	222	222	244	244
Run G1 (ΔRHE1)	0	111	0	22	0	22
Run G2 (ΔRHE2)	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 200)** +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:

SwapTimeG1 = 0 – 0 + 10 + 1 = 11

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

SwapTimeG2 = 11 – 11 + 10 + 1 = 11

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

SwapTimeG2 = 11 – 0 + 10 + 1 = 22

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

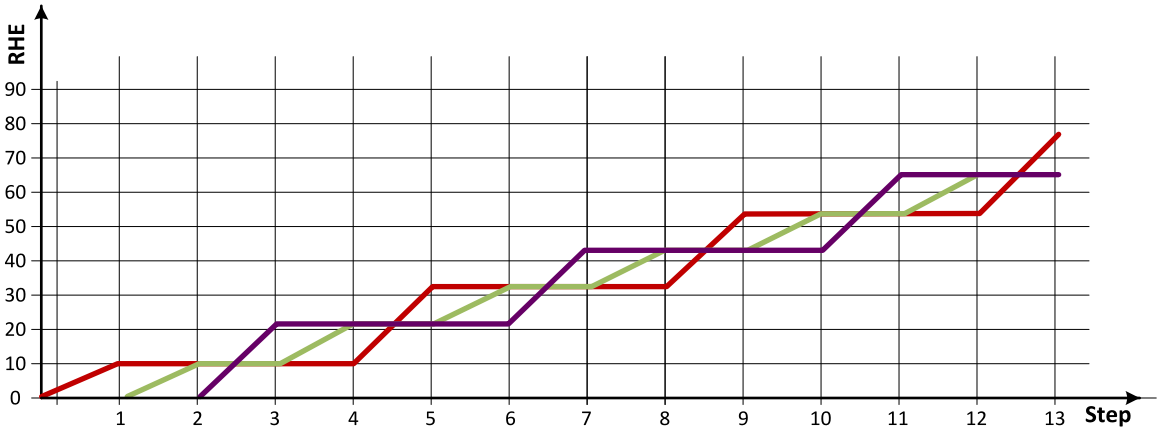


Image 5.24 Run hours equalization - case #2

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 (ΔRHE1)	0	11	0	0	0	22	0	0	0	22	0	0	0	22
Run G2 (ΔRHE2)	0	0	11	0	11	0	11	0	11	0	11	0	11	0
Run G3 (ΔRHE3)	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:

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.

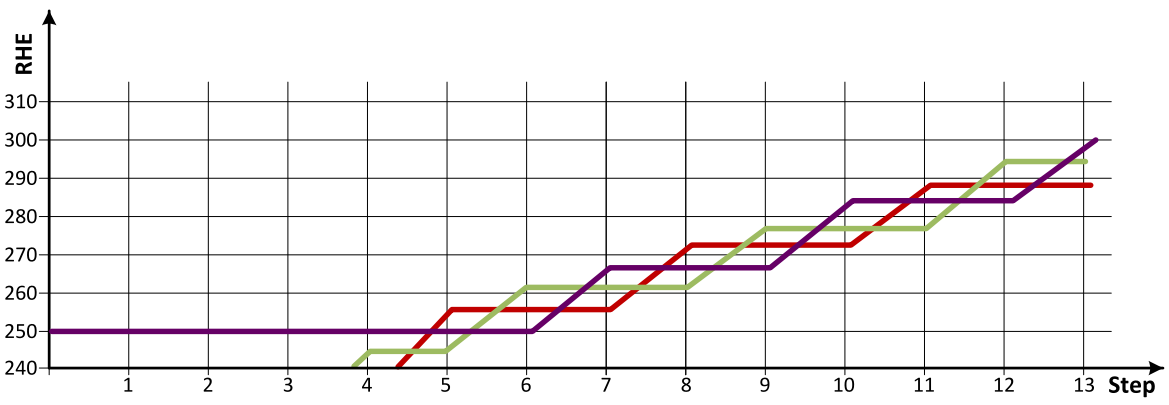


Image 5.25 Run hours equalization - case #3

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 (ΔRHE1)	0	111	0	22	0	22	0	0	17	0	0	16	0	0
Run G2 (ΔRHE2)	0	0	22	0	22	0	17	0	0	16	0	0	17	0
Run G3 (ΔRHE3)	0	0	0	0	0	0	0	16	0	0	17	0	0	16

Note: *Setting* ***#Run Hours Max Difference (page 200)*** *= 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 200)*** *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 192)** = 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 192)** = ABS (kW)
    - Nominal power of gen-set > actual load demand + **#Starting Load Reserve 1 (page 193)**
  - **#Power Management Mode (page 192)** = REL (%)
    - Nominal power of gen-set > (actual load demand × 100)/(100 - **#Starting Rel Load Reserve 1 (page 194)**)
- 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.

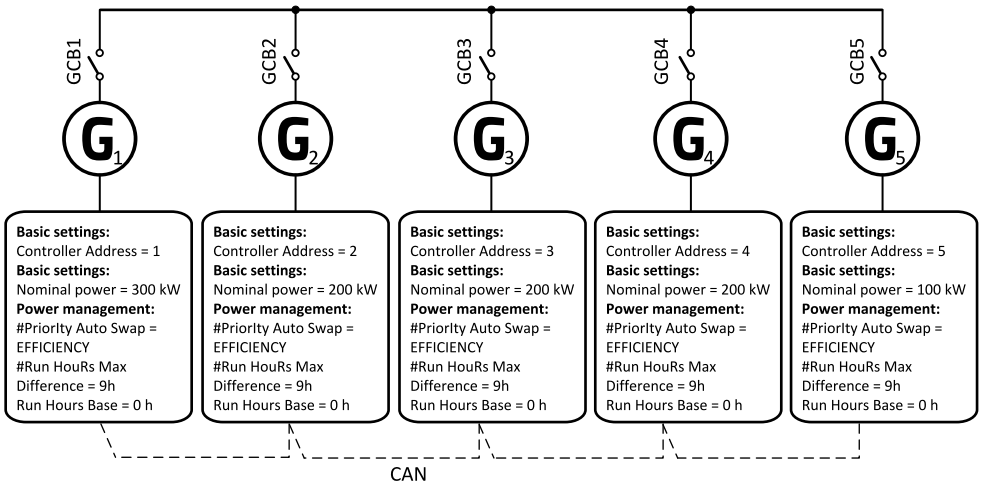


Image 5.26 Example of the system

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 192)** = ABS (kW) and **#Starting Load Reserve 1 (page 193)** = 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 2 [0h]	2 start 5 stop	LDS Swap	300	26
100	2 [10h]			200	50
120	2 [20h]			200	60
120	2 [30h] 3 [10h]	3 start 2 stop	RHE Swap	400	30
120	3 [20h]			200	60
140	3 [30h]			200	70
180	3 [40h] 1	1 start 3 stop	LDS Swap	500	36
200	1			300	67
240	1			300	80
280	1 5	5 start	Gen#5 joins (LDS)	400	70
340	1 5			400	85
380	1 5 4 [20h]	4 start 5 stop	LDS + RHE Swap	600	63
400	1 4			500	80

System Load [kW]	Running gen-sets		Description	Total Running power within PM [kW]	Relative load of gen-sets [%]
440	1 4			500	88
480	1 4 5	5 start	Gen#5 joins (LDS)	600	80
540	1 4 5			600	90
580	1 4 5 2 [30h]	2 start 5 stop	LDS Swap	800	73
600	1 4 2			700	86
640	1 4 2			700	91
680	1 4 2 5	5 start	Gen#5 joins (LDS)	800	85
740	1 4 2 5			800	93
780	1 4 2 5 3 [40h]	3 start 5 stop	LDS Swap	1000	78
800	1 4 2 3			900	89

System Load [kW]	Running gen-sets		Description	Total Running power within PM [kW]	Relative load of gen-sets [%]
840	1 4 2 3			900	93
880	1 4 2 3 5	5 start	Gen#5 joins (LDS)	1000	88
940	1 4 2 3 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 430)**.

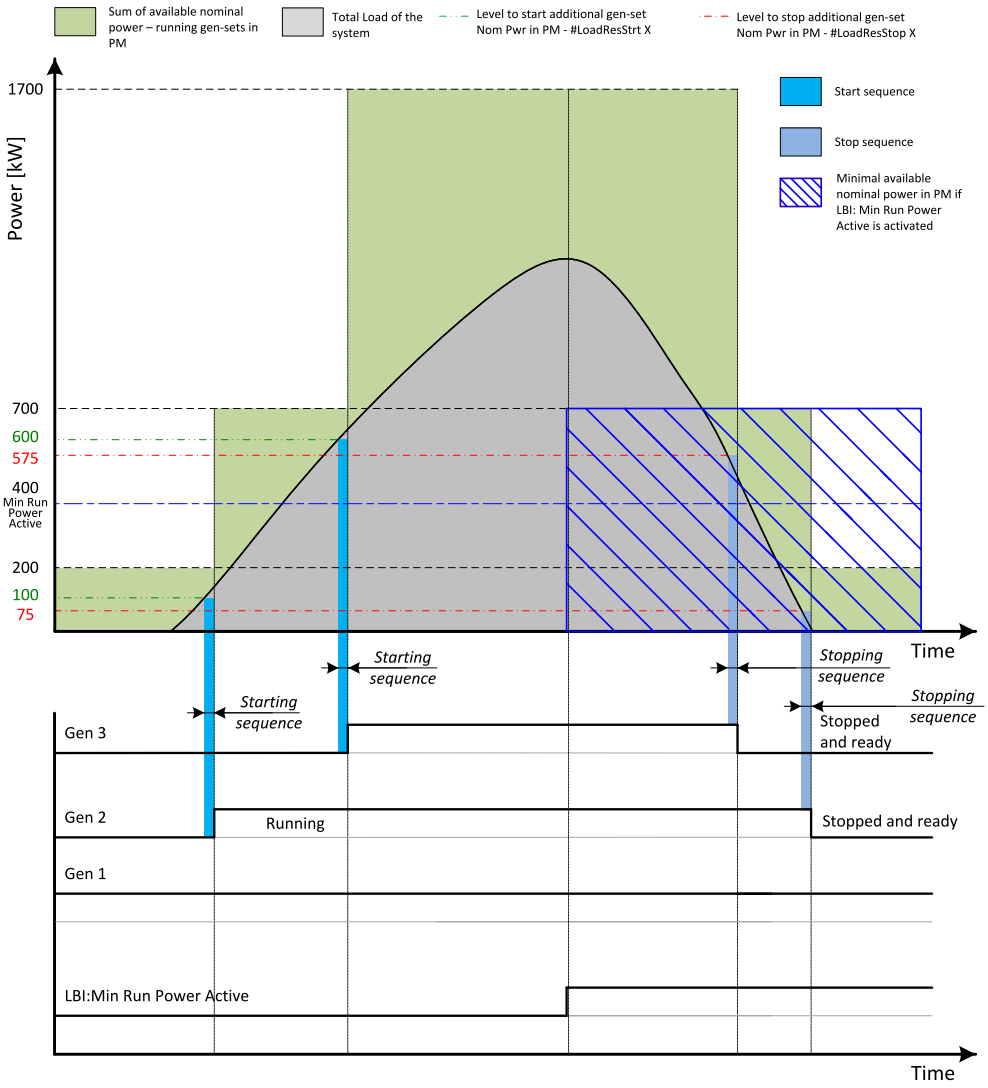


Image 5.27 Minimal running power

Setpoint **#Min Run Power (page 197)** is adjusted to 400 kW. Once the **MIN RUN POWER ACTIVE (PAGE 430)** 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.

5.4.4 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 201)**. Use the defaulf 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 201)** and **Group Link R (page 202)**.
- 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.

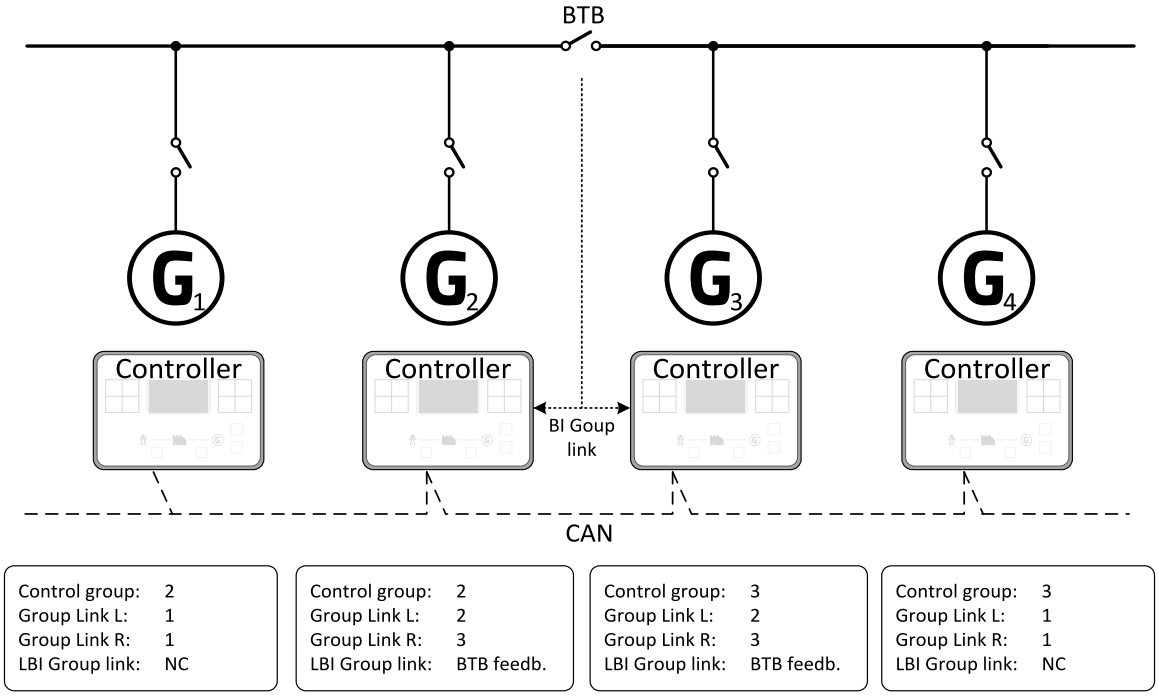


Image 5.28 Example of control groups

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.

5.4.5 Distributed power management signals

Sharing of multiple Logical Binary Input (LBI) functions is critical for power management system operation, because several power management functionalities 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:

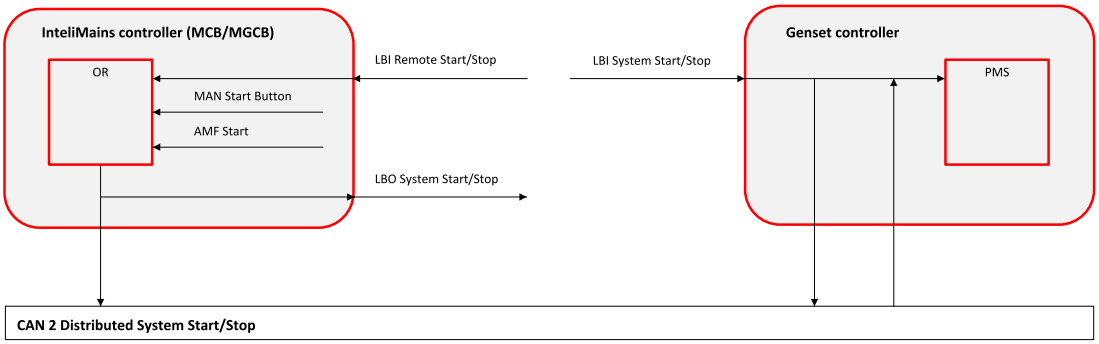
- System Start/Stop

Note: *InteliMains controller activates the System Start/Stop signal in case of all system activations (e.g. AMF, TEST Mode, ...)*

- Min Run Power Act
- Load Res 2 Active
- MCB Feedback

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

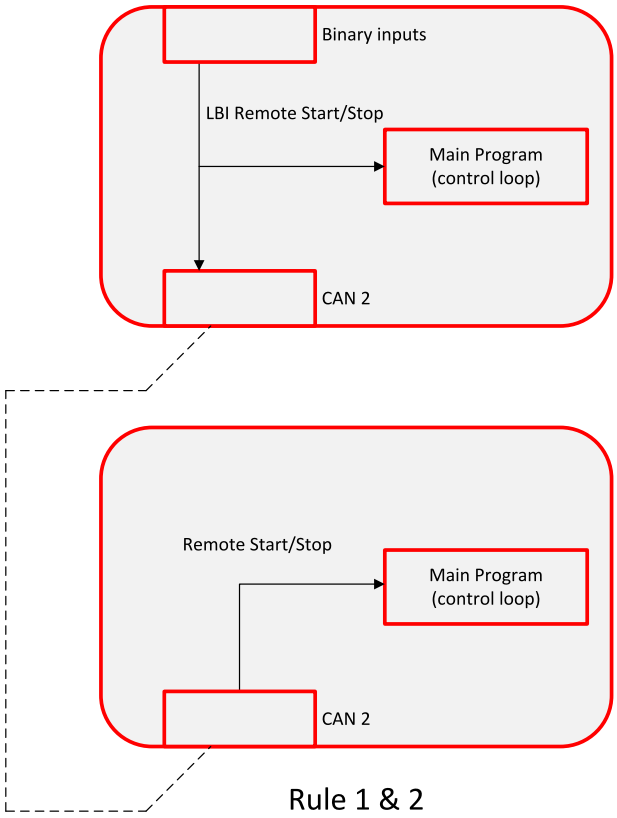
1. LBI state is automatically shared via CAN2 bus, if corresponding LBI function is configured in a controller.



> **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.

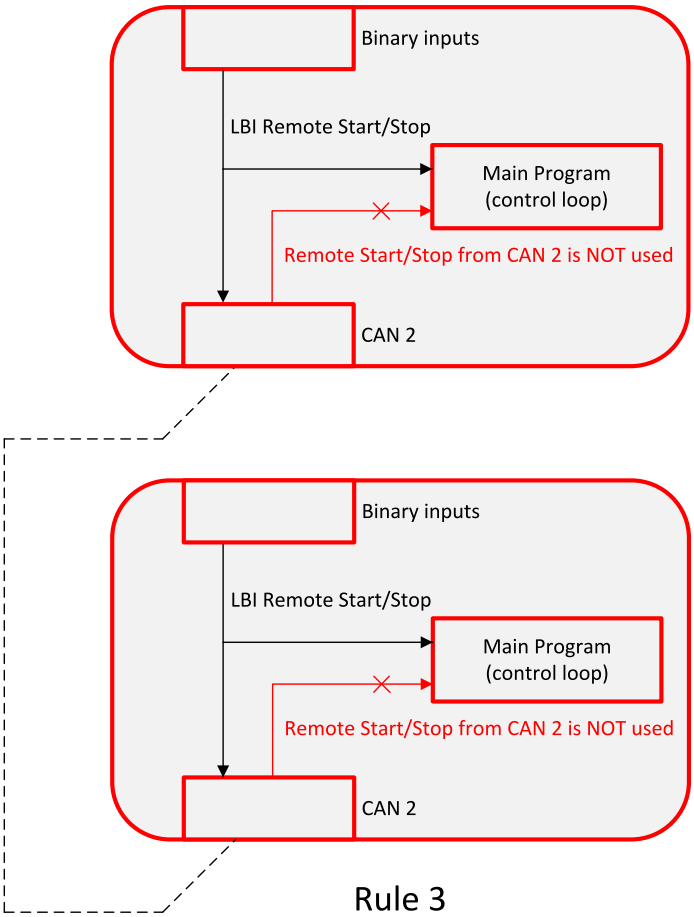
2. LBI state received from CAN2 bus is automatically used, if corresponding LBI function is not configured in a controller.

> **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.



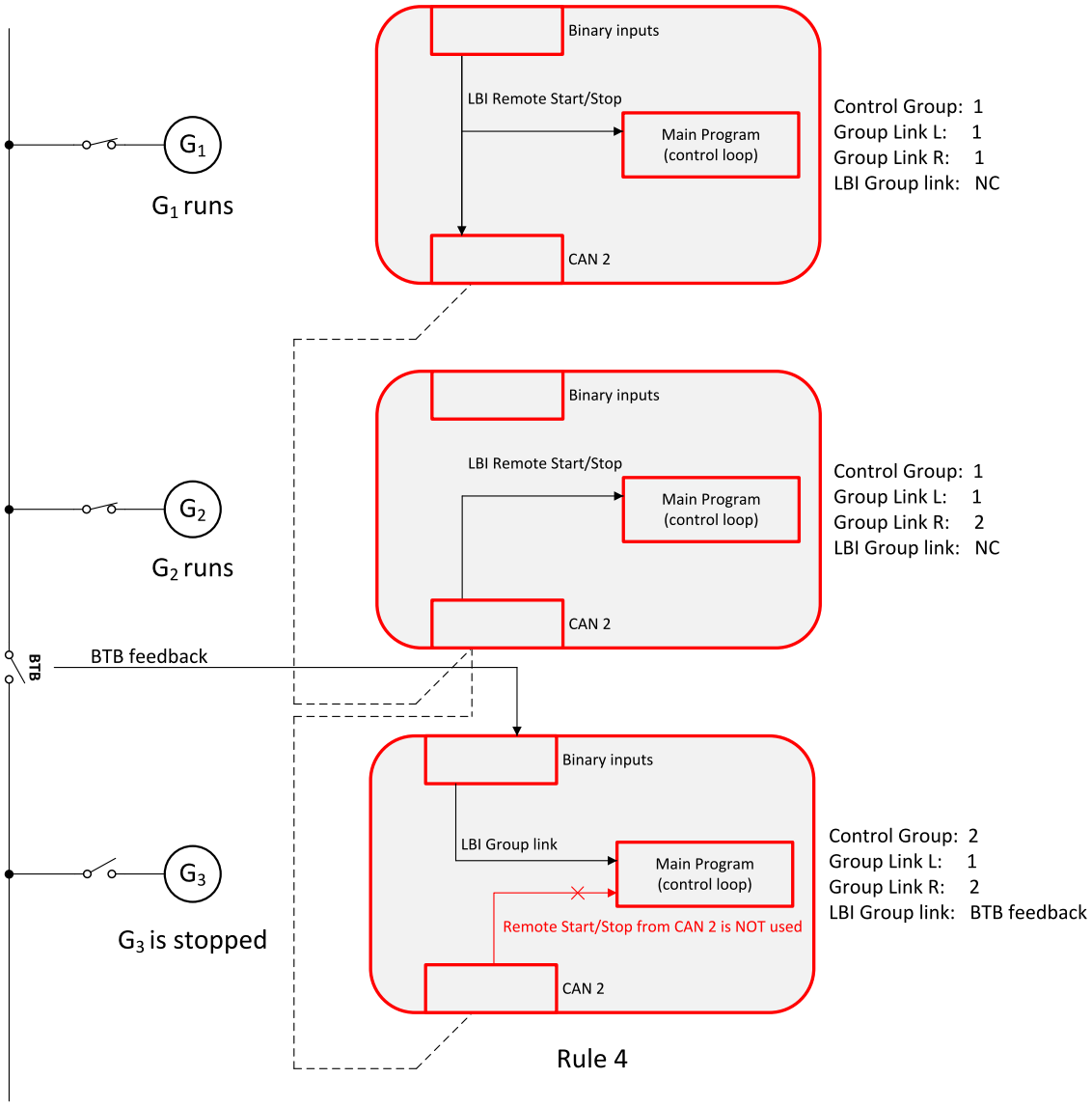
3. LBI state received from CAN2 bus is not used, if corresponding LBI function is configured in a controller.

   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.



Rule 3

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.



5. 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).

5.4.6 Regulation loops

Regulation loops overview

Regulation loops overview

Loop type	Related applications	Related setpoints
Frequency	MINT, SPtM, MCB, MGCB	**Frequency Gain (page 202)**, **Frequency Int (page 202)**
Voltage	MINT, SPtM, MCB, MGCB	**Voltage Gain (page 203)**, **Voltage Int (page 203)**
Angle regulation	MINT, SPtM, MCB, MGCB	**Angle Gain (page 203)**

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.

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

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.

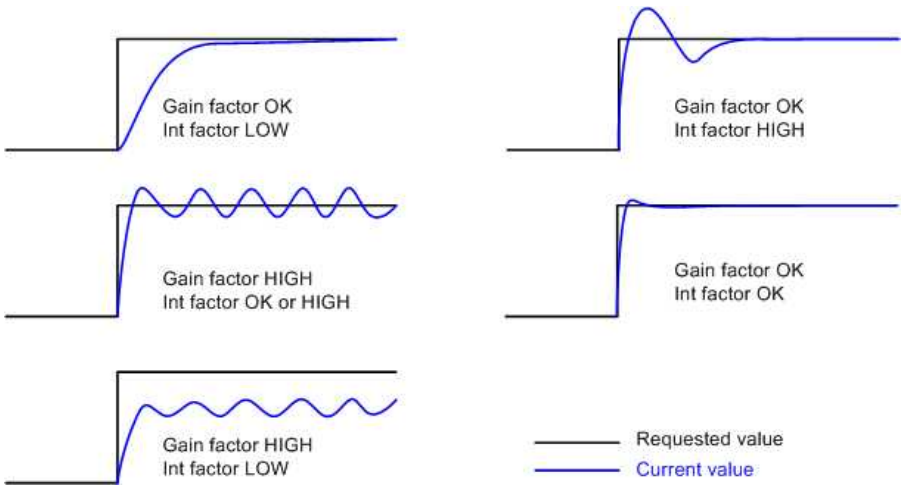


Image 5.29 Typical responses of PI regulator

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.

5.4.7 Frequency control

The frequency control output is used to control the frequency of the engines presented on the bus. The frequency regulation, load regulation and load sharing are realized through the Loadsharing Output. The frequency request is internal value of the regulator. This value is transformed to range 0…100% of the Loadsharing Output which comes out of the controller via communication line. Gen-set controller accept this value and transform this to his speed control output.

Load control adjustment

Synchronization adjustment

- Start the system in MAN Mode.
- In case of MCB application follow the synchronization procedure over the GCB according to rules described in particular gen-set guide.
- To start the synchronization press MGCB ON/OFF button. MGCB LED starts to flash to indicate synchronization. To stop synchronization press again MGCB ON/OFF .
- Adjust **Frequency Gain (page 202)** to unstable speed control and decrease value by 30 % to insure stable performance.
- Adjust **Frequency Int (page 202)** 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 203)** control is off).
- Set **Angle Gain (page 203)**. Synchroscope on the controller measure screen should move slowly and stop in "up" position. Set **Angle Gain (page 203)** to unstable value (synchroscope swings) and decrease value by 30 % to insure stable performance.

5.4.8 Voltage PF control

The voltage control output is used to control the voltage or the power factor of the system. 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 0...100% of the Varsharing Output which comes out of the controller via communication line. Gen-set controller accept this value and transform this to his AVR control output.

Voltage/PF control adjustment

Voltage adjustment

- Set **Voltage Gain (page 203)**, **Voltage Int (page 203)** to zero.
- Start the gen-set in MAN Mode to without load.
- When gen-set is running unloaded (bus voltage is present) increase carefully **Voltage Gain (page 203)** to unstable point and then decrease value by 30 % to insure stable performance.
- Adjust **Voltage Int (page 203)** (usually setting to 100% gives optimal performance).

5.4.9 Electric state machine

Init	Initialization mode of controller. The application is not activated.
BrksOff	MCB, MGCB opened
IslOper	Island operation **Example:** MCB is opened, (M)GCB is closed
MainsOper	Mains is present and all its values are within limits. **Example:** MCB is closed, (M)GCB is opened
ParalOper	Gen-set is in parallel with mains (MCB is closed, (M)GCB is closed)

RevSync	Mains is synchronized to presented bus (MCB is opened, (M)GCB closed)
Synchro	Gen-set is synchronizing (MCB is closed, GCB is opened)
MainsFlt	Mains fails
MainsRet	Mains recover
ValidFlt	State activated after Emergency start del
MCB Off	Mains breaker is opened
EmergMan	Controller mode, where the LBI Emergency manual is activated. All control functions are stopped

5.4.10 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 106)** with fixed alarm types.
- Each alarm is written to the **Alarmlist (page 106)**.
- 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.

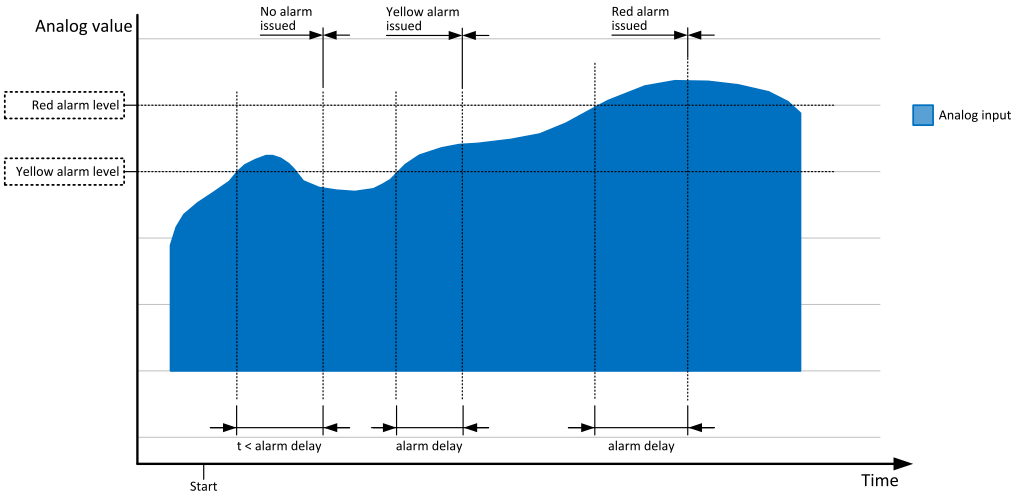


Image 5.30 Analog input alarm evaluation principle

Alarm handling

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 InteliConfig (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 428)**, 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.

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.

Image 5.31 Alarm List

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 438)** as well as the standard alarm outputs (**HORN (PAGE 459)** and **ALARM (PAGE 439)**).

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 459)** and **ALARM (PAGE 439)**) are not activated.

History record only (HistRecOnl)

The event is recorded into the history. Standard alarm outputs (**HORN (PAGE 459)** and **ALARM (PAGE 439)**) 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!**

Breaker open protection

The alarm appears in the alarmlist and is recorded into the history log. There can be two types of breaker open protection.

- Breaker open (BO) - this protection is not visible in alarmlist
- Breaker open with Reset (BOR) - this protection is visible in alarmlist and must be confirmed to deactivate the protection.

Activates the output **AL COMMON BO (PAGE 1)** respective **AL COMMON BOR (PAGE 437)** as well as the standard alarm outputs (**HORN (PAGE 459)** and **ALARM (PAGE 439)**).

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 106)**. The valid range is defined by the most-left (RL) and most-right (RH) points of the sensor characteristic ±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.*

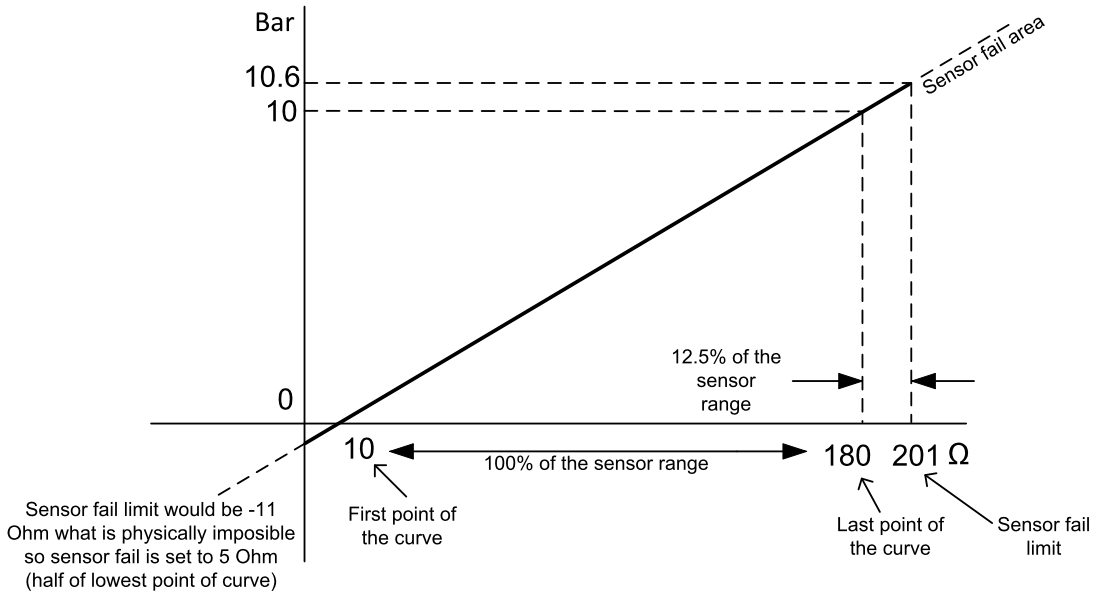


Image 5.32 Sensor fail detection principle

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 106)** or new event is written in **History log (page 107)**. The message will contain a copy of the **Alarmlist (page 106)** or reasons from **History log (page 107)**. To enable this function, adjust setpoints **Event Message (page 286)**, **Wrn Message (page 287)**, **BOC Message (page 287)** and **Sd Messages (page 287)** to ON. Also enter a valid GSM phone number or email address to the setpoints **Telephone Number 1 (page 281)**, **Telephone Number 2 (page 281)**, **Telephone Number 3 (page 282)**, **Telephone Number 4 (page 282)**, **Email Address 1 (page 284)** **Email Address 2 (page 285)****Email Address 3 (page 285)**, and **Email Address 4 (page 285)**.

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
CM-Ethernet	no	no	no	no	yes	yes	yes	yes
CM-GPRS	yes	yes	yes	yes	no yes* yes*	no yes*yes*	no yes* yes*	noyes*yes*
CM-4G-GPS	yes	yes	yes	yes	no yes* yes*	no yes*yes*	no yes* yes*	noyes*yes*

Note: ** Only with enabled* ***Mode (page 274)****.*

Note: ** Only with enabled* ***Mode (page 274)****.*

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

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.

Built-in alarms

Events specification	Protection type	Description
Wrn Battery Voltage	WRN	Battery voltage is out of limits given by **Battery Undervoltage (page 180)** and **Battery Overvoltage (page 180)** setpoints.
Binary input		Configurable Warning/MP/MPR alarms on the binary inputs.
RTC Battery Flat	WRN	RTC battery weak or flat and has to be changed.
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.

Events specification	Protection type	Description
Wrn Bus Lx >V Wrn Bus Lx <V (where x=1,2,3)	Hist	Bus voltage is out of limits given by Bus < and Bus > Voltage setpoint.
Bus >, <Frequency	Hist	The bus frequency is out of limits given by **Bus Right Overfrequency (page 184)** and **Bus Right Underfrequency (page 184)** setpoints.
Bus Voltage Unbalance	Hist	The bus voltage is unbalanced more than the value of **Bus Right Voltage Unbalance (page 183)**.
Current Unbalance	MP	The mains current is unbalanced more than the value of **Current Unbalance (page 188)** setpoint.
Current IDMT	MPR	Mains current exceeds the limit for IDMT protection given by **Nominal Current (page 175)** and **IDMT Overcurrent (page 187)** setpoints.
Short Circuit	MPR	Short circuit current alarm is activated when the current value is out of limits given by **Short Circuit BOR (page 186)**
BTB Fail	WRN	Failure of mains circuit breaker.
Bus CCW Rot	WRN	Bus voltage phases are not wired correctly. MGCB closing is prohibited by controller.
Wrn Synchronization Fail	WRN	If the synchronization timeout gets elapsed (forward synchronization).
Bus Meas Error	WRN	Bus measurement error. Bus voltage is out of limits for 20s.

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

5.4.11 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
Bus Right	Brfrq	Bus Right Frequency

Frequency		
Bus Right Voltage	Vbr1	Bus Right voltage Ph1
Bus Right Voltage	Vbr2	Bus Right voltage Ph2
Bus Right Voltage	Vbr3	Bus Right voltage Ph3
Bus Right Voltage	Vbr12	Bus Right voltage Ph12
Bus Right Voltage	Vbr23	Bus Right voltage Ph23
Bus Right Voltage	Vbr31	Bus Right voltage Ph31
Bus Left Frequency	Brfrq	Bus Left Frequency
Bus Left Voltage	Vbl1	Bus Left voltage Ph1
Bus Left Voltage	Vbl2	Bus Left voltage Ph2
Bus Left Voltage	Vbl3	Bus Left voltage Ph3
Bus Left Voltage	Vbl12	Bus Left voltage Ph12
Bus Left Voltage	Vbl23	Bus Left voltage Ph23
Bus Left Voltage	Vbl31	Bus Left voltage Ph31
Bus Left Current	IL1	Bus Left current Ph1
Bus Left Current	IL2	Bus Left current Ph2
Bus Left Current	IL3	Bus Left current Ph3
Voltage Battery	VBat	Voltage of battery
Binary Inputs	BIN	Controller binary inputs
Binary Outputs	BOUT	Controller binary outputs
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 (modules, etc.).*

5.4.12 Breaker control

The following power switches are controlled by the controller:

- TheBus Tie breaker or contactor – BTB

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

Close/Open	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.
ON coil	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.
OFF coil	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.
UV coil	The GCB UV coil output is active the whole time the gen-set is running (not in idle or cooling). The MCB UV coil output is active when the controller is switched on. 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.

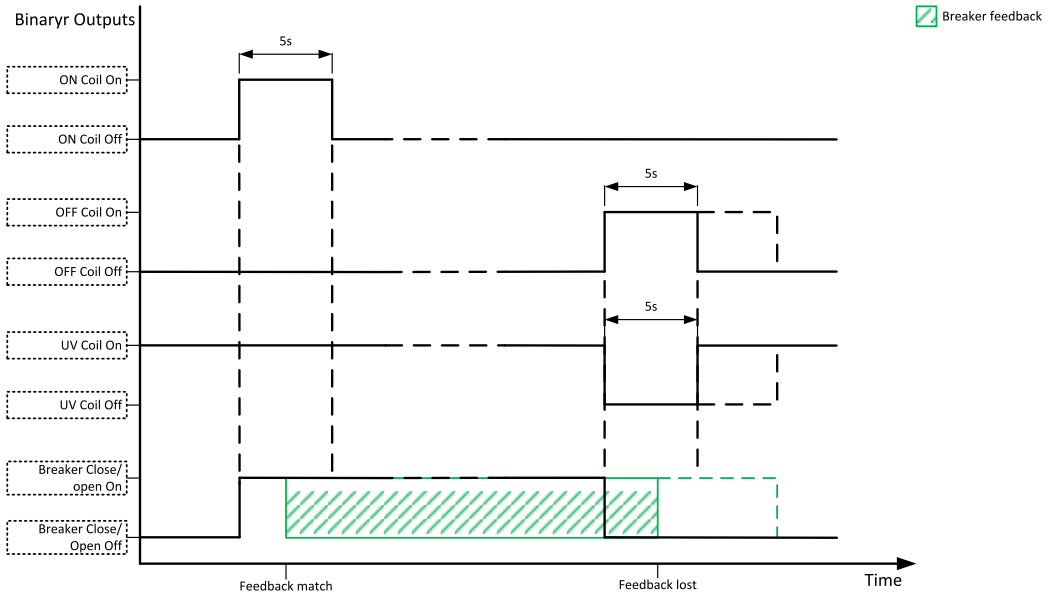


Image 5.33 Breaker control outputs

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).

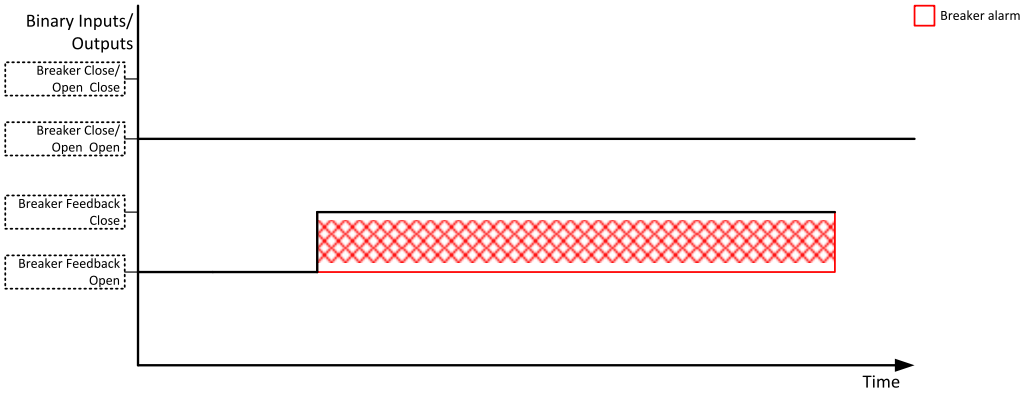


Image 5.34 Breaker fail - breaker close/open in steady position - open

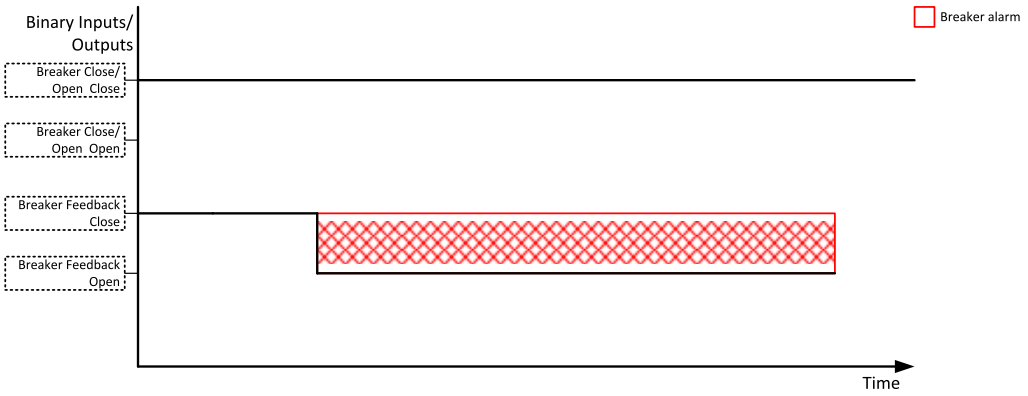


Image 5.35 Breaker fail - breaker close/open in steady position - close

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

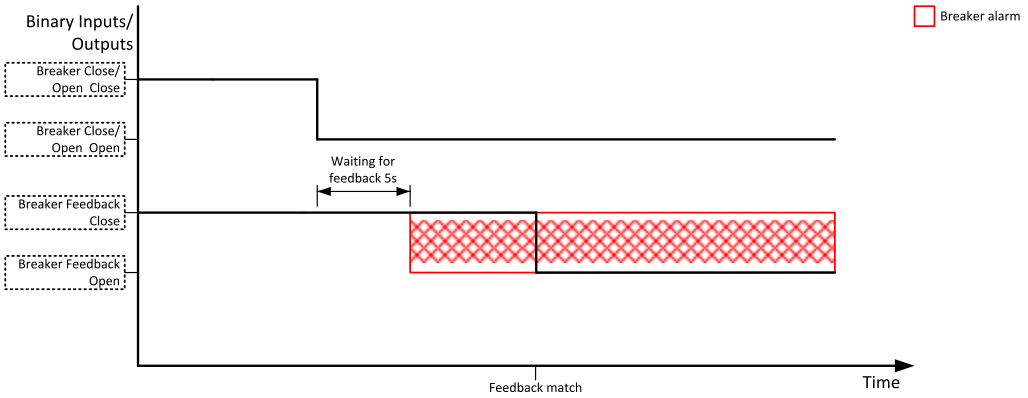


Image 5.36 Breaker fail - breaker close/open opens

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

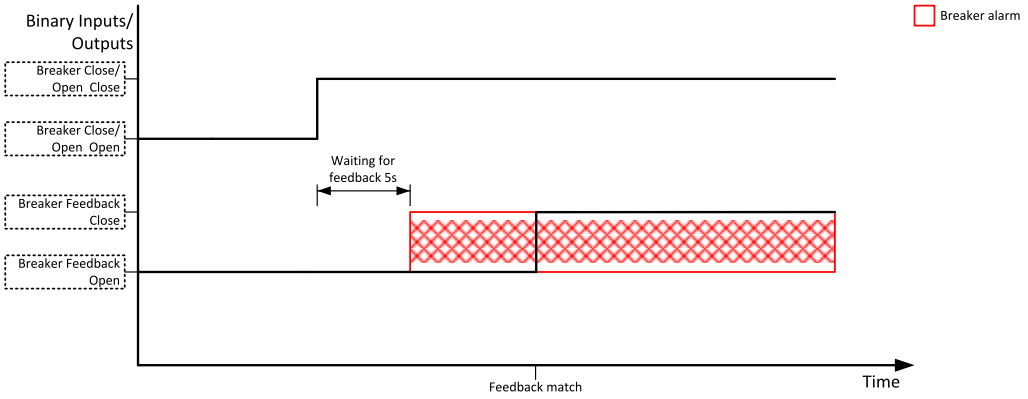


Image 5.37 Breaker fail - breaker close/open closes

5.4.13 Exercise timers

The exercise (general-purpose) timers in controller areis 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 250)**
- **Timer 1 Repetition (page 250)**
- **Timer 1 First Occur. Date (page 251)**
- **Timer 1 First Occur. Time (page 251)**
- **Timer 1 Duration (page 251)**
- **Timer 1 Repeated (page 252)**
- **Timer 1 Repeat Day (page 254)**
- **Timer 1 Day (page 254)**
- **Timer 1 Repeated Day In Week (page 255)**
- **Timer 1 Repeat Day In Month (page 255)**
- **Timer 1 Repeat Week In Month (page 255)**
- **Timer 1 Refresh Period (page 253)**
- **Timer 1 Weekends (page 254)**

Related setpoints for timer 2 are:

- **Timer 2 Function (page 257)**
- **Timer 2 Repetition (page 257)**
- **Timer 2 First Occur. Date (page 258)**
- **Timer 2 First Occur. Time (page 258)**
- **Timer 2 Duration (page 258)**
- **Timer 2 Repeated (page 259)**
- **Timer 2 Repeat Day (page 261)**
- **Timer 2 Day (page 261)**
- **Timer 2 Repeated Day In Week (page 262)**
- **Timer 2 Repeat Day In Month (page 262)**
- **Timer 2 Repeat Week In Month (page 262)**
- **Timer 2 Refresh Period (page 260)**
- **Timer 2 Weekends (page 261)**

Available modes of each timer:

Once	This is a single shot mode. The timer will be activated only once at preset date/time for preset duration.
Daily	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.
Weekly	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.
Monthly	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.
Short period	The timer is repeated with adjusted period (hh:mm). The timer duration is included in the period.

Once mode

Set-up via InteliConfig

To set-up timer via InteliConfig 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 250)****.*

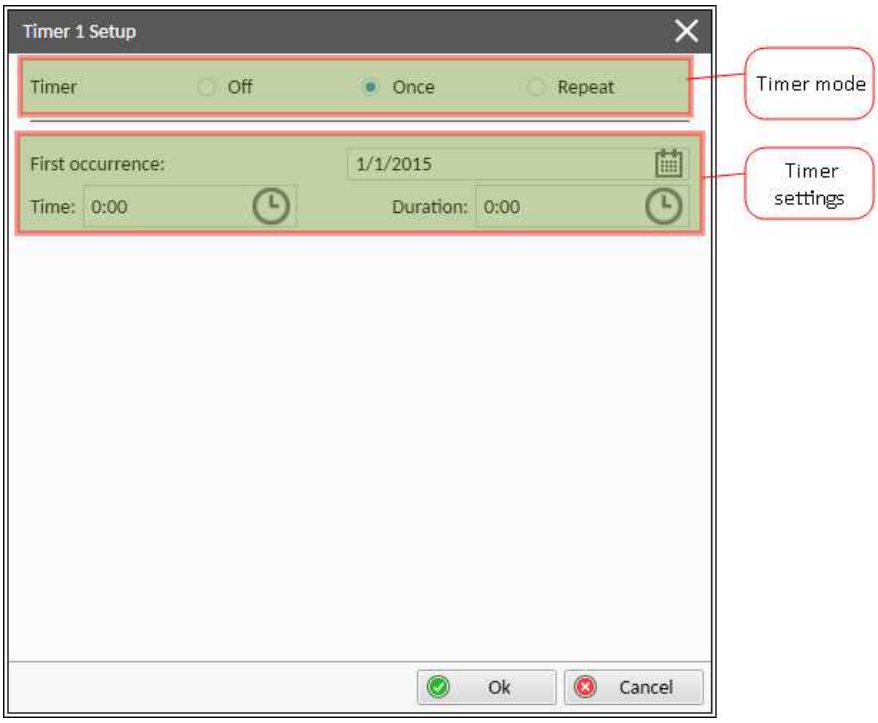


Image 5.38 Once mode - InteliConfig

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 250)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 250)** setpoint select Once

mode. Than adjust **Timer 1 First Occur. Date (page 251)**, **Timer 1 First Occur. Time (page 251)** and **Timer 1 Duration (page 251)**.

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

Daily mode

Set-up via InteliConfig

To set-up timer via InteliConfig 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 250)****.*

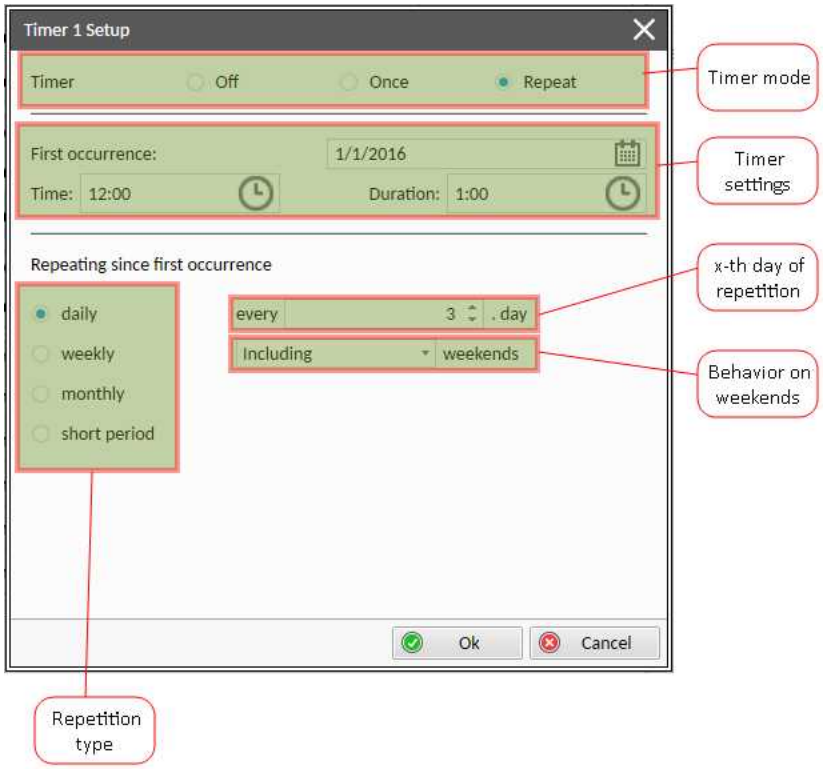


Image 5.39 Daily mode - InteliConfig

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. Than select the x-th day of repetition (**Timer 1 Refresh Period (page 253)**) and behavior of timer on weekends (**Timer 1 Weekends (page 254)**).

> **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 250)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 250)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 251)**, **Timer 1 First Occur. Time (page 251)** and **Timer 1 Duration (page 251)**. In setpoint **Timer 1 Repeated (page 252)** select Daily and adjust **Timer 1 Refresh Period (page 253)** (x-th day of repetition) and **Timer 1 Weekends (page 254)** (behavior of timer on weekends).

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

Weekly mode

Set-up via InteliConfig

To set-up timer via InteliConfig 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 250)****.*

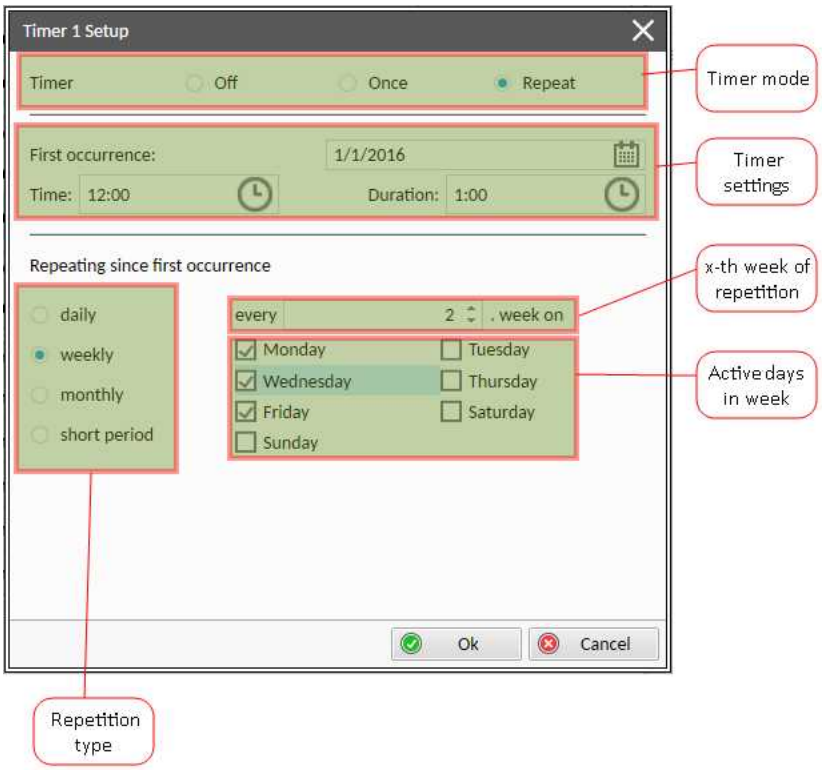


Image 5.40 Weekly mode - InteliConfig

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 253)**) and days when timer should be active (**Timer 1 Day (page 254)**).

> **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 250)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 250)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 251)**, **Timer 1 First Occur. Time (page 251)** and **Timer 1 Duration (page 251)**. In setpoint **Timer 1 Repeated (page 252)** select Weekly and adjust **Timer 1 Day (page 254)** (days when timer should be active) and **Timer 1 Refresh Period (page 253)** (x-th week of repetition).

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

Monthly mode

Set-up via InteliConfig

To set-up timer via InteliConfig 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 250)****.*

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

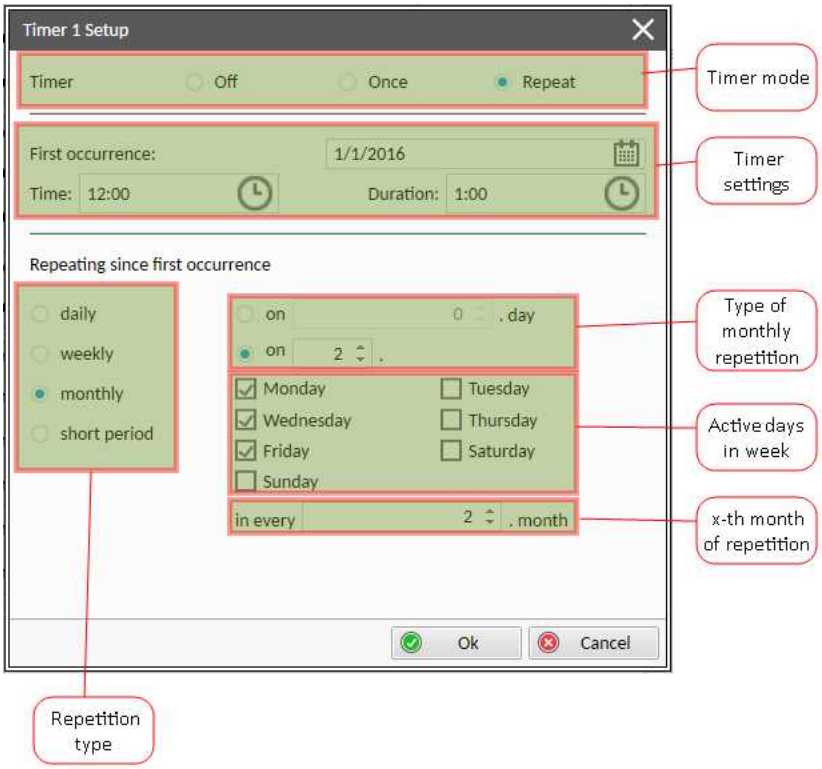


Image 5.41 Monthly mode - InteliConfig

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 255)**). 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.

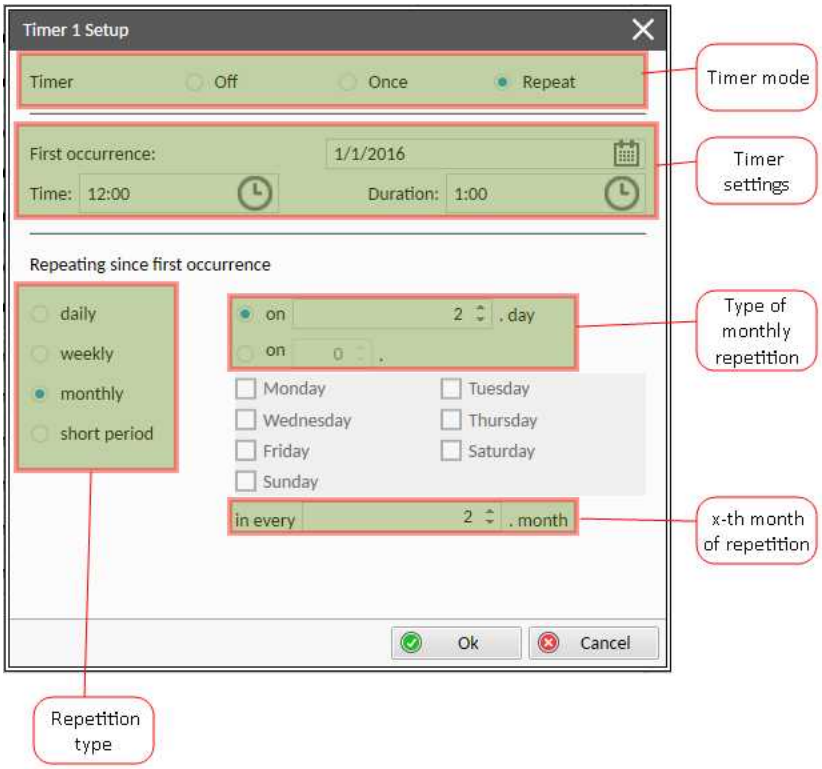


Image 5.42 Monthly mode - InteliConfig

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, the x-th week of repetition and days in week. 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 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 250)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 250)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 251)**, **Timer 1 First Occur. Time (page 251)** and **Timer 1 Duration (page 251)**. In setpoint **Timer 1 Repeated (page 252)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 254)**, **Timer 1 Refresh Period (page 253)** (x-th month of repetition) and **Timer 1 Repeat Day In Month (page 255)** (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 250)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 250)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 251)**, **Timer 1 First Occur. Time (page 251)** and **Timer 1 Duration (page 251)**. In setpoint **Timer 1 Repeated (page 252)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 254)**, **Timer 1 Refresh Period (page 253)** (x-th month of repetition), **Timer 1 Repeated Day In Week (page 255)** (days in week when timer is active) and **Timer 1 Repeat Week In Month (page 255)** (concrete week in repeated months).

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

Short period mode

Set-up via InteliConfig

To set-up timer via InteliConfig 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 250)**.

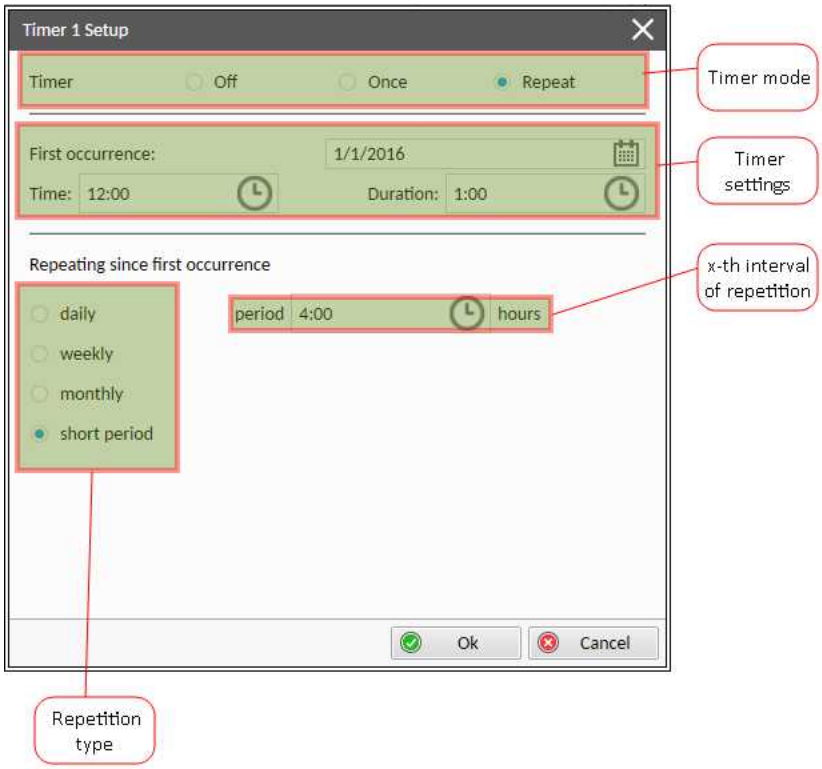


Image 5.43 Short period mode - InteliConfig

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. Than 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 250)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 250)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 251)**, **Timer 1 First Occur. Time (page 251)** and **Timer 1 Duration (page 251)**. In setpoint **Timer 1 Repeated (page 252)** select Short Period and adjust **Timer 1 Refresh Period (page 253)** (interval of repetition).

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

5.4.14 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
AIN Switch 01 (page 484)	Analog Switch 1 On (page 208) Analog Switch 1 Off (page 208)	AIN Switch01 (page 439)
AIN Switch 02 (page 484)	Analog Switch 2 On (page 210) Analog Switch 2 Off (page 210)	AIN Switch02 (page 440)
AIN Switch 03 (page 484)	Analog Switch 3 On (page 212) Analog Switch 3 Off (page 212)	AIN Switch03 (page 440)
AIN Switch 04 (page 485)	Analog Switch 4 On (page 214) Analog Switch 4 Off (page 214)	AIN Switch04 (page 441)
AIN Switch 05 (page 485)	Analog Switch 5 On (page 216) Analog Switch 5 Off (page 216)	AIN Switch05 (page 441)
AIN Switch 06 (page 485)	Analog Switch 6 On (page 218) Analog Switch 6 Off (page 218)	AIN Switch06 (page 442)
AIN Switch 07 (page 486)	Analog Switch 7 On (page 220) Analog Switch 7 Off (page 220)	AIN Switch07 (page 442)
AIN Switch 08 (page 486)	Analog Switch 8 On (page 222) Analog Switch 8 Off (page 222)	AIN Switch08 (page 443)
AIN Switch 09 (page 486)	Analog Switch 9 On (page 224) Analog Switch 9 Off (page 224)	AIN Switch09 (page 443)
AIN Switch 10 (page 487)	Analog Switch 10 On (page 226) Analog Switch 10 Off (page 226)	AIN Switch10 (page 444)
AIN Switch 11 (page 487)	Analog Switch 11 On (page 228) Analog Switch 11 Off (page 228)	AIN Switch11 (page 444)
AIN Switch 12 (page 487)	Analog Switch 12 On (page 230) Analog Switch 12 Off (page 230)	AIN Switch12 (page 445)
AIN Switch 13 (page 488)	Analog Switch 13 On (page 232) Analog Switch 13 Off (page 232)	AIN Switch13 (page 445)
AIN Switch 14 (page 488)	Analog Switch 14 On (page 234) Analog Switch 14 Off (page 234)	AIN Switch14 (page 446)
AIN Switch 15 (page 488)	Analog Switch 15 On (page 236) Analog Switch 15 Off (page 236)	AIN Switch15 (page 446)
AIN Switch 16 (page 489)	Analog Switch 16 On (page 238) Analog Switch 16 Off (page 238)	AIN Switch16 (page 447)
AIN Switch 17 (page 489)	Analog Switch 17 On (page 240) Analog Switch 17 Off (page 240)	AIN Switch17 (page 447)

Analog switch	Setpoints	Binary output
AIN SWITCH 18 (PAGE 489)	Analog Switch 18 On (page 242) Analog Switch 18 Off (page 242)	AIN SWITCH18 (PAGE 448)
AIN SWITCH 19 (PAGE 490)	Analog Switch 19 On (page 244) Analog Switch 19 Off (page 244)	AIN SWITCH19 (PAGE 448)
AIN SWITCH 20 (PAGE 490)	Analog Switch 20 On (page 246) Analog Switch 20 Off (page 246)	AIN SWITCH20 (PAGE 449)

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

Image 5.44 Principle of analog switch

5.4.15 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 180)**. When the phases are connected in different order, following alarms are detected:

- **Bus CCW Rotation**
- **Bus Left CCW Rotation (page 510)**

5.4.16 Sensor curves

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 InteliConfig. In InteliConfig are also prepared some standard curves.*

5.4.17 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.

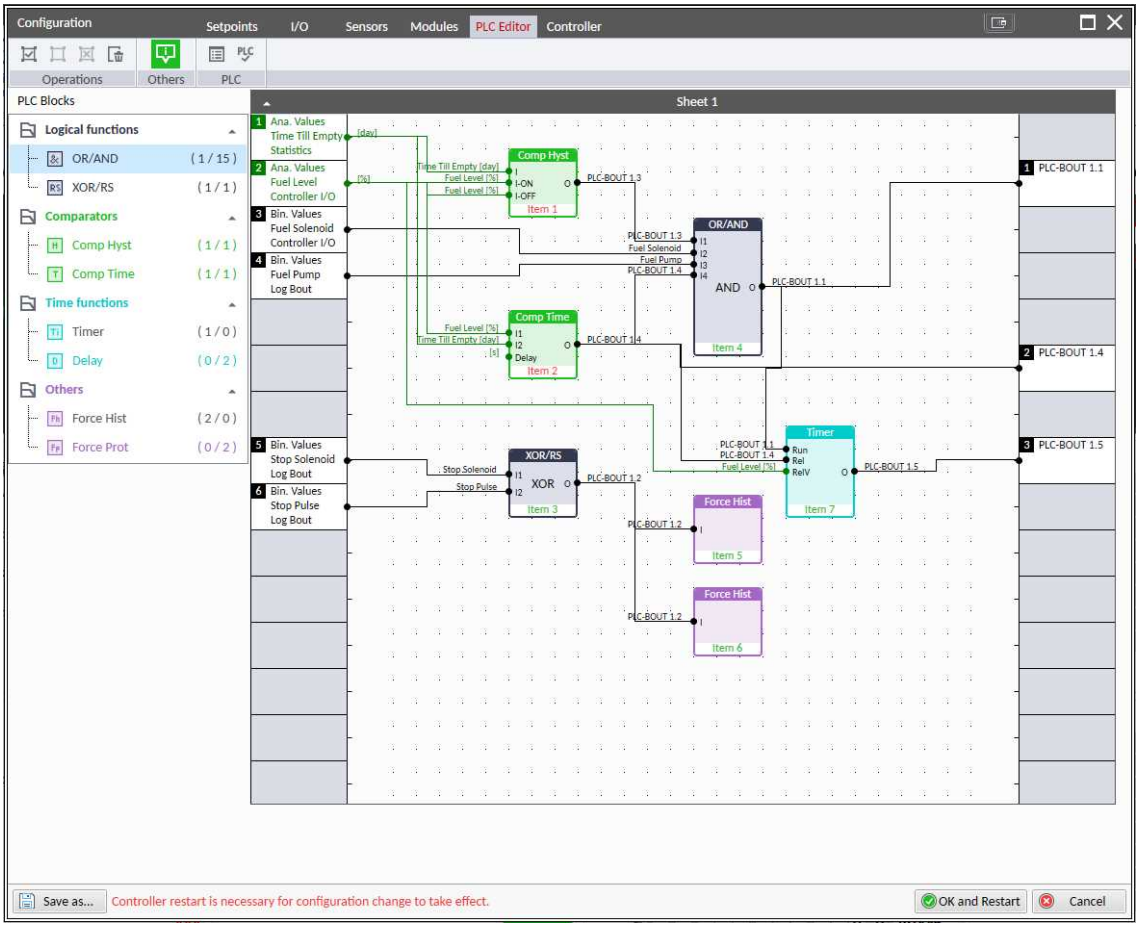


Image 5.45 PLC Editor main page

List of available PLC blocks

PLC block	Number of blocks
OR/AND	16
XOR/RS	2
Comparator with hysteresis (Comp Hyst)	2
Comparator with delay (Comp Time)	2
Timer	1
Delay	2
Force history record (Force Hist)	2
Force protection (Force Prot)	2

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 121)** for more information.
- Add PLC blocks into the sheets. See **Adding PLC blocks (page 122)** for more information.
- Define inputs and outputs of the PLC program. See **Define inputs and outputs (page 123)** for more information.
- Create connections between inputs, blocks and outputs. See **Creating wires (page 125)** for more information.
- Adjust properties of the blocks. See for more information about blocks.

Working with sheets

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

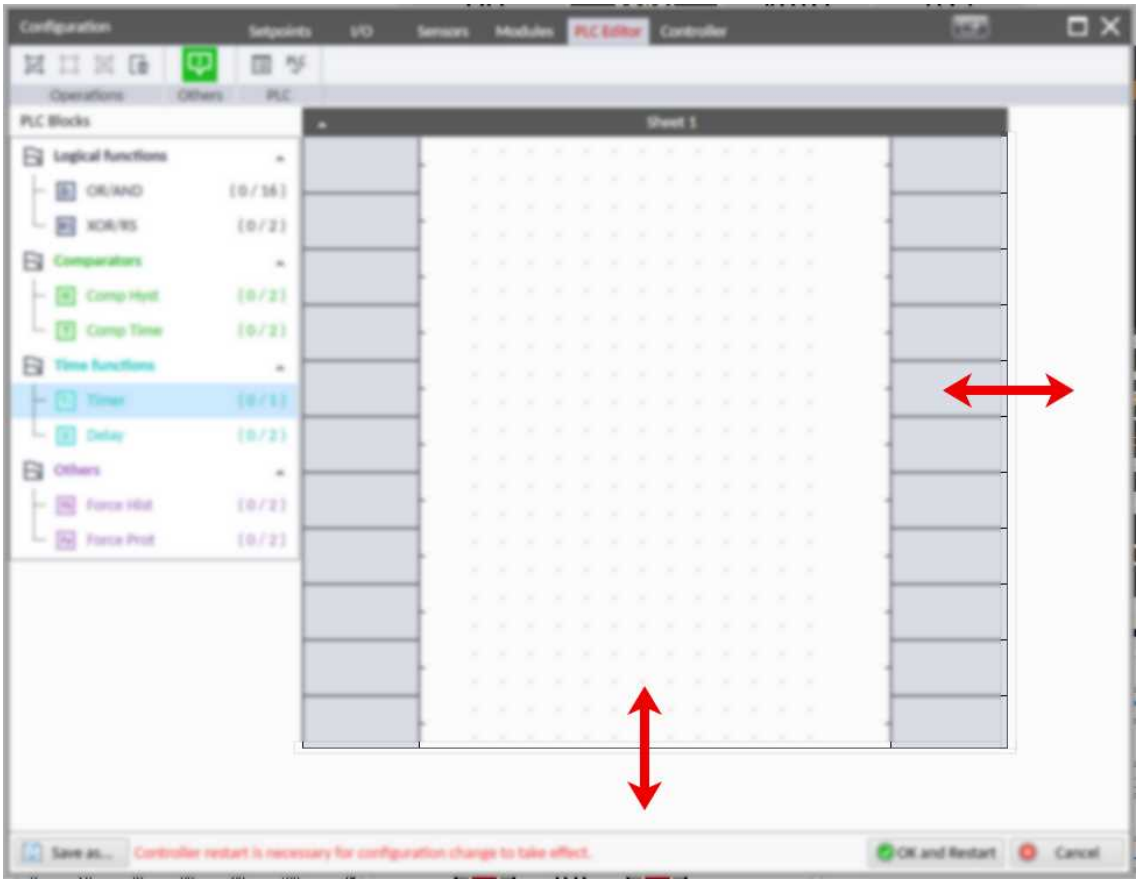


Image 5.46 Adjusting PLC sheet

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 for more information about blocks.
- Connect the block inputs and outputs by drawing wires in the sheet. See **Define inputs and outputs (page 123)** for more information. It is also possible to connected inputs and outputs via properties of selected PLC block.

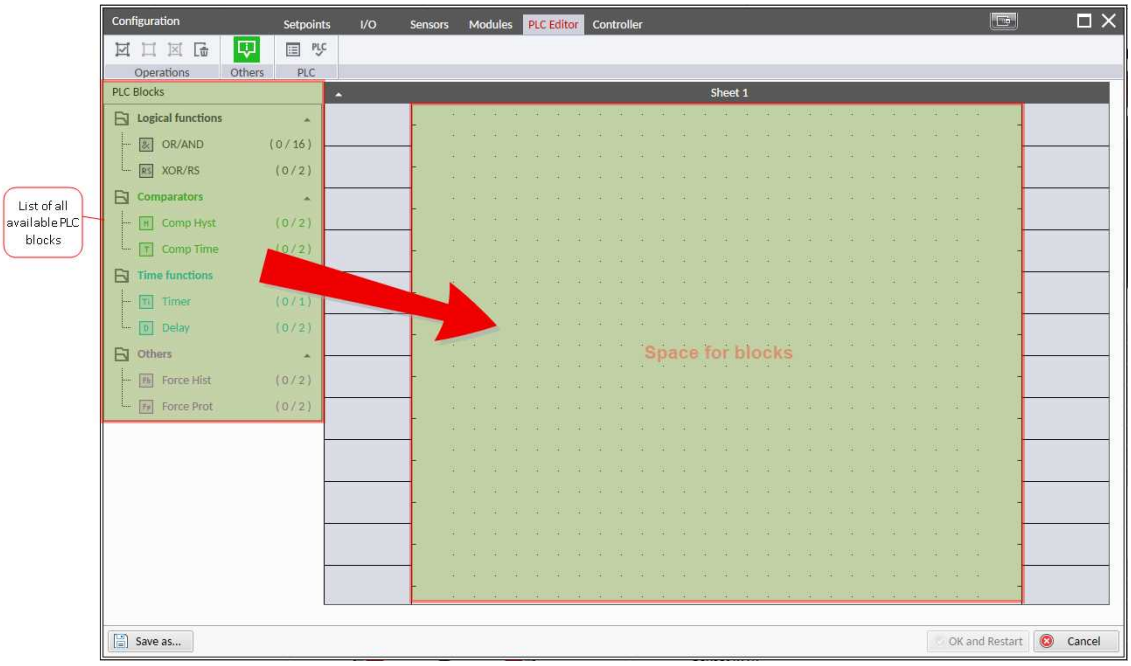


Image 5.47 Adding PLC blocks

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

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

Define inputs and outputs

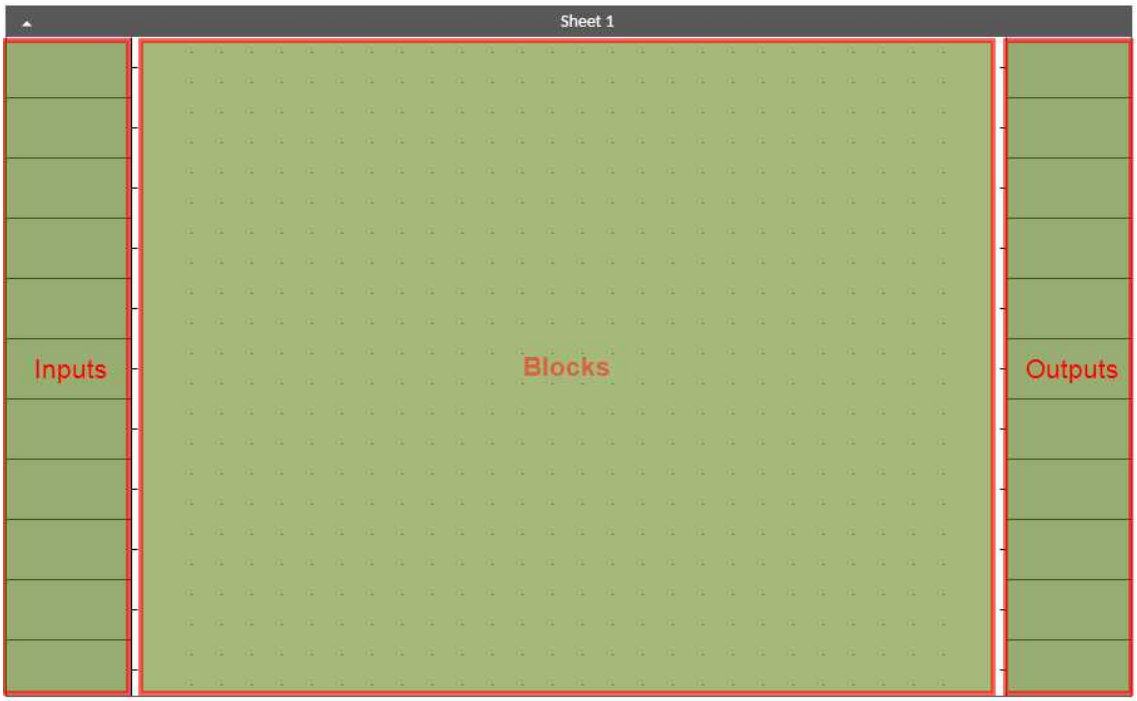
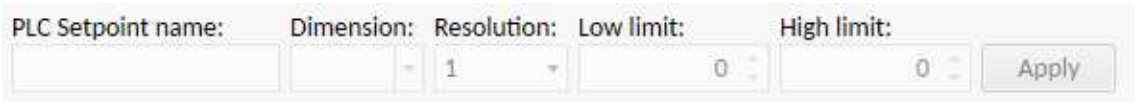


Image 5.48 Blank sheet of PLC editor

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 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.



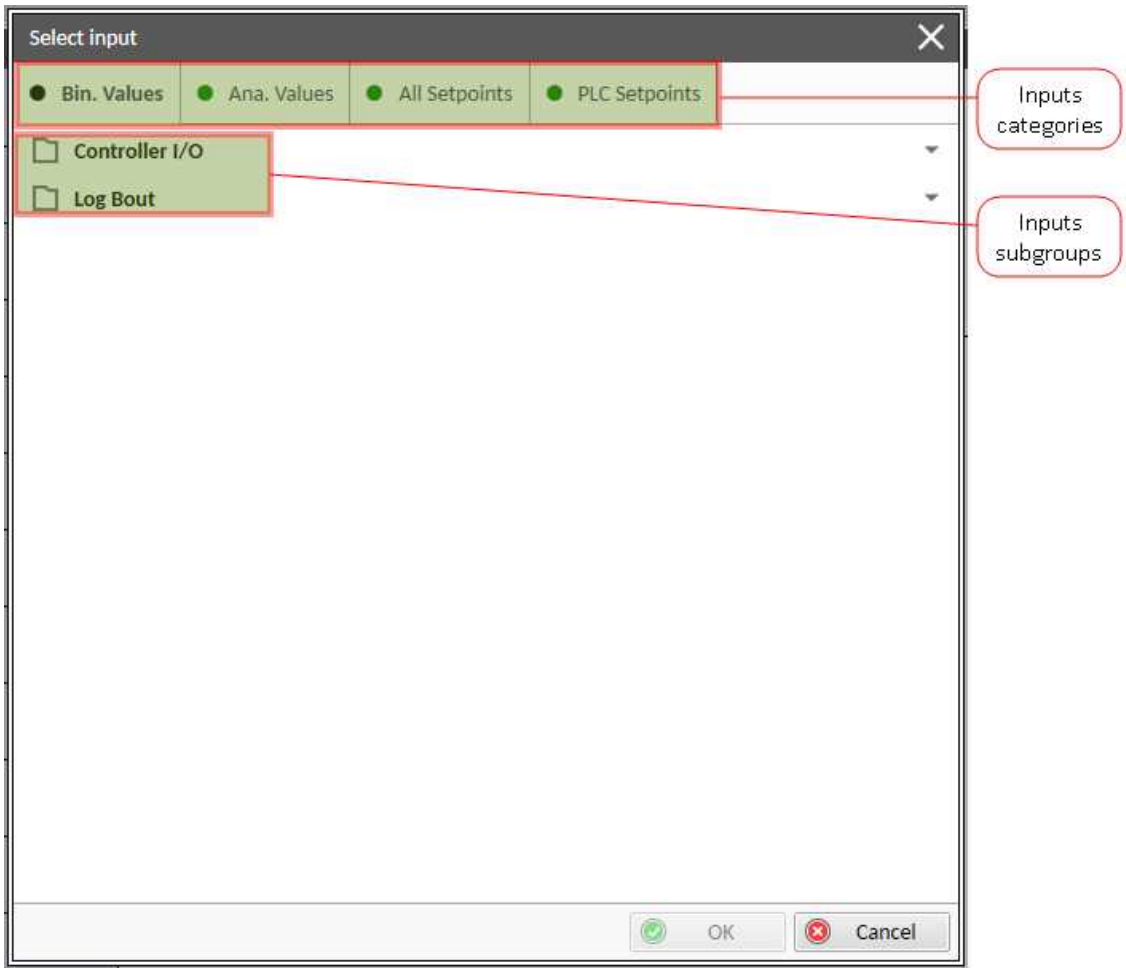


Image 5.49 PLC inputs

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).

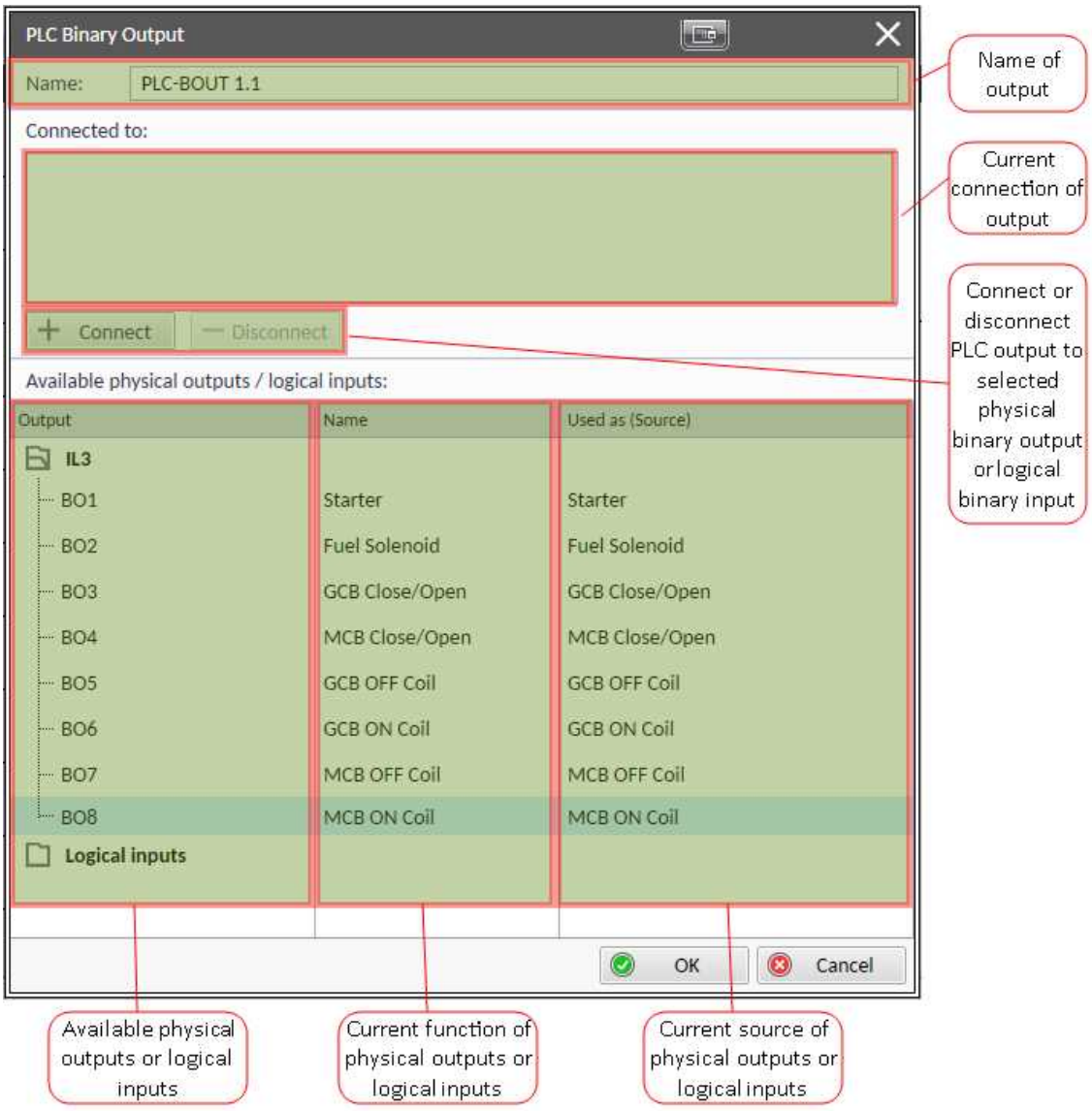


Image 5.50 PLC outputs

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.

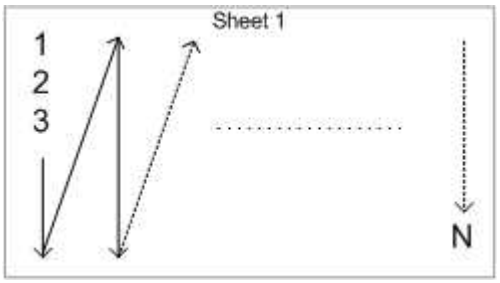
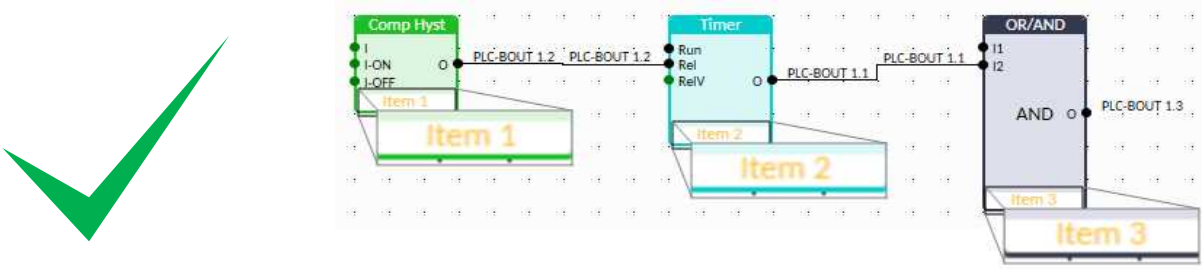
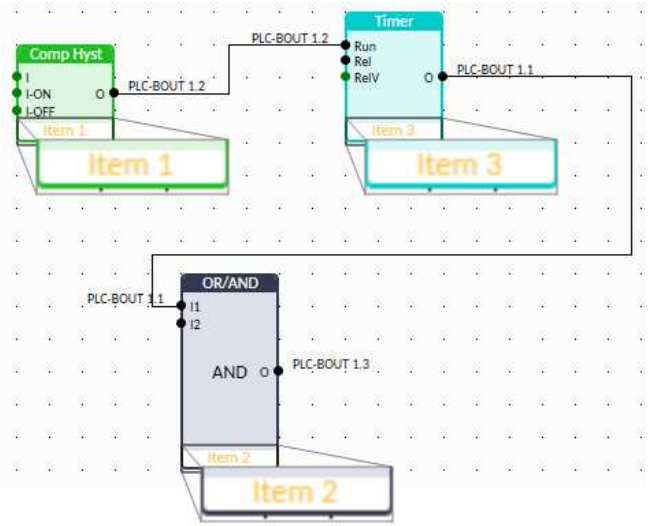


Image 5.51 PLC execution logic

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 InteliConfig 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.**

5.4.18 Alternate configuration

In controller are 3 sets of configuration.

Configuration set 1	Configuration set 2	Configuration set 3
Nominal Frequency 1 (page 294) Nominal Voltage Ph-N 1 (page 294) Nominal Voltage Ph-Ph 1 (page 295) Nominal Current 1 (page 295) Connection Type 1 (page 295)	Nominal Frequency 2 (page 296) Nominal Voltage Ph-N 2 (page 296) Nominal Voltage Ph-Ph 2 (page 297) Nominal Current 2 (page 297) Connection type 2 (page 297)	Nominal Frequency 3 (page 298) Nominal Voltage Ph-N 3 (page 298) Nominal Voltage Ph-Ph 3 (page 299) Nominal Current 3 (page 299) Connection type 3 (page 299)

Configuration sets can be changed via logical binary input **ALTERNATE CONFIG 2 (PAGE 401)** and logical binary input **ALTERNATE CONFIG 3 (PAGE 401)**.

5.4.19 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

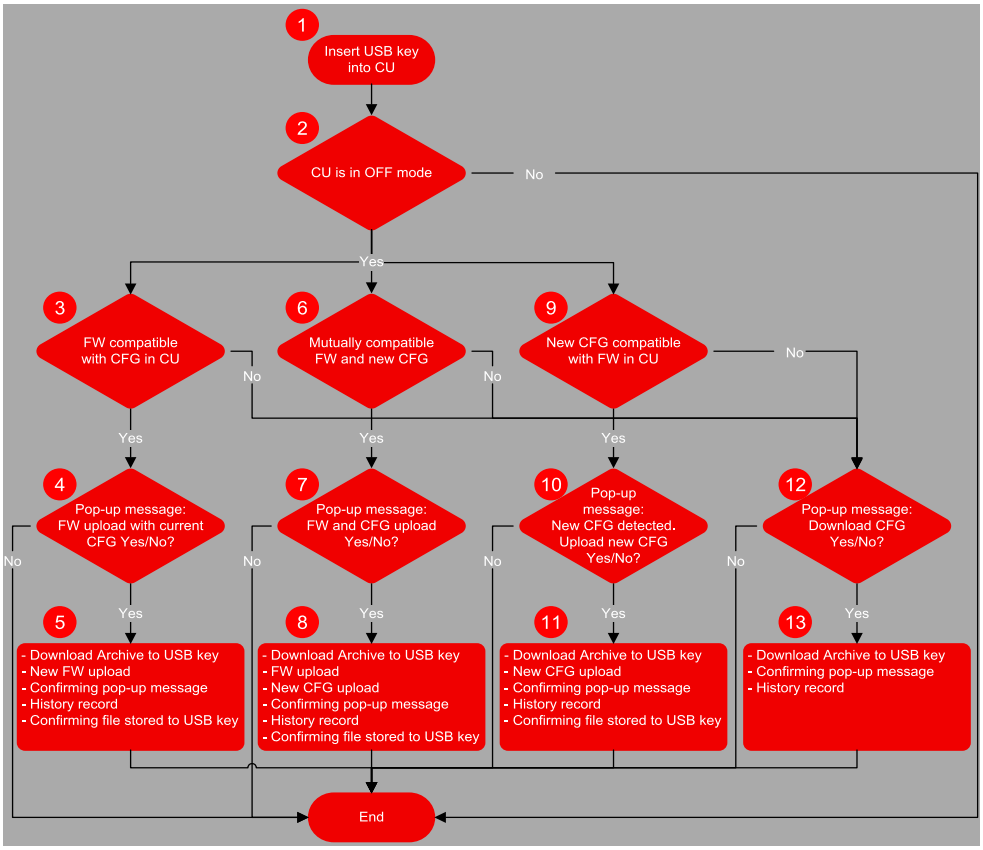


Image 5.52 USB host flowchart

Terminology:

- The Archive = the native file of InteliConfig, 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 InteliConfig 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 ="InteliMains210-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 "InteliMains210-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: "InteliMains210-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_YYMMDDHHMM).
  - 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_YYMMDDHHMM)
    - 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: "InteliMains210-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_YYMMDDHHMM).
  - 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: "InteliMains210-Genset name-M.N.P.B.aig3" and on name of firmware - required name: "InteliMains210-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"

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6 Communication

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6.1 PC

6.1.1 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 39**.

RS232 interface uses **COM1 Mode (page 263)** 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.*

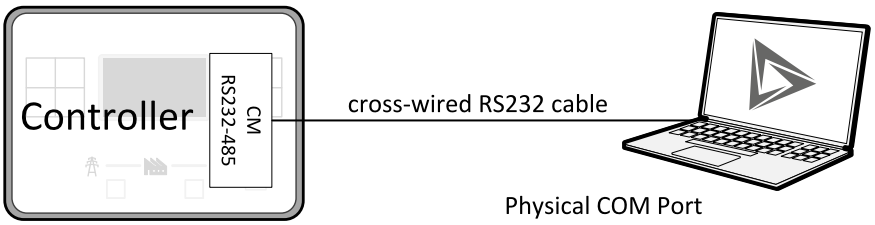


Image 6.1 Cross-wired RS232 cable is used

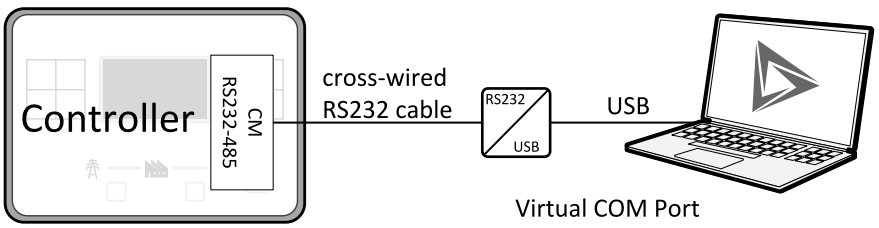


Image 6.2 Cross-wired RS232 cable and USB is used

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 39**.

RS485 interface uses **COM2 Mode (page 264)** port of the controller.

Note: *Also USB-RS485 convertor can be used.*

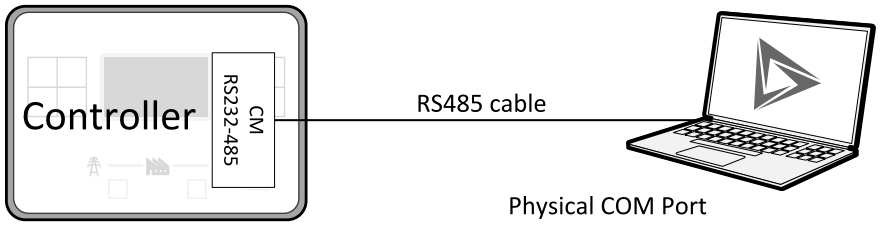


Image 6.3 Plug-in module CM RS232-485 is used

Connection via Ethernet

A plug-in communication module CM-Ethernet is necessary for ethernet 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 39**.

This connection type is used for communication with the controller from InteliConfig or any other PC tool. This connection can be used regardless of AirGate is switched on or off. Only three remote clients can be connected at the same time (via AirGate only two remote clients at the same time).

To connect your PC tool to the controller use the INTERNET connection type and just put the CM-Ethernet IP address into the gen-set address box in the PC tool. If you do not use the default **ComAp TCP Port (page 294)** 23, then you also have to specify the port number using a colon.

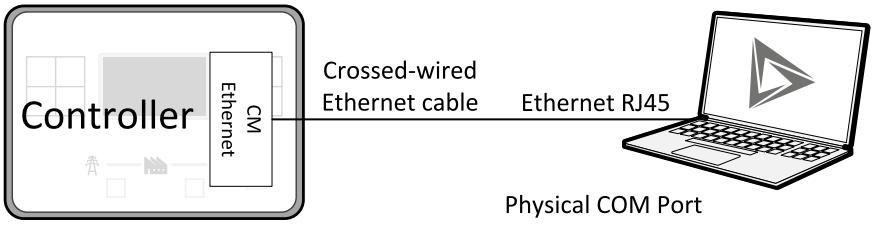


Image 6.4 Ethernet cable is used

Connection via USB

USB interface uses HID profile.

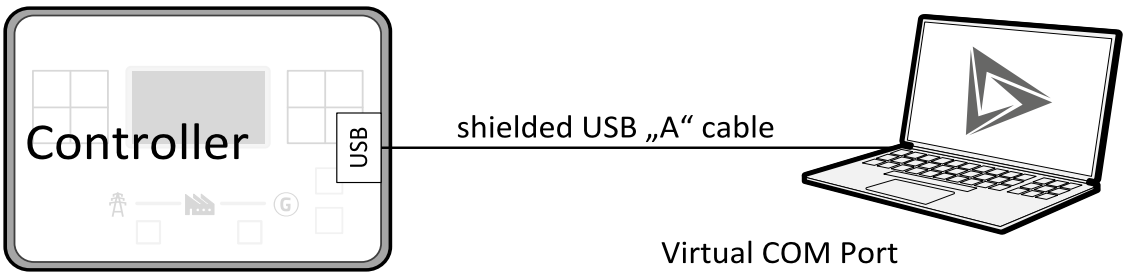


Image 6.5 Shielded USB type A cable is used

back to Communication

6.1.2 Remote communication

A PC can be connected to the controller also remotely via CM-GPRS or CM-Ethernet plug-in module.

IMPORTANT: Factory default password and access code are "0". It is highly recommended to change these parameters.

Ethernet LAN connection

Direct IP LAN connection is intended to be used if the CM-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 CM-Ethernet must have static IP address in the respective local network.

Note: *If you have troubles with setting up static and public IP address for direct connection from Internet use AirGate connection instead.*

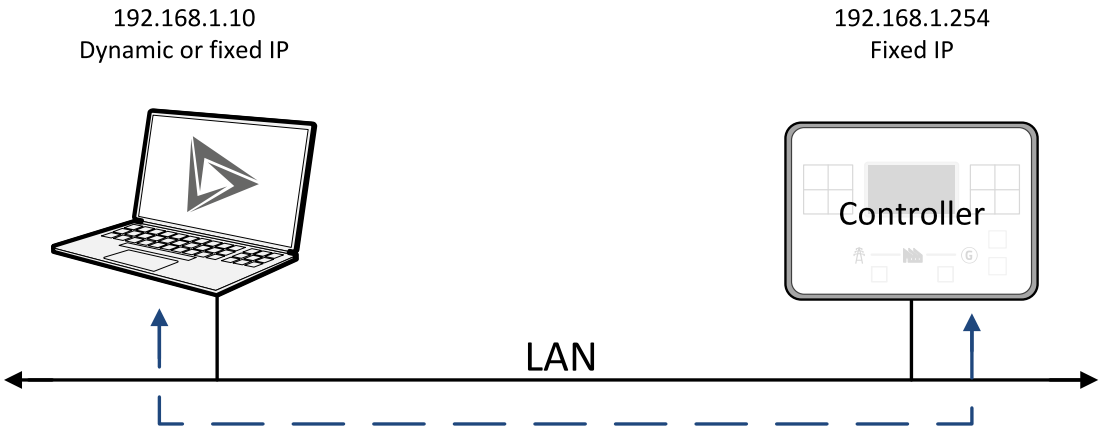


Image 6.6 Ethernet LAN connection

Setting-up static IP address

There are two basic ways to get the static IP address.

First way is to switch theCM-Ethernet to manual IP address mode. Adjust the setpoint **IP Address Mode (page 289)** to FIXED. In that case all setpoints of IP settings(**IP Address (page 290)**, **Subnet Mask (page 290)**, **Gateway IP (page 290)**, **DNS IP Address 1 (page 291)**) 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 CM-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.*

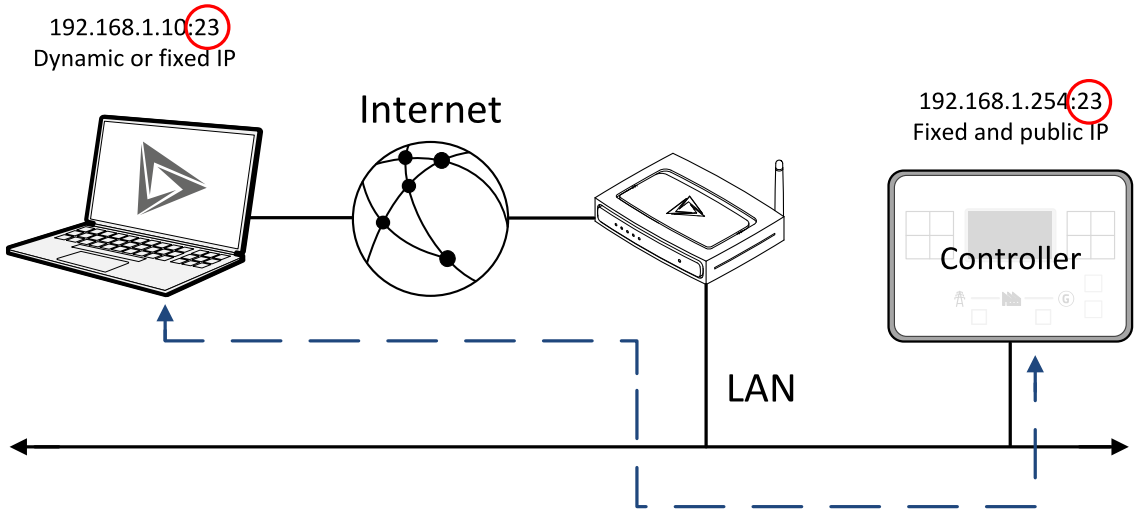
Next way is to switch the CM-Ethernet to automatic IP address mode. Adjust the setpoint **IP Address Mode** **(page 289)** to AUTOMATIC. In that case all IP settings are assigned by DHCP server. Then configure the DHCP server to assign always the same IP address (i.e. static IP address) to the particular CM-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 CM-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 CM-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 InteliConfig,or any other ComAp PC tool over the Internet in situations, where obtaining fixed public IP address is not possible. Only two remote clients can be connected at the same time.

This connection type is active if AirGate connection is enabled. Setpoint **AirGate Address (page 293)** 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 InteliMains 210 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 286)**

Note: *Firstly setpoint **Telephone Number 1 (page 281)** has to be adjusted.*

The following events can be received by mobile phone:

- Engine Start/Stop
  - Manual Start/Stop
  - Remote Start/Stop
  - AMF Start/Stop (as Automatic Mains Failure Start/Stop)
  - Test Start/Stop Gen-set
- Mains Fail
- Mains Returned
- Load on Mains
- Load on Gen-set
- Test On Load

Message structure:

- Genset Name (hh:mm:ss dd.mm.yyyy)
- hh:mm:ss Mains Fail
- hh:mm:ss AMF Start
- hh:mm:ss Load on Genset
- hh:mm:ss Mains Returned
- hh:mm:ss Load on Mains
- hh:mm:ss AMF Stop

Alarm SMS

The InteliMains 210 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 287)**
- **Sd Messages (page 287)**
- **BOC Message (page 287)**

Note: *Firstly setpoint* ***Telephone Number 1 (page 281)*** *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 InteliMains 210 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 InteliConfig.*

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.
mcb close	Closing MCB in MAN and TEST mode
mcb open	Opening MCB in MAN and TEST mode
off	Switching to OFF mode.
man	Switching to MAN mode.
auto	Switching to AUTO mode.
test	Switching to TEST 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 “InteliMains 210-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.):
#InteliMains 210-Test: <OK>,<OK>,<OK>, <OK>,<OK>, <OK>
The value <OK> or <ERROR> means if the command has been performed succesfuly or not.

Emails

Event Email

The InteliMains 210 controller equipped with the CM-Ethernet communication module is able to send Event Email according to the setting of setpoint:

- **Event Message (page 286)**

Note: *Firstly setpoints* ***Email Address 1 (page 284)*** *and* ***SMTP Sender Address (page 279)*** *(for CM-GPRS) or* ***SMTP Sender Address (page 289)*** *(for CM-Ethernet) have to be adjusted.*

Note: ***#Summer Time Mode (page 248)*** *and* ***Time Zone (page 286)*** *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 InteliMains 210 controller equipped with the CM-Ethernet communication module is able to send Alarm Emails according to the setting of setpoints:

- **Wrn Message (page 287)**
- **Sd Messages (page 287)**
- **BOC Message (page 287)**

Note: *Firstly setpoints* ***Email Address 1 (page 284)*** *and* ***SMTP Sender Address (page 279)*** *(for CM-GPRS) or* ***SMTP Sender Address (page 289)*** *(for CM-Ethernet) have to be adjusted.*

Note: ***#Summer Time Mode (page 248)*** *and* ***Time Zone (page 286)*** *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.*

Web Server

> **IMPORTANT: The web interface is based on HTTP protocol and is intended to be used only in private networks. It is not recommended to expose the web interface to the public Internet.**

The Web Server is designed for basic monitoring and adjustment of the controller using a web browser. Just put the controller IP address into the browser to display the main controller web page like http://192.168.1.254. You will be asked for the controller access code prior to entering the web pages.

> **IMPORTANT: Do not use the browser navigation buttons as "Back", "Forward" or "Reload". Use the links and the reload button located in the toolbar instead.**

Note: *Only two remote clients can be connected to the Web Server at one moment. If you close your web browser without disconnecting from the CM-Ethernet ("Exit" button at the web pages), the connection will be blocked for next 5 minutes.*

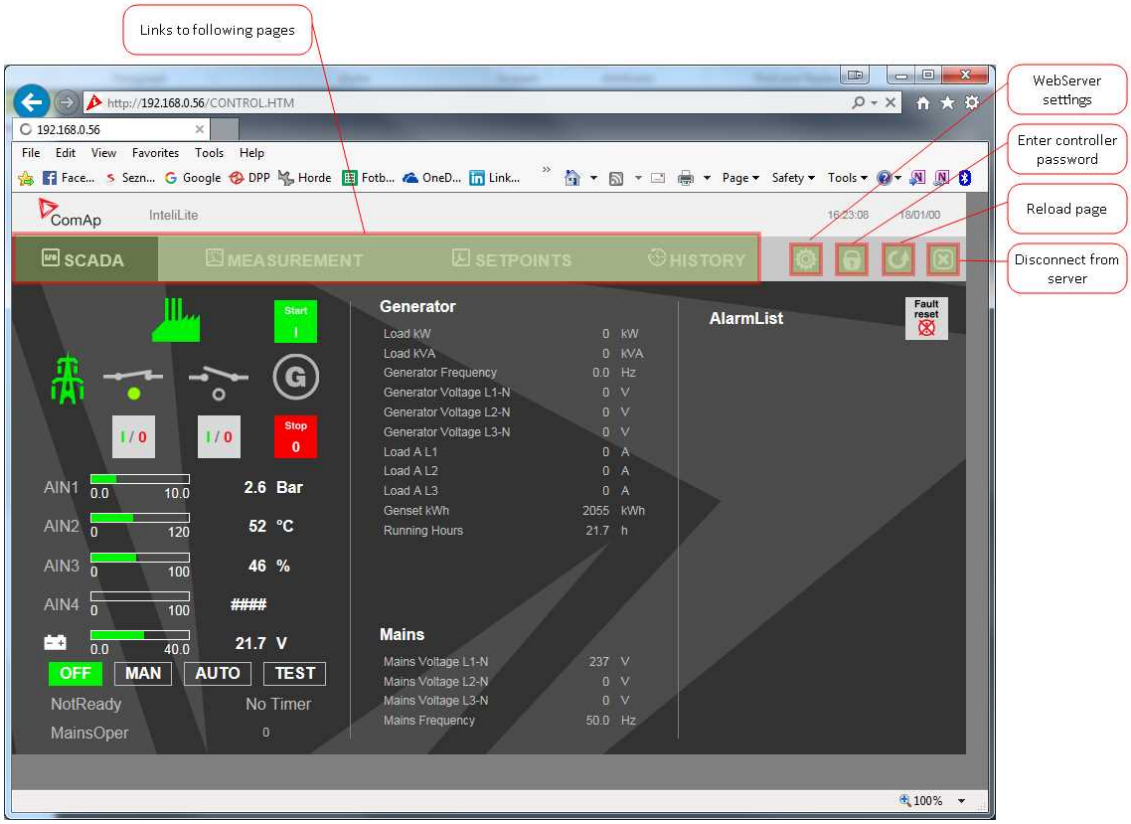


Image 6.7 Web Server main screen

Scada

Click to the SCADA link in the toolbar to display the scada page. The scada page is also the main page which is displayed by default if you just put the CM-Ethernet address into the browser (after entering the right access code).

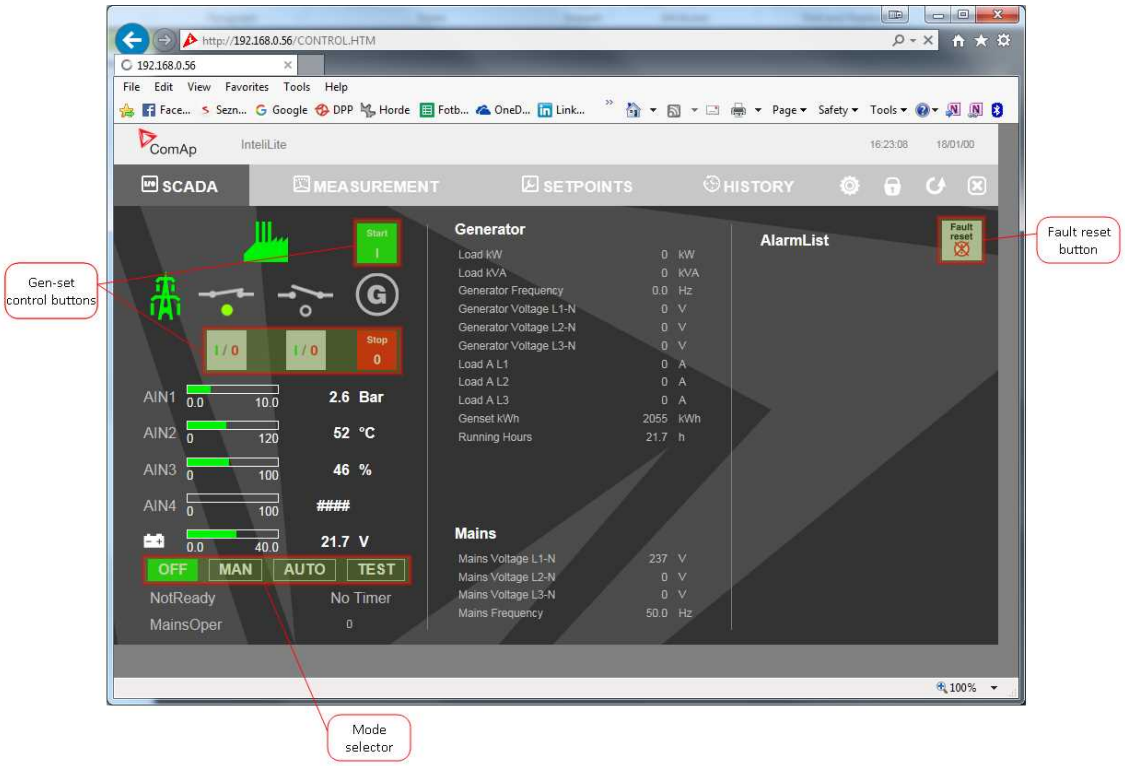


Image 6.8 Web Server - Scada screen

Measurement

Click to the MEASUREMENT link in the toolbar to display the measurement page. Then click to the required group name in the left box to display values of the group in the right box.

Note: *The measurement page is automatically refreshed every 60 seconds (this time cannot be changed).*

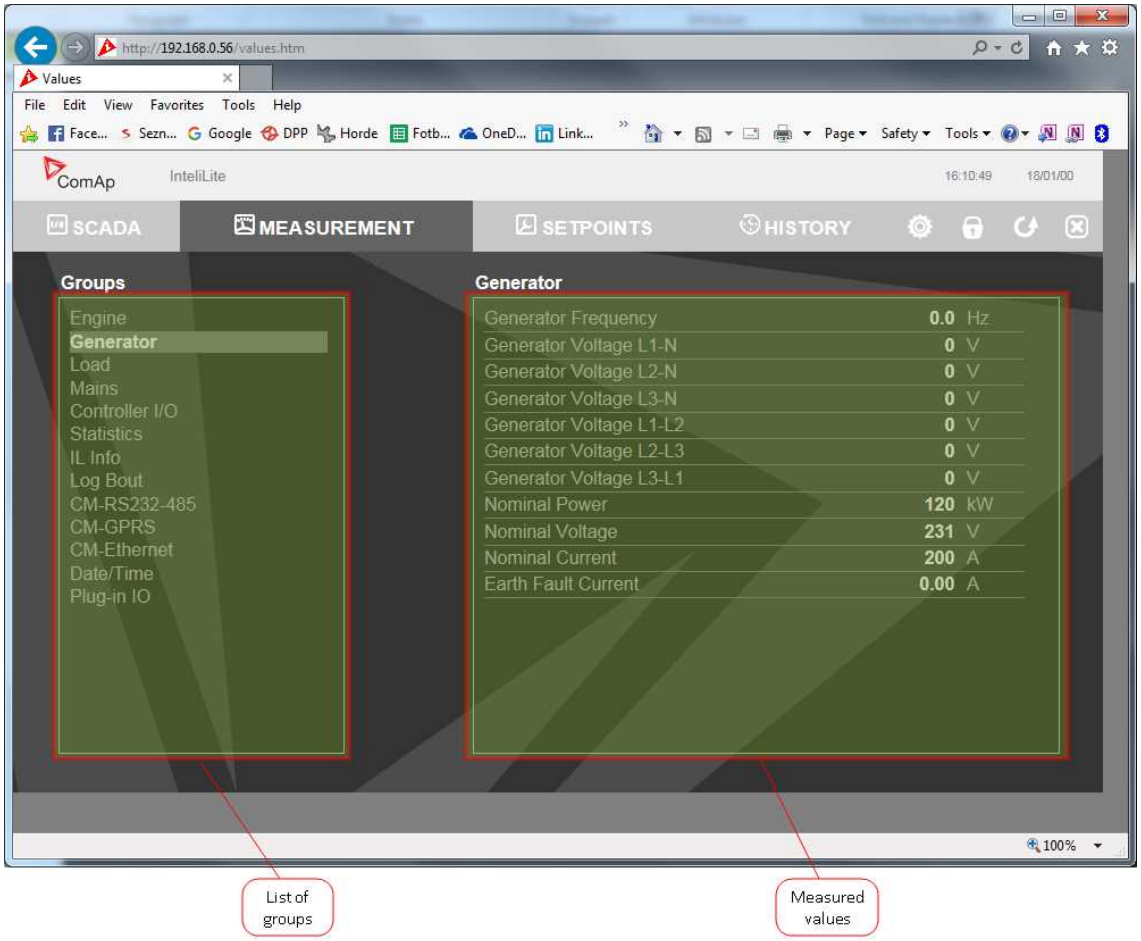


Image 6.9 Web Server - measurement screen

Setpoints

Click to the SETPOINTS link in the toolbar to display the setpoints page.

Click to the required group name in the left box to display setpoints of the group in the right box.

Click to the required setpoint name or value to change the value. If the respective setpoint is protected by password, which is indicated by a lock icon by the setpoint name, you have to click on the "Controller password" icon located in the toolbar and then enter valid password.

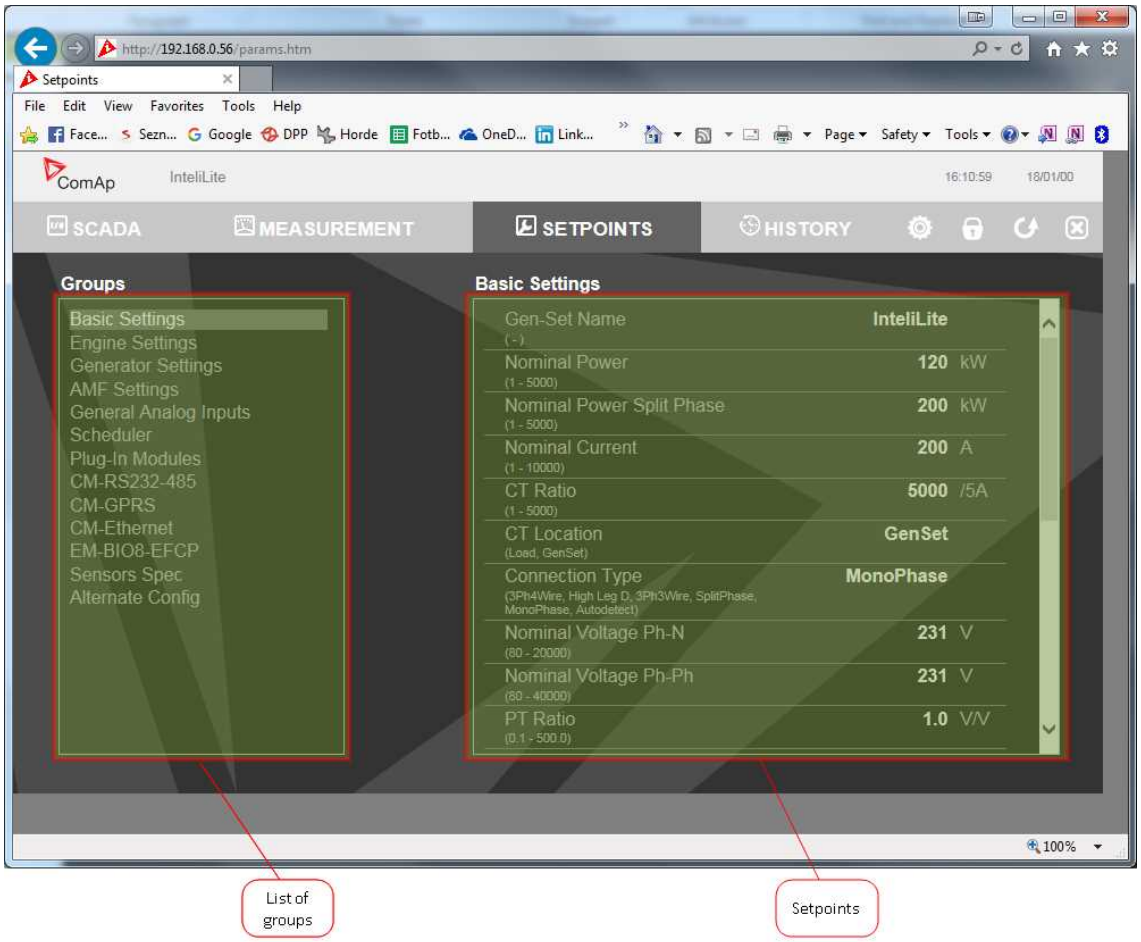


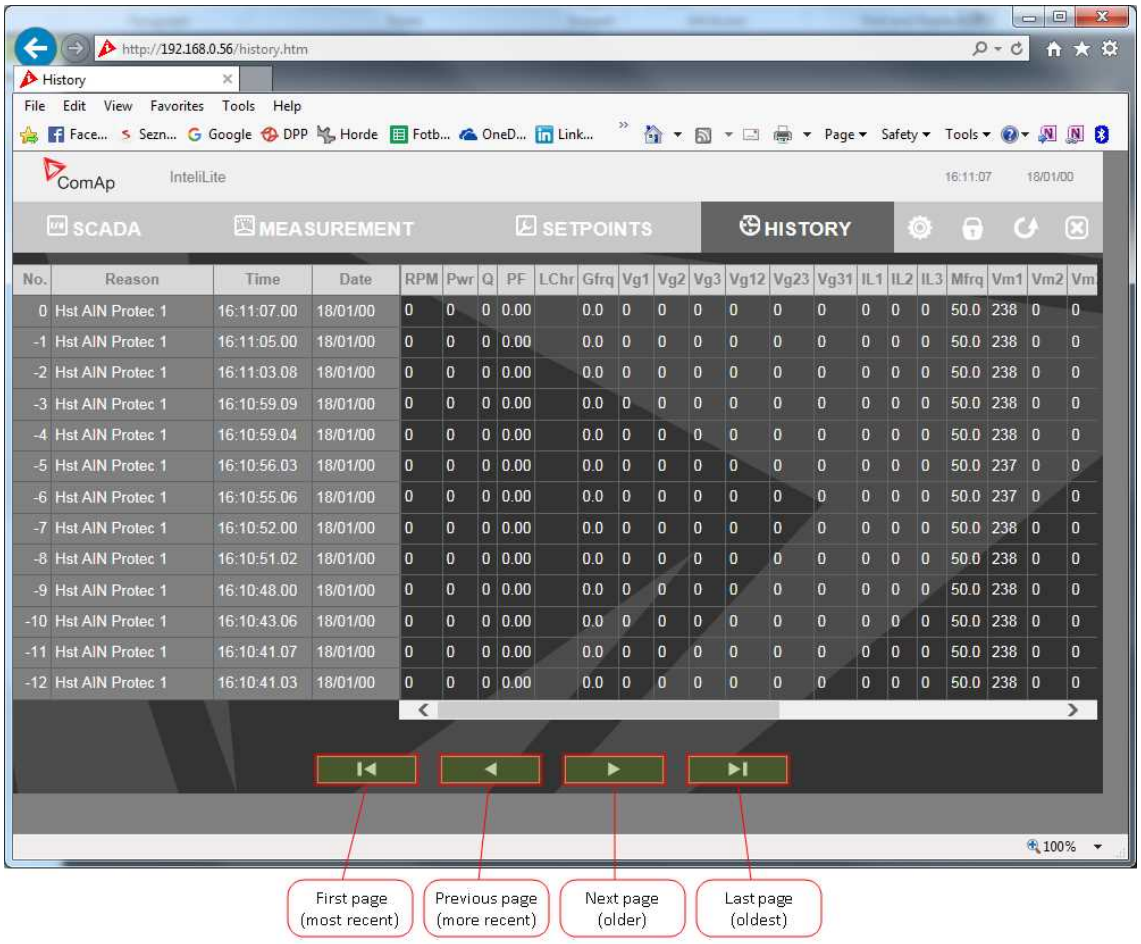
Image 6.10 Web Server - Setpoints screen

History

Click to the HISTORY link in the toolbar to display the history page.

Use the control buttons to move within the history file.

***Note:** The history page is automatically refreshed every 60 seconds. If a new record appears in the controller, the web page will not show it immediately as e.g. InteliConfig.*



No.	Reason	Time	Date	RPM	Pwr	Q	PF	LChr	Gfrq	Vg1	Vg2	Vg3	Vg12	Vg23	Vg31	IL1	IL2	IL3	Mfrq	Vm1	Vm2	Vm
0	Hst AIN Protec 1	16:11:07.00	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0
-1	Hst AIN Protec 1	16:11:05.00	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0
-2	Hst AIN Protec 1	16:11:03.08	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0
-3	Hst AIN Protec 1	16:10:59.09	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0
-4	Hst AIN Protec 1	16:10:59.04	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0
-5	Hst AIN Protec 1	16:10:56.03	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	237	0	0
-6	Hst AIN Protec 1	16:10:55.06	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	237	0	0
-7	Hst AIN Protec 1	16:10:52.00	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0
-8	Hst AIN Protec 1	16:10:51.02	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0
-9	Hst AIN Protec 1	16:10:48.00	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0
-10	Hst AIN Protec 1	16:10:43.06	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0
-11	Hst AIN Protec 1	16:10:41.07	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0
-12	Hst AIN Protec 1	16:10:41.03	18/01/00	0	0	0	0.00		0.0	0	0	0	0	0	0	0	0	0	50.0	238	0	0

Image 6.11 Web Server - History screen

Web Server Adjustment

Click to the "Web Server settings" icon in the toolbar to display the settings page.

Select the controller language the web pages will appear in.

Select the rate of automatic refresh of the scada page.

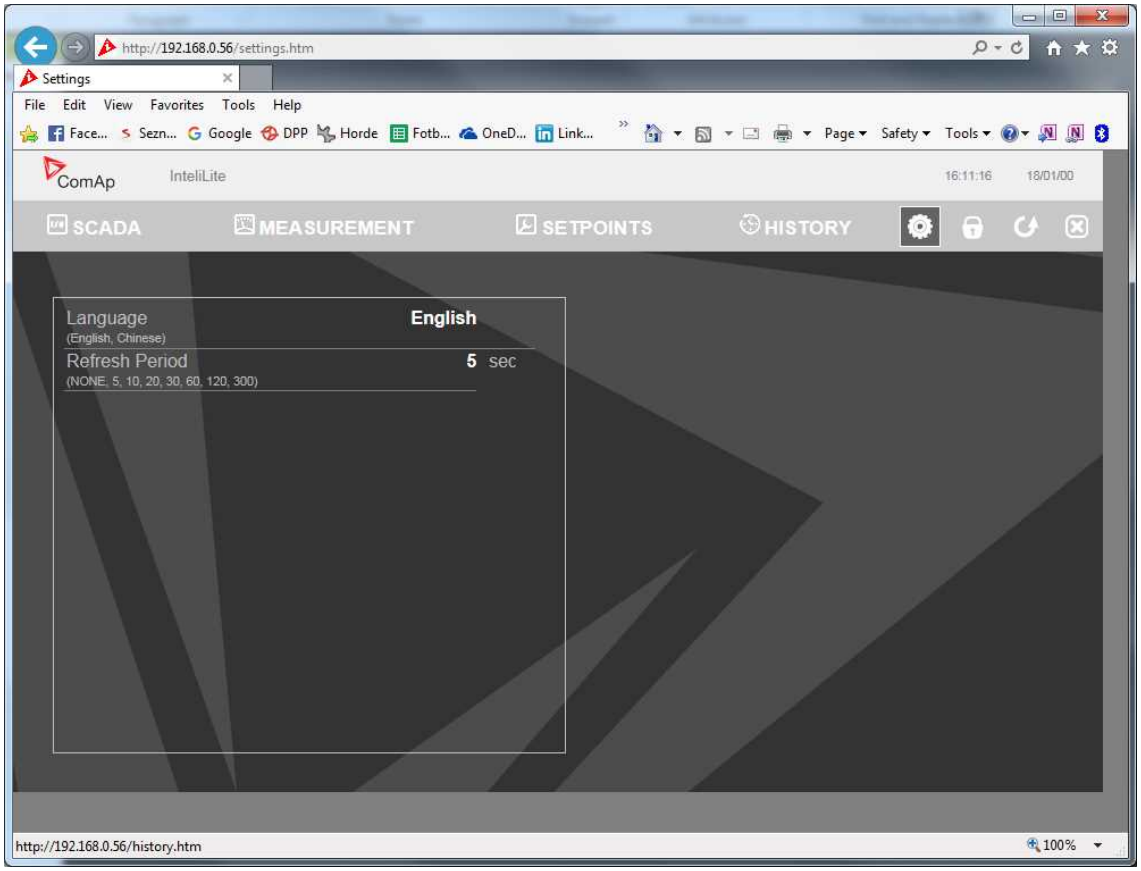


Image 6.12 Web Server - Adjustment screen

back to Communication

6.2 Connection to 3rd party systems

back to Communication

6.2.1 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“.

- CM-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 292)** in the CM-Ethernet setpoint group. The setpoints **SNMP RD Community String (page 292)** and **SNMP WR Community String (page 292)** 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 InteliConfig
- 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 InteliGen 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 InteliConfig 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 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 CM-Ethernet setpoint group by the setpoints **SNMP Traps IP Address 1 (page 292)** and **SNMP Traps IP Address 2 (page 293)**. 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.

- 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
  - AMF start
  - Remote start
- Stop commands of gen-set
  - Stop button
  - AMF stop
  - Remote stop
- Breaker records
  - Load on gen-set
  - Load on mains
- Others
  - Test on load
  - Mains fail
  - Mains returned

6.2.2 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 on serial interfaces (CM-RS232-485 module is requiredvia on board RS485 connector or via CM-RS232-485 communication module). The MODBUS-RTU server must be activated by switching the setpoint **COM1 Mode (page 263)** or **COM2 Mode (page 264)** into the Modbus position. The serial speed for MODBUS-RTU communication is to be adjusted by the setpoint **COM1 MODBUS Communication Speed (page 264)** or **COM2 MODBUS Communication Speed (page 265)**.

- MODBUS/TCP can be used on the ethernet interface (CM-Ethernet module is required). Up to 2 clients can be connected simultaneously. The MODBUS/TCP server must be activated by the setpoint **MODBUS Server (page 291)**.

MODBUS, MODBUS/TCP protocol can be used simultaneously with Web connection and direct ethernet/AirGate connection.

The MODBUS, MODBUS/TCP protocol is enabled alternatively with the SNMP protocol, so both protocols can not be active simultaneously.

> **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 10^5 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 InteliConfig. 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 Write: 06, 16
4200 .. 7167	Reserved registers	Read/Write, depends on each specific register	Input Registers Holding Registers	Read: 03, 04 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 149)**.

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 149)**.

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 Logical binary outputs Protections on binary inputs CU + configured* modules Protections on analog inputs CU + configured* modules 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 maping
Integer8	1-byte signed integer	1	MSB = sign extension LSB = value
Unsigned8	1-byte unsigned integer	1	MSB = 0 LSB = value
Integer16	2-byte signed integer	1	MSB = value, MSB LSB = value, LSB
Unsigned16	2-byte unsigned integer	1	MSB = value, MSB LSB = value, LSB
Integer32	4-byte signed integer	2	MSB1 = value, byte 3 (MSB) LSB1 = value, byte 2 MSB2 = value, byte 1

Data type	Meaning	Number of registers	Data maping
			LSB2 = value, byte 0 (LSB)
Unsigned32	4-byte unsigned integer	2	MSB1 = value, byte 3 (MSB) LSB1 = value, byte 2 MSB2 = value, byte 1 LSB2 = value, byte 0 (LSB)
Binary8	8-bit binary value	1	MSB = 0 LSB = value, bits 0-7
Binary16	16-bit binary value	1	MSB = value, bits 8-15 LSB = value, bits 0-7
Binary32	32-bit binary value	2	MSB1 = value, bits 24-31 LSB1 = value, bits 16-23 MSB2 = value, bits 8-15 LSB2 = value, bits 0-7
Char	1-byte ASCII character	1	MSB = 0 LSB = ASCII value of the character
StrList	Index into a list of strings	1	MSB = 0 LSB = index into the list
ShortStr	Zero-terminated string of max 15 ASCII characters.	8	MSB1 = ASCII value of the 1. character LSB1 = ASCII value of the 2. character MSB2 = ASCII value of the 3. character LSB2 = ASCII value of the 4. character …
LongStr	Zero-terminated string of max 31 ASCII characters.	16	MSB1 = ASCII value of the 1. character LSB1 = ASCII value of the 2. character MSB2 = ASCII value of the 3. character LSB2 = ASCII value of the 4. character …

Data type	Meaning	Number of registers	Data maping
Date	Date (dd-mm-yy)	2	MSB1 = BCD (dd) LSB1 = BCD (mm) MSB2 = BCD (yy) LSB2 = 0
Time	Time (hh-mm-ss)	2	MSB1 = BCD (hh) LSB1 = BCD (mm) MSB2 = BCD (ss) LSB2 = 0
Alarm	An item of the Alarmlist	27	MSB1 = reserved for future use LSB1 = reserved for future use MSB2 = Alarm level *) LSB2 = Alarm status **) MSB3 = alarm string ***) LSB3 = alarm string MSB4 = alarm string LSB5 = alarm string …

*) 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 successfuly.

The controller responds with the error codes in as follows:

- 01 – Ilegal 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 errorneous 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 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
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:

1. (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 InteliConfig.

2. Write the command argument into the registers 44208-44209 (register addresses 4207-4208). Use function 16.
3. Write the command code into the register 44210 (register address 4209). Use function 6.
4. (Optional) Read the command return value from the registers 44208-44209 (register addresses 4207-4208). Use function 3.
5. 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:
   a. 0x00000001 – invalid argument
   b. 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 InteliConfig

Table: Values									
Allowed MODBUS functions: 03, 04									
Register(s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01053	8213	**BatteryVoltage**	**V**	Integer	2	**1**	0	400	Controller I/O

Request: (Numbers in Hex)							
01	03	04	1D	00	01	15	3C
Controller address	Modbus function	Register address $041D_{hex}$ = **1053_{dec}**		Number of registers		CRC	

Response: (Numbers in Hex)						
01	03	02	00	F0	B8	00
Controller address	Modbus function	Length of data 02_{hex} = 2 bytes read	Data $00F0_{hex}$ = **240_{dec}**		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 InteliConfig

Table: Values									
Allowed MODBUS functions: 03, 04									
Register(s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01228	9018	**Nominal Power**	**kW**	Integer	2	**0**	0	32767	Generator

Request: (Numbers in Hex)							
01	03	04	CC	00	01	45	05
Controller address	Modbus function	Register address $04CC_{hex}$ = **1228_{dec}**		Number of registers		CRC	

Response: (Numbers in Hex)						
01	03	02	00	C8	B9	D2
Controller address	Modbus function	Length of data 02_{hex} = 2 bytes read	Data $00C8_{hex}$ = **200_{dec}**		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
01068	8235	**Binary Inputs**		Binary#2	2	**0**	-	-	Controller I/O

Request: (Numbers in Hex)							
01	03	04	2C	00	01	44	F3
Controller address	Modbus function	Register address $042C_{hex}$ = **1068**$_{dec}$		Number of registers		CRC	

Response: (Numbers in Hex)						
01	03	02	00	12	38	49
Controller address	Modbus function	Length of data 02_{hex} = 2 bytes read	Data 0012_{hex} = **00010010**$_{bin}$		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 Modbus Addr. Prot. Addr.	Source = Value = State	C.O.# State #	Name of Value Name of State	Bit #	Bit Name 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 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 01_{hex} = 1 byte read	Data 01_{hex} = 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 151)**

Register addresses	Number of registers	Access	Data type	Meaning
4207 - 4208	2	read/write	Unsigned32	Writing:command argument Reading: command return value
4209	1	write	Unsigned16	Command code

Table **List of commands and arguments (page 152)**

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 $10_{hex} = 16_{dec}$	Register address $106F_{hex} = \mathbf{4207}_{dec}$		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 InteliConfig or directly in controller.

Table **Reserved registers (page 151)**

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 1073_{hex} = **4211**$_{dec}$		Password $04D2_{hex}$ = **1234**$_{dec}$		CRC	

Response for success: (Numbers in Hex)							
01	06	10	73	00	00	7C	D1
Controller address	Modbus function	Register address 1073_{hex} = **4211**$_{dec}$		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 **see Error codes (exception codes) on page 151**	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
03008	8276	**Nominal Power**	**kW**	Unsigned	2	**0**	1	5000	Basic Settings

Request: (Numbers in Hex)							
01	06	0B	C0	00	64	8A	39
Controller address	Modbus function	Register address $0BC0_{hex}$ = **3008**$_{dec}$		Data 0064_{hex} = **100**$_{dec}$		CRC	

Response: (Numbers in Hex)							
01	06	0B	C0	00	00	8B	D2
Controller address	Modbus function	Register address $0BC0_{hex}$ = **3008**$_{dec}$		Allways zero		CRC	

Writen 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: $01060BC00064_{hex}$

Modbus TCP examples

- Reading of Battery voltage
  - Export table of values from InteliConfig

Table: Values									
Allowed MODBUS functions: 03, 04									
Register(s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01053	8213	**BatteryVoltage**	**V**	Integer	2	**1**	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 $041D_{hex}$ = **1053**$_{dec}$		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 $041D_{hex}$ = **1053**$_{dec}$		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 02_{hex} = 2 bytes read	Data $00F0_{hex}$ = **240**$_{dec}$	

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**.

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7 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
RTC battery	Replaceable
Fusing	Power terminal max. 4 A w/o BOUT consumption E-Stop max.12 A
Fusing E-Stop	12 A
Max. Power Dissipation	9 W

D+

Max. excitation current	250 mA
Charging fail threshold	80 % of Usupply

Operating conditions

Operating temperature	-20 °C to +70 °C
Operating temperature for Low Temp. version	-40 °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^2
Surrounding air temperature rating 70°C	
Suitable for pollution degree 2	

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	132 x 64 px

Binary inputs

Number	8, non-isolated
Close/Open indication	0-2 V DC close contact 6-36 V DC open contact

Binary outputs

Low current	6 low current output, non-isolated BO 3-8 = 0,5 A switching to positive supply terminal

Communications

USB port	Non-isolated
CAN 1 + CAN 2	250 / 50 kbps, isolated, nominal impedance 120 Ω

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8 Appendix

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8.1 Controller objects

8.1.1 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 10^5 times without risk of damage or data loss, but it may become damaged, when the allowed number of writing cycles is exceeded.**

List of setpoint groups

For full list of setpoints go to the chapter **List of setpoints (page 165)**.

List of setpoints

Process Control

Basic settings

Communication Settings

Bus Right Settings

Bus Left Settings

Power Management

Load Control

Voltage/PF Control

Synchronisation

General Analog Inputs

Scheduler

Plug-In Modules

Communication Modules

Alternate Configuration

PLC

Group: Process Control

Subgroup: Load Control

#System Load Control PTM

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	Baseload / Loadsharing [-]		
Default value	Baseload	**Alternative config**	NO
Step	[-]		
Comm object	8774	**Related applications**	MCB, MGCB, BTB
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 **#System BaseLoad (page 171)**. 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 **#System BaseLoad (page 171)** is also used for determining which gen-sets have to run or not.
Loadsharing	Gen-sets load is controlled by IM210 controller to share the total load (given by the setpoint **#System BaseLoad (page 171)**) 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 IM210 controller is present in the system. In systems without IM210 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 170)** in parallel to mains operation and does not depend on active load control mode.*

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#System PF Control PTM

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	Base PF / Var Sharing [-]		
Default value	Base PF	**Alternative config**	NO
Step	[-]		
Comm object	8779	**Related applications**	MCB, MGCB, BTB
Description			

Power factor control mode in parallel to mains operation of the whole group of gen-sets.

Base PF	Gensets PF is controlled by their PF control loops to provide constant power factor adjusted by setpoint **#System Power Factor (page 171)**. InteliMains doesn't play active role in PF control in parallel to mains operation.
Var Sharing	Gensets PF is controlled by InteliMains through the VAr sharing line.

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#System BaseLoad

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	0 .. 32 000 [kW]		
Default value	1 000 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8775	**Related applications**	MCB, MGCB, BTB
Description			
Required total load of the gen-set group in parallel to mains operation in baseload mode (setpoint **#System Load Control PTM (page 170)** = Baseload).			

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#System Power Factor

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	0,60 .. 1,20 [-]		
Default value	1,00 [-]	**Alternative config**	NO
Step	0,01 [-]		
Comm object	8776	**Related applications**	MCB, MGCB, BTB
Description			
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: Mains coupling

Mains Coupling

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	11037	**Related applications**	MCB, MGCB, BTB
Description			

Setpoint adjusts behavior of BTB in systems where mains is present on both sides of bus.

- Enable - BTB can be closed when there is mains on both sides
- Disable - BTB cant be closed, when there is mains on both sides

Note: *Passive phase/voltage check is performed before mains coupling.*

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Subgroup: Transferred Bus Power Measurement

Bus Power Measurement

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	None/Mains CT/Analog Input [-]		
Default value	Mains CT	**Alternative config**	NO
Step	[-]		
Comm object	10599	**Related applications**	MCB, MGCB, BTB
Description			

Defines source value of the **Bus Left Import (page 367)** measurement.

None	The Transferred Bus Power is not measured.
Bus CT	The **Bus Left Import (page 367)** value is measured via Bus CTs.
Analog Input	The **Bus Left Import (page 367)** value is measured via analog input, accordingly LAI: **BUS IMPORT MEASUREMENT (PAGE 490)**.

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Subgroup: BTB Control

Synchronization R To Mains

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	16047	**Related applications**	BTB
Description			

Setpoint for adjustment of the direction of synchronization. This setpoint has to be Enable for situations where the Mains is on the left side and gen-sets are on the right side.

Note: *In case the Mains is on the right side, the controller will not try to synchronize.*

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Synchronization L To Mains

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	16048	**Related applications**	BTB
Description			
Setpoint for adjustment of the direction of synchronization. This setpoint has to be Enable for situations where the Mains is on the right side and gen-sets are on the left side. ***Note:*** *In case the Mains is on the left side, the controller will not try to synchronize.*			

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Synchronization R To L

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	16049	**Related applications**	BTB
Description			
Setpoint for setting the direction of synchronization. This setpoint has to be set to Enable if on both sides are gen-sets. In case the setpoint is set to enable and even on one side is mains, controller recognizes it and automatically adjust the direction of synchronization.			

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Synchronization L To R

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	16050	**Related applications**	BTB
Description			
Setpoint for setting the direction of synchronization. This setpoint has to be set to Enable if on both sides are gen-sets. In case the setpoint is set to enable and even on one side is mains, controller recognizes it and automatically adjust the direction of synchronization.			

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BTB Opening

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	14028	**Related applications**	BTB
Description			

Setpoint adjusts if the BTB should be opened (in AUTO mode) when both sides are dead.

- Enable - BTB is opened when both sides are dead
- Disable - BTB stays closed even both sides of the bus are dead

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Dead Bus Closing

Setpoint group	Process Control	**Related FW**	2.0.0
Range [units]	Disabled / LeftToRight / RightToLeft/ Both [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	11038	**Related applications**	MCB, MGCB, BTB
Description			

Setpoint adjusts behavior of BTB when there is dead bus.

Disable	Closing to dead bus is disabled. Controller in AUTO mode does not close breaker unless there is voltage on both sides
LeftToRight	Closing to dead bus is enabled only if there is healthy voltage on busL. Controller in AUTO mode does not close breaker unless there is not healthy voltage on busL or is healthy votlage on both sides
RightToLeft	Closing to dead bus is enabled only if there is healthy voltage on busR. Controller in AUTO mode does not close breaker unless there is not healthy voltage on busR or is healthy voltage on both sides
Both	BTB closes if one of the buses is healthy

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Group: Basic settings

Subgroup: Name

Controller Name

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	0 .. 15 characters [-]		
Default value	InteliGen	**Alternative config**	NO
Step	[-]		
Comm object	8637	**Related applications**	MCB, MGCB, BTB
Description			

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 InteliConfig or from controller's configuration menu.

Note: *If the Gen-Set Name is "TurboRunHours", the running hours will be counted faster - 1 minute in real will represent 1 hour.*

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Subgroup: Power settings

Nominal Bus Import

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	Yes
Step	1 kW		
Comm object	8276	**Related applications**	MCB, MGCB, BTB
Description			

Nominal power imported from the Bus. Bus Overload BOR protection is based on this setpoint.

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Subgroup: Current settings

Nominal Current

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	1 .. 10 000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	8275	**Related applications**	MCB, MGCB, BTB
Description			

It is current limit for current protections and means maximal continuous current.

Note: *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Current 1 (page 295), Nominal Current 2 (page 297)*** *and* ***Nominal Current 3 (page 299).***

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Bus Import CT Ratio

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	1 .. 2 000 [A/5A]		
Default value	500 A/5A	**Alternative config**	NO
Step	1 A/5A		
Comm object	8274	**Related applications**	MCB, MGCB, BTB
Description			

Bus current transformers ratio.

Note: *Generator currents and power measurement is suppressed if current level is below 1% of CT range.*

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Subgroup: Voltage settings

Connection type

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	Mono Phase / SplitPhase / 3Ph3Wire / High Leg D / 3Ph4Wire [-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	11628	**Related applications**	MCB, MGCB
Description			

Connection type:

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)
Split Phase	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift

	3x CT (Current Transformer)

Note: *To lock this setpoint against editing you also have to lock setpoint* ***Connection Type 1 (page 295), Connection type 2 (page 297)*** *and* ***Connection type 3 (page 299)****.*

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Nominal Voltage Ph-N

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	80 .. 20 000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	8277	**Related applications**	MCB, MGCB, BTB
Description			
Nominal voltage (phase to neutral). ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Voltage Ph-N 1 (page 294), Nominal Voltage Ph-N 2 (page 296)*** *and* ***Nominal Voltage Ph-N 3 (page 298)****.*			

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Nominal Voltage Ph-Ph

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	80 .. 40 000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	11657	**Related applications**	MCB, MGCB, BTB
Description			
Nominal system voltage (phase to phase). ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Voltage Ph-Ph 1 (page 295), Nominal Voltage Ph-Ph 2 (page 297)*** *and* ***Nominal Voltage Ph-Ph 3 (page 299)****.*			

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Bus VT Ratio

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	0,1 .. 500,0 [V/V]		
Default value	1,0 V/V	**Alternative config**	NO
Step	0,1 V/V		
Comm object	9579	**Related applications**	MCB, MGCB, BTB
Description			
Bus voltage potential transformers ratio. If no PTs are used, adjust the setpoint to 1.			

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Subgroup: Frequency settings

Nominal Frequency

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	45 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	8278	**Related applications**	MCB, MGCB, BTB
Description			
Nominal system frequency (usually 50 or 60 Hz). ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Frequency 1 (page 294), Nominal Frequency 2 (page 296)*** *and* ***Nominal Frequency 3 (page 298)****.*			

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Subgroup: Controller settings

Controller mode

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	OFF / MAN / AUTO / TEST [-]		
Default value	OFF	**Alternative config**	NO
Step	[-]		
Comm object	8315	**Related applications**	MCB, MGCB, BTB
Description			
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 InteliConfig.			

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Power On Mode

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	Previous / OFF [-]		
Default value	Previous	**Alternative config**	NO
Step	[-]		
Comm object	13000	**Related applications**	MCB, MGCB, BTB
Description			

This setpoint adjusts controller mode after power on of controller.

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.

Note: *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*

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Backlight Timeout

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	Disabled / 1 .. 255 [min]		
Default value	Disabled	**Alternative config**	NO
Step	1 min		
Comm object	10121	**Related applications**	MCB, MGCB, BTB
Description			

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.

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Horn Timeout

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	Disabled / 1 .. 599 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	8264	**Related applications**	MCB, MGCB, BTB
Description			

Setting of horn behavior.

Disabled	Disabling the Horn sounding function
1 .. 599 [s]	Timeout for **HORN (PAGE 459)** binary output. The **HORN (PAGE 459)** output is opened when this timeout elapsed.

Note: *Horn timeout starts again from the beginning if a new alarm appears before previous Horn timeout has elapsed.*

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Subgroup: Phase rotation

Phase Rotation

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	Clockwise / CounterCCW [-]		
Default value	Clockwise	**Alternative config**	NO
Step	[-]		
Comm object	15122	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint adjust the phase sequence of voltage terminals.			

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Subgroup: Battery Protections

Battery Undervoltage

Setpoint group	Engine settings	**Related FW**	2.0.0
Range [units]	8,0 V .. **Battery Overvoltage (page 180)** [V]		
Default value	18,0 V	**Alternative config**	NO
Step	0,1 V		
Comm object	8387	**Related applications**	MCB, MGCB, BTB
Description			
Warning threshold for low battery voltage.			

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Battery Overvoltage

Setpoint group	Engine settings	**Related FW**	2.0.0
Range [units]	**Battery Undervoltage (page 180)** .. 40,0 [V]		
Default value	36,0 V	**Alternative config**	NO
Step	0,1 V		
Comm object	9587	**Related applications**	MCB, MGCB, BTB
Description			
Warning threshold for high battery voltage.			

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Battery <> Voltage Delay

Setpoint group	Engine settings	**Related FW**	2.0.0
Range [units]	0 .. 600 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	8383	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **Battery Undervoltage (page 180)** and **Battery Overvoltage (page 180)** protection.			

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Group: Communication Settings

Subgroup: Controller CAN Address

Controller Address

Setpoint group	Communication Settings	**Related FW**	2.0.0
Range [units]	1 .. 32 [-]		
Default value	1	**Alternative config**	NO
Step	1		
Comm object	24537	**Related applications**	MCB, MGCB, BTB
Description			

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.

> ***Note:*** *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

Setpoint group	Communication Settings	**Related FW**	2.0.0
Range [units]	Direct / MODBUS [-]		
Default value	Direct	**Alternative config**	NO
Step	[-]		
Comm object	24134	**Related applications**	MCB, MGCB, BTB
Description			

Communication protocol switch for on-board RS485.

Direct	InteliConfig communication protocol via serial cable.
MODBUS	MODBUS protocol.

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RS485 Communication Speed

Setpoint group	Communication Settings	**Related FW**	2.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	57600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24135	**Related applications**	MCB, MGCB, BTB
Description			
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. ***Note:*** *Winscope supports only 19200, 38400, 57600 speeds.*			

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RS485 MODBUS Speed

Setpoint group	Communication Settings	**Related FW**	2.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24141	**Related applications**	MCB, MGCB, BTB
Description			
If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here.			

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Group: Bus Right Settings

Subgroup: Bus Right Voltage Limits

Bus Right Overvoltage

Setpoint group	Bus Right Settings	**Related FW**	2.0.0
Range [units]	**Bus Right Undervoltage (page 183)** .. 150 [%]		
Default value	110 %	**Alternative config**	NO
Step	1 % of **Nominal Voltage Ph-Ph (page 177)**		
Comm object	9686	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Right overvoltage. All three phases are checked. Maximum out of three is used.			

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Bus Right Undervoltage

Setpoint group	Bus Right Settings	**Related FW**	2.0.0
Range [units]	50 .. **Bus Right Overvoltage (page 182)** [%]		
Default value	60 %	**Alternative config**	YES
Step	1 % of **Nominal Voltage Ph-Ph (page 177)**		
Comm object	9687	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Right undervoltage. All three phases are checked. Minimum voltage out of three phases is used.			

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Bus Right < > Voltage Delay

Setpoint group	Bus Right Settings	**Related FW**	2.0.0
Range [units]	0,0 .. 600,0 [s]		
Default value	2,0 s	**Alternative config**	YES
Step	0,1 s		
Comm object	9103	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **Bus Right Undervoltage (page 183)** and **Bus Right Overvoltage (page 182)** protection.			

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Bus Right Voltage Unbalance

Setpoint group	Bus Right Settings	**Related FW**	2.0.0
Range [units]	1 .. 150 [%] of **Nominal Voltage Ph-Ph (page 177)**		
Default value	10 %	**Alternative config**	NO
Step	1 % of **Nominal Voltage Ph-Ph (page 177)**		
Comm object	8288	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Right voltage unbalance.			

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Bus Right Voltage Unbalance Delay

Setpoint group	Bus Right Settings	**Related FW**	2.0.0
Range [units]	0,0 .. 60,0 [s]		
Default value	2,0 s	**Alternative config**	NO
Step	0,1 s		
Comm object	8289	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **Bus Right Voltage Unbalance (page 183)** protection.			

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Subgroup: Bus Right Frequency Limits

Bus Right Overfrequency

Setpoint group	Bus Right Settings	**Related FW**	2.0.0
Range [units]	**Bus Right Underfrequency (page 184)** .. 150 [%]		
Default value	102,0 %	**Alternative config**	NO
Step	1,0 % of **Nominal Frequency (page 178)**		
Comm object	9688	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Right overfrequency.			

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Bus Right Underfrequency

Setpoint group	Bus Right Settings	**Related FW**	2.0.0
Range [units]	50 .. **Bus Right Overfrequency (page 184)** [%]		
Default value	98,0 %	**Alternative config**	NO
Step	1,0 % of **Nominal Frequency (page 178)**		
Comm object	9689	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Right underfrequency.			

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Bus Right < > Frequency Delay

Setpoint group	Bus Right Settings	**Related FW**	2.0.0
Range [units]	0,0 .. 60,0 [s]		
Default value	0,5 s	**Alternative config**	NO
Step	0,1 s		
Comm object	8297	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **Bus Right Underfrequency (page 184)** and **Bus Right Overfrequency (page 184)** protection.			

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Group: Bus Left Settings

Subgroup: Overload Protection

Overload BOR

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	0 .. 200 [%]		
Default value	120 %	**Alternative config**	NO
Step	1 % of **Nominal Bus Import (page 175)**		
Comm object	8280	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for Bus Left overload (in % of Nominal power) protection. Protection is BOR.			

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Overload Wrn

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	0 .. 200 [%]		
Default value	120 %	**Alternative config**	NO
Step	1 % of **Nominal Bus Import (page 175)**		
Comm object	9685	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for Bus Left overload (in % of Nominal power) protection. This is only warning.			

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Overload Delay

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	0,0 .. 600,0 [s]		
Default value	5,0 s	**Alternative config**	NO
Step	0,1 s		
Comm object	8281	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **Overload BOR (page 185)** and **Overload Wrn (page 185)** protection.			

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Subgroup: Current Protection

Short Circuit BOR

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	100 .. 500 [%]		
Default value	250 %	**Alternative config**	NO
Step	1 % of **Nominal Current (page 175)**		
Comm object	8282	**Related applications**	MCB, MGCB, BTB
Description			
BOR occurs when current reaches this preset threshold.			

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Short Circuit BOR Delay

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	0,00 .. 10,00 [s]		
Default value	0,04 s	**Alternative config**	YES
Step	0,01 s		
Comm object	9991	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **Short Circuit BOR (page 186)** protection.			

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IDMT Overcurrent

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	1,0 .. 180,0 [s]		
Default value	4,0 s	**Alternative config**	NO
Step	0,1 s		
Comm object	8283	**Related applications**	MCB, MGCB, BTB
Description			

IDMT curve shape selection. IDMT Overcurrent Delay is a reaction time of IDMT protection for 200% overcurrent I_{gen} =2*Nominal Current (page 175)

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 Bus Left current.

Table 8.1 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

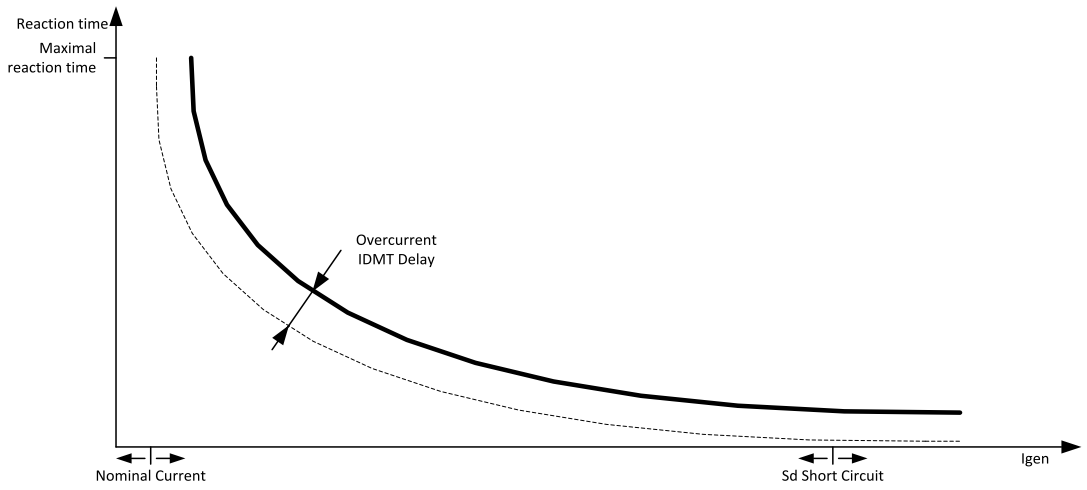

Image 8.1 IDMT Overcurrent Delay

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Current Unbalance

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	1 .. 200 [%] of **Nominal Current (page 175)**		
Default value	50 %	**Alternative config**	NO
Step	1 % of **Nominal Current (page 175)**		
Comm object	8284	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Left current asymmetry (unbalance).			

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Current Unbalance Delay

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	0,0 .. 600,0 [s]		
Default value	5,0 s	**Alternative config**	NO
Step	0,1 s		
Comm object	8285	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **Current Unbalance (page 188)** protection.			

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Subgroup: Bus Left Voltage Limits

Bus Left Overvoltage

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	**Bus Left Undervoltage (page 188)** .. 150 [%]		
Default value	110 %	**Alternative config**	NO
Step	1 % of **Nominal Voltage Ph-Ph (page 177)**		
Comm object	8305	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Left overvoltage. All three phases are checked. Maximum out of three is used.			

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Bus Left Undervoltage

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	50 .. **Bus Left Overvoltage (page 188)** [%]		
Default value	60 %	**Alternative config**	YES
Step	1 % of **Nominal Voltage Ph-Ph (page 177)**		
Comm object	8307	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Left undervoltage. All three phases are checked. Minimum voltage out of three phases is used.			

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Bus Left < > Voltage Delay

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	0,0 .. 600,0 [s]		
Default value	2,0 s	**Alternative config**	YES
Step	0,1 s		
Comm object	8306	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **Bus Left Undervoltage (page 188)** and **Bus Left Overvoltage (page 188)** protection.			

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Bus Left Voltage Unbalance

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	1 .. 150 [%] of **Nominal Voltage Ph-Ph (page 177)**		
Default value	10 %	**Alternative config**	NO
Step	1 % of **Nominal Voltage Ph-Ph (page 177)**		
Comm object	8446	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Left voltage unbalance.			

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Bus Left Voltage Unbalance Delay

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	0,0 .. 60,0 [s]		
Default value	2,0 s	**Alternative config**	NO
Step	0,1 s		
Comm object	8447	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **Bus Left Voltage Unbalance (page 189)** protection.			

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Subgroup: Bus Left Frequency Limits

Bus Left Overfrequency

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	**Bus Left Underfrequency (page 190)** .. 150 [%]		
Default value	102,0 %	**Alternative config**	NO
Step	1,0 % of **Nominal Frequency (page 178)**		
Comm object	8310	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Left overfrequency.			

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Bus Left Underfrequency

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	50 .. **Bus Left Overfrequency (page 189)** [%]		
Default value	98,0 %	**Alternative config**	NO
Step	1,0 % of **Nominal Frequency (page 178)**		
Comm object	8312	**Related applications**	MCB, MGCB, BTB
Description			
Threshold for Bus Left underfrequency.			

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Bus Left < > Frequency Delay

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	0,0 .. 600,0 [s]		
Default value	0,5 s	**Alternative config**	NO
Step	0,1 s		
Comm object	8311	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **Bus Left Underfrequency (page 190)** and **Bus Left Overfrequency (page 189)** protection.			

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Subgroup: Bus Measurement Error

Bus Measurement Error

Setpoint group	Bus Left Settings	**Related FW**	2.0.0
Range [units]	DISABLED / ENABLED		
Default value	DISABLED	**Alternative config**	NO
Step	-		
Comm object	10558	**Related applications**	MCB, MGCB, BTB

Description

Bus measure error is detected when the voltage on controller's bus terminals is out of limits for 20 seconds under these conditions:

MCB application

- MCB (feedback)was closed in AUTO mode.
- Any GCB in power management group (on CAN bus) was closed. The alarm is activated after 20 s, however the MCB closing is blocked immediately for safety reasons.

MGCB application

- MCB and MGCB (feedbacks) were closed in AUTO mode.
- Any GCB in power management group (on CAN bus) was closed. The alarm is activated after 20 s, however the MGCB closing is blocked immediately from safety reasons.

BTB application

- BTB feedback was closed in AUTO mode
- Any GCB in power management group (on CAN bus) was closed. The alarm is activated after 20 s, however the BTB closing is blocked immediately for safety reasons. The GCBs at "left" and "right" sides are evaluated independently

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Group: Power Management

Subgroup: Power Management Control

#Power Management Mode

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	ABS [kW] / REL [%]		
Default value	ABS	**Alternative config**	NO
Step	[-]		
Comm object	9874	**Related applications**	MCB, MGCB
Description			

This setpoint is used to select the **Power management (page 78)** 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 Auto Swap

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	Disabled / Run Hours Equal / Efficient [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	10593	**Related applications**	MCB, MGCB
Description			

This setpoint adjusts priority auto swapping.

Disabled	Optimalization is disabled.
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 **#Run Hours Max Difference (page 200)**).
Efficient	This method changes the priorities (not the setpoints itself) to optimize which gen-sets are running according to their capacities and actual load demand. > **IMPORTANT: This priority swapping function is only for absolute mode of power management (#Power Management Mode (page 192) = ABS).** 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.

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#System Start Delay

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 600 [-]		
Default value	5	**Alternative config**	NO
Step	1		
Comm object	8549	**Related applications**	MCB, MGCB
Description			
This setpoint adjusts the delay of the system activation after the binary input **REMOTE START/STOP (PAGE 433)** has been activated.			

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#System Stop Delay

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 600 [-]		
Default value	30	**Alternative config**	NO
Step	1		
Comm object	8550	**Related applications**	MCB, MGCB
Description			
This setpoint adjusts the delay of the system deactivation after the binary input **REMOTE START/STOP (PAGE 433)** has been deactivated.			

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Subgroup: Load Reserve Set 1

#Starting Load Reserve 1

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. **#Stopping Load Reserve 1 (page 194)** [kW]		
Default value	60 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8489	**Related applications**	MCB, MGCB
Description			

This setpoint is used to adjust the load reserve for start of next gen-set in absolute mode. i.e. **#Power Management Mode (page 192)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 430) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

Note: *See **Power management (page 78)** chapter for more information.*

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#Stopping Load Reserve 1

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	**#Starting Load Reserve 1 (page 193)** .. 32 000 [kW]		
Default value	110 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8491	**Related applications**	MCB, MGCB
Description			

This setpoint is used to adjust the load reserve for stop of next gen-set in absolute mode. i.e. **#Power Management Mode (page 192)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 430) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

Note: *See **Power management (page 78)** chapter for more information.*

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#Starting Rel Load Reserve 1

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. **#Stopping Rel Load Reserve 1 (page 195)** [%]		
Default value	60 %	**Alternative config**	NO
Step	1 %		
Comm object	10648	**Related applications**	MCB, MGCB
Description			

This setpoint is used to adjust the load reserve for start of next gen-set in relative mode. i.e. **#Power Management Mode (page 192)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 430) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

Note: *See **Power management (page 78)** chapter for more information.*

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#Stopping Rel Load Reserve 1

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	**#Starting Rel Load Reserve 1 (page 194)** .. 110 [%]		
Default value	80 %	**Alternative config**	NO
Step	1 %		
Comm object	10652	**Related applications**	MCB, MGCB
Description			

This setpoint is used to adjust the load reserve for stop of next gen-set in relative mode. i.e. **#Power Management Mode (page 192)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 430) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

Note: *See **Power management (page 78)** chapter for more information.*

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Subgroup: Load Reserve Set 2

#Starting Load Reserve 2

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. **#Stopping Load Reserve 2 (page 196)** [kW]		
Default value	410 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8490	**Related applications**	MCB, MGCB
Description			

This setpoint is used to adjust the load reserve for start of next gen-set in absolute mode. i.e. **#Power Management Mode (page 192)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 430) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 78)** chapter for more information.*

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#Stopping Load Reserve 2

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	**#Starting Load Reserve 2 (page 195)** .. 32 000 [kW]		
Default value	460 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8633	**Related applications**	MCB, MGCB
Description			

This setpoint is used to adjust the load reserve for stop of next gen-set in absolute mode. i.e. **#Power Management Mode (page 192)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 430) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 78)** chapter for more information.*

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#Starting Rel Load Reserve 2

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. **#Stopping Rel Load Reserve 2 (page 197)** [%]		
Default value	60 %	**Alternative config**	NO
Step	1 %		
Comm object	10649	**Related applications**	MCB, MGCB
Description			

This setpoint is used to adjust the load reserve for start of next gen-set in relative mode. i.e. **#Power Management Mode (page 192)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 430) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 78)** chapter for more information.*

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#Stopping Rel Load Reserve 2

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	#Starting Rel Load Reserve 2 (page 196) .. 110 [%]		
Default value	80 %	**Alternative config**	NO
Step	1 %		
Comm object	10653	**Related applications**	MCB, MGCB
Description			

This setpoint is used to adjust the load reserve for stop of next gen-set in relative mode. i.e. **#Power Management Mode (page 192)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 430) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 78)** chapter for more information.*

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Subgroup: Minimal Running Power

#Min Run Power

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 65 000 [kW]		
Default value	210 kw	**Alternative config**	NO
Step	1 kW		
Comm object	9584	**Related applications**	MCB, MGCB
Description			

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 **Min Run Power Active (page 430)**), 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.

Note: *Logical binary input **Min Run Power Active (page 430))** needs to be activated on all gen-sets in the same time.*

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Subgroup: Start/Stop Timing

#Next Engine Start Delay

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 3 600 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	8492	**Related applications**	MCB, MGCB
Description			
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

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 3 600 [s]		
Default value	20 s	**Alternative config**	NO
Step	1 s		
Comm object	8494	**Related applications**	MCB, MGCB
Description			
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

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	8495	**Related applications**	MCB, MGCB
Description			
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. ***Note:*** *If there isn't any available gen-set to start, the alarm is not suppressed.* ***Note:*** *This function is not supported in BTB application.*			

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Subgroup: Over Load Next Start Protection

#Overload Next Start Protection

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	14942	**Related applications**	MCB, MGCB
Description			
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 **#Overload Next Start Level (page 199)** right after the delay **#Overload Next Start Delay (page 199)**.			

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#Overload Next Start Level

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 100 [%]		
Default value	80 %	**Alternative config**	NO
Step	1 %		
Comm object	14941	**Related applications**	MCB, MGCB
Description			
Threshold level for **#Overload Next Start Protection (page 199)**.			

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#Overload Next Start Delay

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 5 [s]		
Default value	1 s	**Alternative config**	NO
Step	1 s		
Comm object	8493	**Related applications**	MINT
Description			
Delay for **#Overload Next Start Protection (page 199)**.			

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Subgroup: Run Hours Equalization

#Run Hours Max Difference

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 65 000 [h]		
Default value	100 h	**Alternative config**	NO
Step	1 h		
Comm object	9919	**Related applications**	MCB, MGCB
Description			
This setpoint adjusts the "dead-band" for the running hours equalization function (**#Priority Auto Swap (page 192)** = Run Hours Equal). The priorities are swapped not until the relative engine hours difference is higher than this dead-band.			

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Run Hours Base

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0,0 .. 200000,0 [h]		
Default value	0,0 h	**Alternative config**	NO
Step	0,1 h		
Comm object	10600	**Related applications**	MINT
Description			

Running hours base corrects actual Running hours differences between particular gen-sets.

> **Example:**
> Gen-set 1 actual Running hours = 1000 h.
> Gen-set 2 actual Running hours = 2000 h.
> 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.

Note: *This function is not supported in BTB application.*

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Subgroup: Efficient Mode

#Power Band Change Up Delay

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 3 600 [s]		
Default value	10 s	**Alternative config**	NO
Step	[s]		
Comm object	8896	**Related applications**	MCB, MGCB
Description			
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 **#Priority Auto Swap (page 192)** = Efficient.			

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#Power Band Change Down Delay

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	0 .. 3 600 [s]		
Default value	10 s	**Alternative config**	NO
Step	[s]		
Comm object	10795	**Related applications**	MCB, MGCB
Description			
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 **#Priority Auto Swap (page 192)** = Efficient.			

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Subgroup: Group Settings

Control Group

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	1,2 .. 32 [-]		
Default value	1 s	**Alternative config**	NO
Step	1 s		
Comm object	10589	**Related applications**	MCB, MGCB
Description			
This setpoint selects the control group (to get more information on this function please refer to the chapter **Control groups (page 95)** to which the particular gen-set belongs. If there aren't logical groups at the site, adjust the setpoint to 1. ***Note:*** *This function is not supported in BTB application.*			

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Group Link L

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	1,2 .. 32 [-]		
Default value	1 s	**Alternative config**	NO
Step	1 s		
Comm object	10590	**Related applications**	MCB, MGCB
Description			
If the input **GROUP LINK (PAGE 429)** of this particular controller is used to provide the "group link" information for two Control groups (to get more information refer to the chapter **Control groups (page 95)**), 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.			

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Group Link R

Setpoint group	Power Management	**Related FW**	2.0.0
Range [units]	1,2 .. 32 [-]		
Default value	1 s	**Alternative config**	NO
Step	1 s		
Comm object	10591	**Related applications**	MCB, MGCB
Description			
If the input **GROUP LINK (PAGE 429)** of this particular controller is used to provide the "group link" information for two Control groups (to get more information refer to the chapter **Control groups (page 95)**), 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.			

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Group: Load Control

Subgroup: Regulation Loops

Frequency Gain

Setpoint group	Load Control	**Related FW**	2.0.0
Range [units]	0,0 .. 200,0 [%]		
Default value	10,0 %	**Alternative config**	NO
Step	0,1 %		
Comm object	8715	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint adjusts the gain factor (P-factor) of the frequency control PI loop. ***Note:*** *See the chapter **Regulation loops (page 100)** for more information.*			

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Frequency Int

Setpoint group	Load Control	**Related FW**	2.0.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	8716	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint adjusts the relative integration factor (I-factor) of the frequency control PI loop. ***Note:*** *See the chapter **Regulation loops (page 100)** for more information.*			

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Angle Gain

Setpoint group	Load Control	**Related FW**	2.0.0
Range [units]	0,0 .. 200,0 [%]		
Default value	10,0 %	**Alternative config**	NO
Step	0,1 %		
Comm object	8718	**Related applications**	MCB, MGCB, BTB
Description			

This setpoint is used for adjusting of the gain factor (P-factor) of the phase angle P-control loop.

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.*

Note: *See the chapter **Regulation loops (page 100)** for more information.*

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Group: Voltage/PF Control

Subgroup: Regulation Loops

Voltage Gain

Setpoint group	Voltage/PF Control	**Related FW**	2.0.0
Range [units]	0,0 .. 200,0 [%]		
Default value	10,0 %	**Alternative config**	NO
Step	0,1 %		
Comm object	8501	**Related applications**	MCB, MGCB, BTB
Description			

This setpoint adjusts the gain factor (P-factor) of the voltage control PI loop.

Note: *See the chapter **Regulation loops (page 100)** for more information.*

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Voltage Int

Setpoint group	Voltage/PF Control	**Related FW**	2.0.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	8720	**Related applications**	MCB, MGCB, BTB
Description			

This setpoint adjusts the relative integration factor (I-factor) of the voltage control PI loop.

Note: *See the chapter **Regulation loops (page 100)** for more information.*

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Group: Synchronisation

Synchronization Type

Setpoint group	Synchronisation	**Related FW**	2.0.0
Range [units]	Phase Match / Slip Synchro [-]		
Default value	Phase Match	**Alternative config**	NO
Step	[-]		
Comm object	14802	**Related applications**	MCB, MGCB, BTB

Description

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 **Voltage Window (page 205)** and **Phase Window (page 205)**. When voltage and phase shift are match, **Dwell Time (page 205)** 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 + **Slip Frequency (page 205)** (Mains frequency in SPtM, Bus frequency in MINT application). When this frequency is reached, **Dwell Time (page 205)** 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 **MGCB Latency (page 206)** and **MCB Latency (page 206)**). ***Note:*** *Condition of **Voltage Window (page 205)** has to be also fulfilled.*

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Synchronization Timeout

Setpoint group	Synchronisation	**Related FW**	2.0.0
Range [units]	OFF / 1 .. 1800 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	8657	**Related applications**	MCB, MGCB, BTB

Description

This setpoint adjusts the maximum duration of synchronizing.

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.*

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Voltage Window

Setpoint group	Synchronisation	**Related FW**	2.0.0
Range [units]	0,0 .. 100,0 [%]		
Default value	10,0 %	**Alternative config**	NO
Step	0,1 %		
Comm object	8650	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint adjusts maximum difference between Bus Right and Bus Left voltage in respective phases for synchronization.			

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Phase Window

Setpoint group	Synchronisation	**Related FW**	2.0.0
Range [units]	0 .. 90 [°]		
Default value	10 °	**Alternative config**	NO
Step	1 °		
Comm object	8652	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint adjusts the maximum absolute value of difference between actual phase angle between the Bus Right and Bus Left voltages for synchronization.			

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Dwell Time

Setpoint group	Synchronisation	**Related FW**	2.0.0
Range [units]	0,0 .. 25,0 [s]		
Default value	0,3 s	**Alternative config**	NO
Step	0,1 s		
Comm object	8653	**Related applications**	MCB, MGCB, BTB
Description			
The period of time that the phase angle difference must be within **Phase Window (page 205)** and voltage difference within **Voltage Window (page 205)** before the breaker is closed.			

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Slip Frequency

Setpoint group	Synchronisation	**Related FW**	2.0.0
Range [units]	-0,50 .. 0,50 [Hz]		
Default value	-0,25 Hz	**Alternative config**	NO
Step	0,01 Hz		
Comm object	14798	**Related applications**	MCB, MGCB, BTB
Description			
Slip frequency for slip synchronization (**Synchronization Type (page 204)** = Slip Synchro).			

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Slip Frequency Window

Setpoint group	Synchronisation	**Related FW**	2.0.0
Range [units]	0,01 .. 0,50 [Hz]		
Default value	0,15 Hz	**Alternative config**	NO
Step	0,01 Hz		
Comm object	14799	**Related applications**	MCB, MGCB, BTB
Description			
Window of slip frequency for slip synchronization (**Synchronization Type (page 204)** = Slip Synchro).			

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MGCB Latency

Setpoint group	Synchronisation	**Related FW**	2.0.0
Range [units]	20 .. 1 000 [ms]		
Default value	80 ms	**Alternative config**	NO
Step	1 ms		
Comm object	14800	**Related applications**	MCB, MGCB, BTB
Description			
Latency of MGCB. > **IMPORTANT: This setpoint is enable, when Synchronization Type (page 204) has Split Synchro value**			

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MCB Latency

Setpoint group	Synchronisation	**Related FW**	2.0.0
Range [units]	20 .. 1 000 [ms]		
Default value	80 ms	**Alternative config**	NO
Step	1 ms		
Comm object	14801	**Related applications**	MCB, MGCB, BTB
Description			
Latency of MCB. > **IMPORTANT: This setpoint is enable, when Synchronization Type (page 204) has Split Synchro value**			

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Group: General Analog Inputs

General Analog Input 1

Analog Protection 1 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9259	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT01 (PAGE 464)**.			
Note: *These setpoints are used only if LAI **AIN PROT01 (PAGE 464)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 1 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9260	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT01 (PAGE 464)**.			
Note: *These setpoints are used only if LAI **AIN PROT01 (PAGE 464)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 1 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9261	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT01 (PAGE 464)**.			
Note: *These setpoints are used only if LAI **AIN PROT01 (PAGE 464)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 1 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	11407	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH01 (PAGE 439)** on. The value is measured from **AIN SWITCH 01 (PAGE 484)** analog input.			

Image 8.2 General analog input 1 switch

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Analog Switch 1 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	11410	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH01 (PAGE 439)** off. The value is measured from **AIN SWITCH 01 (PAGE 484)** analog input.			

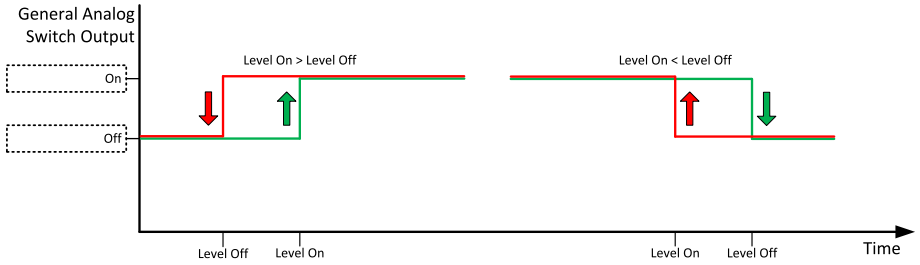

Image 8.3 General analog input 1 switch

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General Analog Input 2

Analog Protection 2 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9262	**Related applications**	MCB, MGCB
Description			
Warning or history threshold level for **AIN PROT02 (PAGE 465)**.			
Note: *These setpoints are used only if LAI **AIN PROT02 (PAGE 465)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 2 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9263	**Related applications**	MCB, MGCB
Description			
Shutdown or BOC threshold level for **AIN PROT02 (PAGE 465)**.			
Note: *These setpoints are used only if LAI **AIN PROT02 (PAGE 465)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 2 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9264	**Related applications**	MCB, MGCB
Description			
Delay for **AIN PROT02 (PAGE 465)**.			
Note: *These setpoints are used only if LAI **AIN PROT02 (PAGE 465)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 2 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	11408	**Related applications**	MCB, MGCB
Description			
Threshold level for switching the binary output **AIN SWITCH 02 (PAGE 484)** on. The value is measured from **AIN SWITCH 02 (PAGE 484)** analog input.			

Image 8.4 General analog input 2 switch

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Analog Switch 2 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	11411	**Related applications**	MCB, MGCB
Description			
Threshold level for switching the binary output **AIN SWITCH 02 (PAGE 484)** off. The value is measured from **AIN SWITCH 02 (PAGE 484)** analog input.			

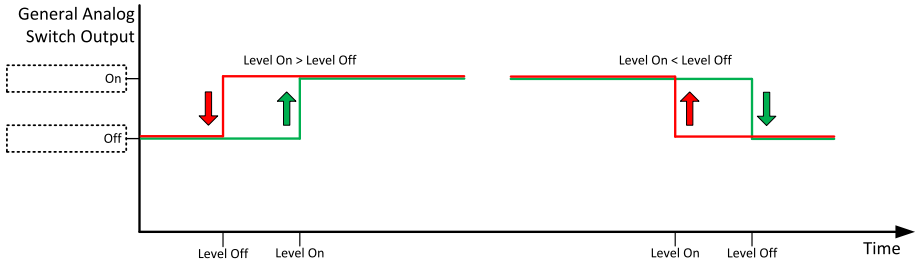

Image 8.5 General analog input 2 switch

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Analog Protection 3 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9265	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT03 (PAGE 466)**.			

Note: *These setpoints are used only if LAI **AIN PROT03 (PAGE 466)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 3 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9266	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT03 (PAGE 466)**.			

Note: *These setpoints are used only if LAI **AIN PROT03 (PAGE 466)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 3 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9267	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT03 (PAGE 466)**.			

Note: *These setpoints are used only if LAI **AIN PROT03 (PAGE 466)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Switch 3 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	11409	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 03 (PAGE 484)** on. The value is measured from **AIN SWITCH 03 (PAGE 484)** analog input.			

Image 8.6 General analog input 3 switch

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Analog Switch 3 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	11412	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 03 (PAGE 484)** off. The value is measured from **AIN SWITCH 03 (PAGE 484)** analog input.			

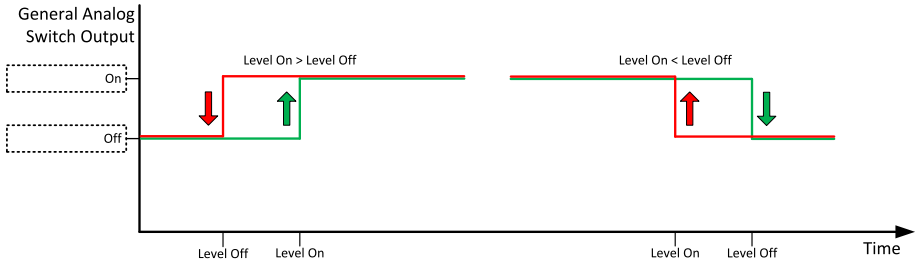

Image 8.7 General analog input 3 switch

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Analog Protection 4 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9268	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT04 (PAGE 467)**.			

Note: *These setpoints are used only if LAI **AIN PROT04 (PAGE 467)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 4 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9269	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT04 (PAGE 467)**.			

Note: *These setpoints are used only if LAI **AIN PROT04 (PAGE 467)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 4 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9270	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT04 (PAGE 467)**.			

Note: *These setpoints are used only if LAI **AIN PROT04 (PAGE 467)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Switch 4 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14385	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 04 (PAGE 485)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.8 General analog input 4 switch

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Analog Switch 4 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14386	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 04 (PAGE 485)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

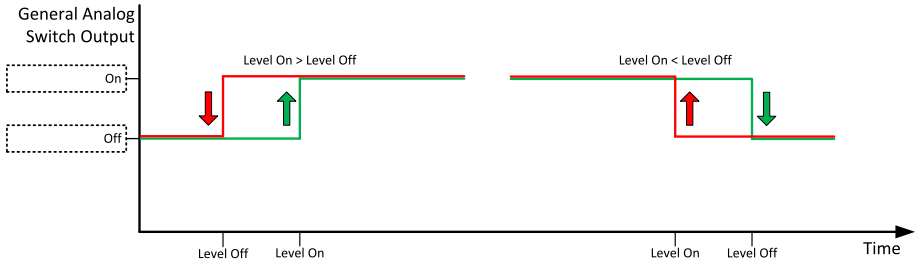

Image 8.9 General analog input 4 switch

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Analog Protection 5 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9271	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT05 (PAGE 468)**.			

Note: *These setpoints are used only if LAI **AIN PROT05 (PAGE 468)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 5 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9272	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT05 (PAGE 468)**.			

Note: *These setpoints are used only if LAI **AIN PROT05 (PAGE 468)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 5 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9273	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT05 (PAGE 468)**.			

Note: *These setpoints are used only if LAI **AIN PROT05 (PAGE 468)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Switch 5 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14963	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 05 (PAGE 485)** on. The value is measured from **AIN SWITCH 05 (PAGE 485)** analog input.			

Image 8.10 General analog input 4 switch

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Analog Switch 5 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14979	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 05 (PAGE 485)** off. The value is measured from **AIN SWITCH 05 (PAGE 485)** analog input.			

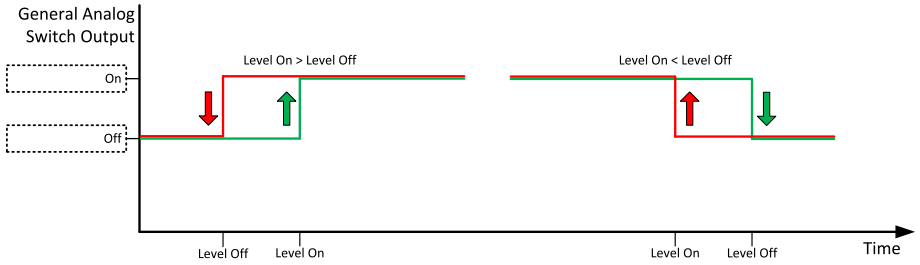

Image 8.11 General analog input 4 switch

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Analog Protection 6 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9274	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT06 (PAGE 469)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT06 (PAGE 469)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 6 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9275	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT06 (PAGE 469)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT06 (PAGE 469)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 6 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9276	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT06 (PAGE 469)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT06 (PAGE 469)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 6 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14964	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 06 (PAGE 485)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.12 General analog input 4 switch

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Analog Switch 6 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14980	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 06 (PAGE 485)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

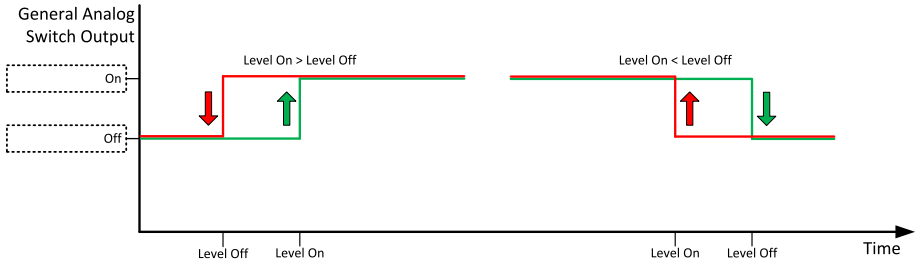

Image 8.13 General analog input 4 switch

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Analog Protection 7 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9277	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT07 (PAGE 470)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT07 (PAGE 470)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 7 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9278	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT07 (PAGE 470)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT07 (PAGE 470)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 7 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9279	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT07 (PAGE 470)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT07 (PAGE 470)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 7 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14965	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 07 (PAGE 486)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.14 General analog input 4 switch

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Analog Switch 7 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14981	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 07 (PAGE 486)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

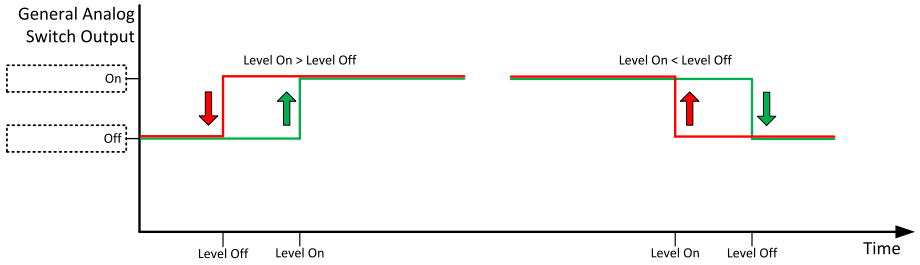

Image 8.15 General analog input 4 switch

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Analog Protection 8 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9280	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT08 (PAGE 471)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT08 (PAGE 471)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 8 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9281	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT08 (PAGE 471)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT08 (PAGE 471)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 8 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9282	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT08 (PAGE 471)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT08 (PAGE 471)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 8 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14966	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 08 (PAGE 486)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.16 General analog input 4 switch

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Analog Switch 8 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14982	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 08 (PAGE 486)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

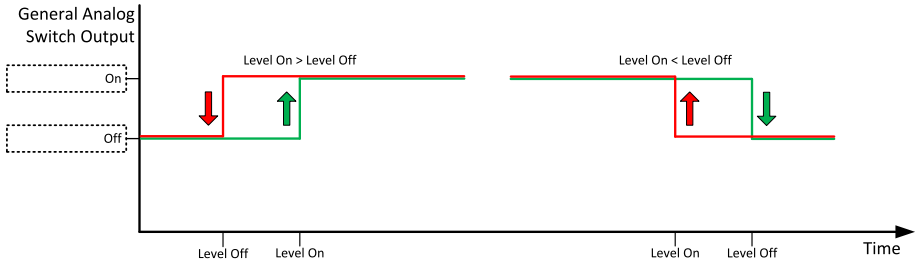

Image 8.17 General analog input 4 switch

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Analog Protection 9 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9283	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT09 (PAGE 472)**.			

Note: *These setpoints are used only if LAI **AIN PROT09 (PAGE 472)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 9 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9284	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT09 (PAGE 472)**.			

Note: *These setpoints are used only if LAI **AIN PROT09 (PAGE 472)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 9 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9285	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT09 (PAGE 472)**.			

Note: *These setpoints are used only if LAI **AIN PROT09 (PAGE 472)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Switch 9 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14967	**Related applications**	MCB, MGCB, BTB
Description			

Threshold level for switching the binary output **AIN SWITCH 09 (PAGE 486)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

Image 8.18 General analog input 4 switch

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Analog Switch 9 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14983	**Related applications**	MCB, MGCB, BTB
Description			

Threshold level for switching the binary output **AIN SWITCH 09 (PAGE 486)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

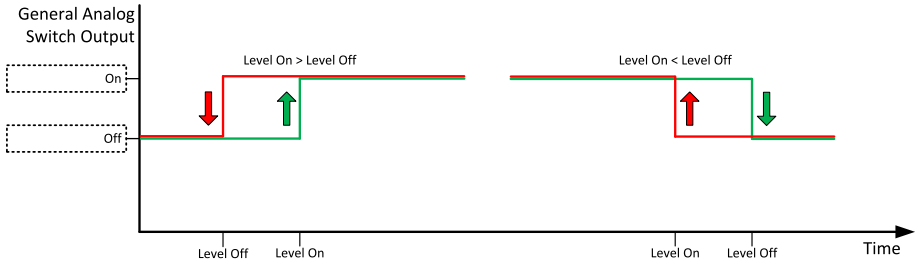

Image 8.19 General analog input 4 switch

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Analog Protection 10 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9286	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT10 (PAGE 473)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT10 (PAGE 473)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 10 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9287	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT10 (PAGE 473)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT10 (PAGE 473)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 10 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9288	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT10 (PAGE 473)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT10 (PAGE 473)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 10 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14968	**Related applications**	MCB, MGCB, BTB
Description			

Threshold level for switching the binary output **AIN SWITCH 10 (PAGE 487)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

Image 8.20 General analog input 4 switch

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Analog Switch 10 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14984	**Related applications**	MCB, MGCB, BTB
Description			

Threshold level for switching the binary output **AIN SWITCH 10 (PAGE 487)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

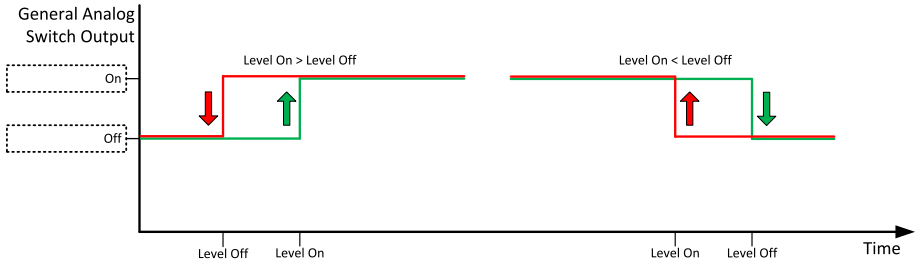

Image 8.21 General analog input 4 switch

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Analog Protection 11 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9289	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT11 (PAGE 474)**.			

Note: *These setpoints are used only if LAI **AIN PROT11 (PAGE 474)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 11 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9290	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT11 (PAGE 474)**.			

Note: *These setpoints are used only if LAI **AIN PROT11 (PAGE 474)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 11 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9291	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT11 (PAGE 474)**.			

Note: *These setpoints are used only if LAI **AIN PROT11 (PAGE 474)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Switch 11 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14969	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 11 (PAGE 487)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.22 General analog input 4 switch

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Analog Switch 11 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14985	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 11 (PAGE 487)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

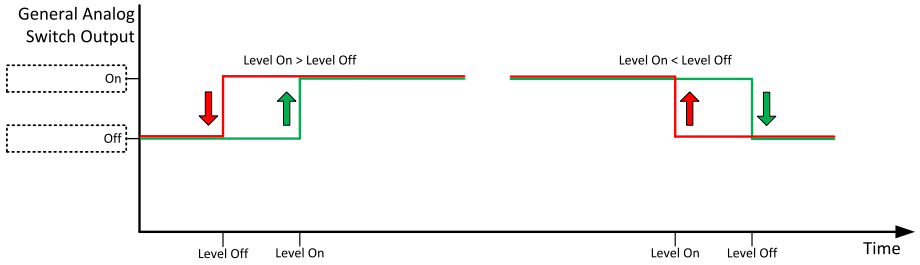

Image 8.23 General analog input 4 switch

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Analog Protection 12 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9292	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT12 (PAGE 475)**.			
Note: *These setpoints are used only if LAI **AIN PROT12 (PAGE 475)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 12 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9293	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT12 (PAGE 475)**.			
Note: *These setpoints are used only if LAI **AIN PROT12 (PAGE 475)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 12 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9294	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT12 (PAGE 475)**.			
Note: *These setpoints are used only if LAI **AIN PROT12 (PAGE 475)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 12 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14970	**Related applications**	MCB, MGCB, BTB
Description			

Threshold level for switching the binary output **AIN SWITCH 12 (PAGE 487)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

Image 8.24 General analog input 4 switch

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Analog Switch 12 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14986	**Related applications**	MCB, MGCB, BTB
Description			

Threshold level for switching the binary output **AIN SWITCH 12 (PAGE 487)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

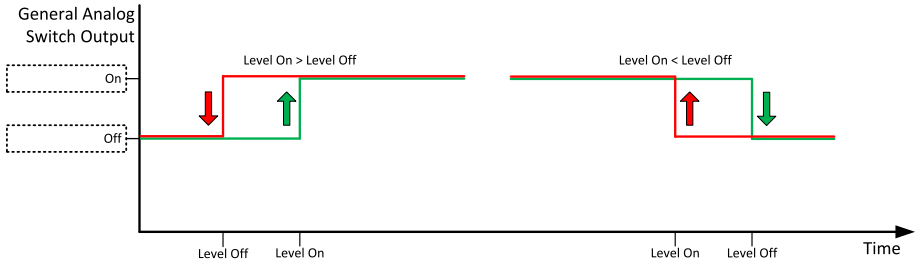

Image 8.25 General analog input 4 switch

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General Analog Input 13

Analog Protection 13 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9295	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT13 (PAGE 476)**.			
Note: *These setpoints are used only if LAI **AIN PROT13 (PAGE 476)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 13 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9296	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT13 (PAGE 476)**.			
Note: *These setpoints are used only if LAI **AIN PROT13 (PAGE 476)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 13 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9297	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT13 (PAGE 476)**.			
Note: *These setpoints are used only if LAI **AIN PROT13 (PAGE 476)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 13 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14971	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 13 (PAGE 488)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.26 General analog input 4 switch

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Analog Switch 13 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14987	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 13 (PAGE 488)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

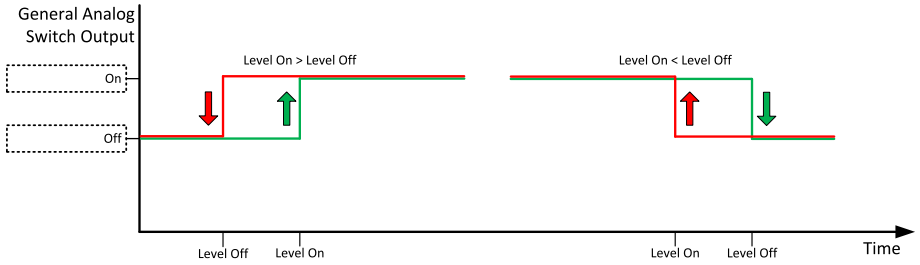

Image 8.27 General analog input 4 switch

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Analog Protection 14 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9298	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT14 (PAGE 477)**.			
Note: *These setpoints are used only if LAI **AIN PROT14 (PAGE 477)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 14 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9299	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT14 (PAGE 477)**.			
Note: *These setpoints are used only if LAI **AIN PROT14 (PAGE 477)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 14 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9300	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT14 (PAGE 477)**.			
Note: *These setpoints are used only if LAI **AIN PROT14 (PAGE 477)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 14 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14972	**Related applications**	MCB, MGCB, BTB
Description			

Threshold level for switching the binary output **AIN SWITCH 14 (PAGE 488)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

Image 8.28 General analog input 4 switch

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Analog Switch 14 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14988	**Related applications**	MCB, MGCB, BTB
Description			

Threshold level for switching the binary output **AIN SWITCH 14 (PAGE 488)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

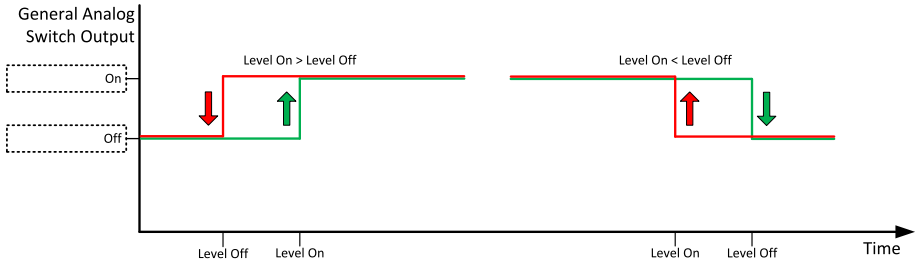

Image 8.29 General analog input 4 switch

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Analog Protection 15 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9301	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT15 (PAGE 478)**.			

Note: *These setpoints are used only if LAI **AIN PROT15 (PAGE 478)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 15 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9302	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT15 (PAGE 478)**.			

Note: *These setpoints are used only if LAI **AIN PROT15 (PAGE 478)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Protection 15 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9303	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT15 (PAGE 478)**.			

Note: *These setpoints are used only if LAI **AIN PROT15 (PAGE 478)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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Analog Switch 15 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14973	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 15 (PAGE 488)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.30 General analog input 4 switch

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Analog Switch 15 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14989	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 15 (PAGE 488)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

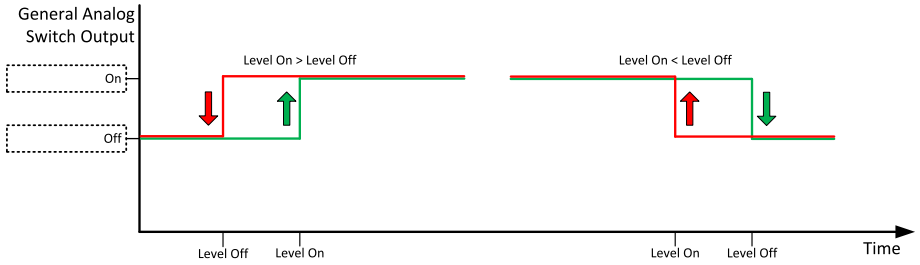

Image 8.31 General analog input 4 switch

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Analog Protection 16 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9304	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT16 (PAGE 479)**.			
Note: *These setpoints are used only if LAI **AIN PROT16 (PAGE 479)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 16 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9305	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT16 (PAGE 479)**.			
Note: *These setpoints are used only if LAI **AIN PROT16 (PAGE 479)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 16 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9306	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT16 (PAGE 479)**.			
Note: *These setpoints are used only if LAI **AIN PROT16 (PAGE 479)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 16 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14974	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 16 (PAGE 489)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.32 General analog input 4 switch

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Analog Switch 16 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14990	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 16 (PAGE 489)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

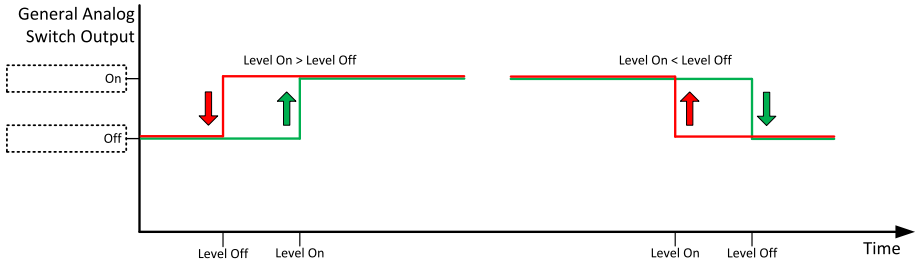

Image 8.33 General analog input 4 switch

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Analog Protection 17 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9307	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT17 (PAGE 480)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT17 (PAGE 480)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 17 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9308	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT17 (PAGE 480)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT17 (PAGE 480)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Protection 17 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9309	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT17 (PAGE 480)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT17 (PAGE 480)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

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Analog Switch 17 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14975	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 17 (PAGE 489)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.34 General analog input 4 switch

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Analog Switch 17 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14991	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 17 (PAGE 489)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

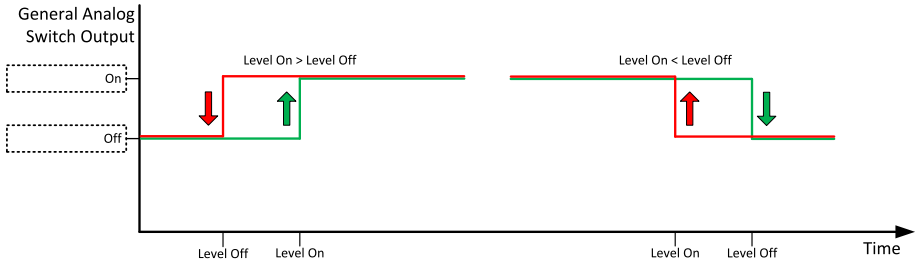

Image 8.35 General analog input 4 switch

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Analog Protection 18 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9310	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT18 (PAGE 481)**.			

Note: *These setpoints are used only if LAI **AIN PROT18 (PAGE 481)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 18 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9311	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT18 (PAGE 481)**.			

Note: *These setpoints are used only if LAI **AIN PROT18 (PAGE 481)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 18 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9312	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT18 (PAGE 481)**.			

Note: *These setpoints are used only if LAI **AIN PROT18 (PAGE 481)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Switch 18 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14976	**Related applications**	MCB, MGCB, BTB
Description			

Threshold level for switching the binary output **AIN SWITCH 18 (PAGE 489)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

Image 8.36 General analog input 4 switch

back to List of setpoints

Analog Switch 18 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14992	**Related applications**	MCB, MGCB, BTB
Description			

Threshold level for switching the binary output **AIN SWITCH 18 (PAGE 489)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

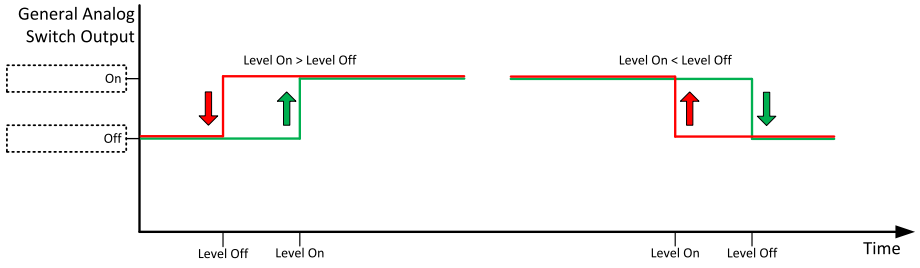

Image 8.37 General analog input 4 switch

back to List of setpoints

Analog Protection 19 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9313	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT19 (PAGE 482)**.			

Note: *These setpoints are used only if LAI **AIN PROT19 (PAGE 482)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 19 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9314	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT19 (PAGE 482)**.			

Note: *These setpoints are used only if LAI **AIN PROT19 (PAGE 482)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 19 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9315	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT19 (PAGE 482)**.			

Note: *These setpoints are used only if LAI **AIN PROT19 (PAGE 482)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Switch 19 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14977	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 19 (PAGE 490)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.38 General analog input 4 switch

back to List of setpoints

Analog Switch 19 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14993	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 19 (PAGE 490)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

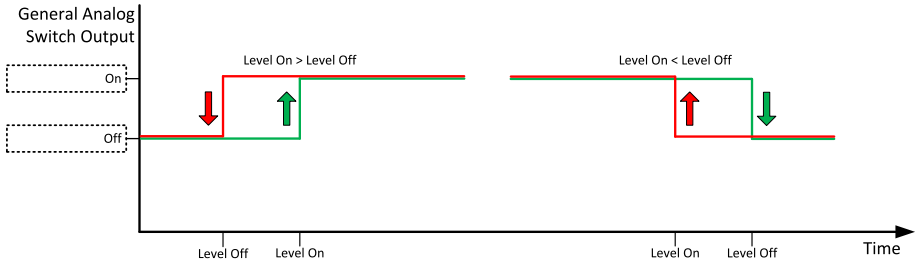

Image 8.39 General analog input 4 switch

back to List of setpoints

Analog Protection 20 Wrn

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9316	**Related applications**	MCB, MGCB, BTB
Description			
Warning or history threshold level for **AIN PROT20 (PAGE 483)**.			

Note: *These setpoints are used only if LAI **AIN PROT20 (PAGE 483)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 20 Sd

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	9317	**Related applications**	MCB, MGCB, BTB
Description			
Shutdown or BOC threshold level for **AIN PROT20 (PAGE 483)**.			

Note: *These setpoints are used only if LAI **AIN PROT20 (PAGE 483)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 20 Delay

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9318	**Related applications**	MCB, MGCB, BTB
Description			
Delay for **AIN PROT20 (PAGE 483)**.			

Note: *These setpoints are used only if LAI **AIN PROT20 (PAGE 483)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Switch 20 On

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14978	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 20 (PAGE 490)** on. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

Image 8.40 General analog input 4 switch

back to List of setpoints

Analog Switch 20 Off

Setpoint group	General Analog Inputs	**Related FW**	2.0.0
Range [units]	the range is defined by analog sensor curve		
Default value	the value is defined by analog sensor curve	**Alternative config**	NO
Step	the step is defined by analog sensor curve		
Comm object	14994	**Related applications**	MCB, MGCB, BTB
Description			
Threshold level for switching the binary output **AIN SWITCH 20 (PAGE 490)** off. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.			

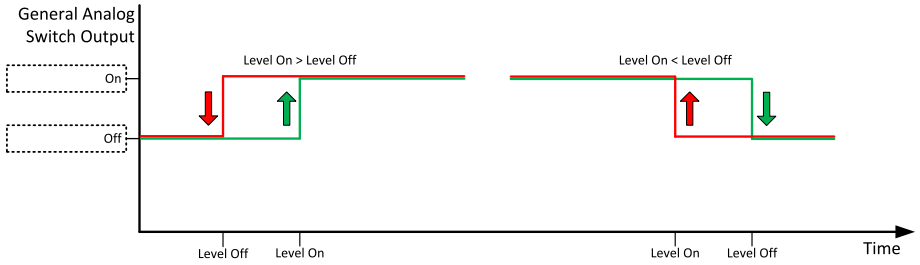

Image 8.41 General analog input 4 switch

back to List of setpoints

Group: Scheduler

Subgroup: Time & Date

Time

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	HH:MM:SS [-]		
Default value	0:0:0	**Alternative config**	NO
Step	[-]		
Comm object	24554	**Related applications**	MCB, MGCB, BTB
Description			
Real time clock adjustment.			

back to List of setpoints

Date

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	DD/MM/YYYY [-]		
Default value	1.1.2015	**Alternative config**	NO
Step	[-]		
Comm object	24553	**Related applications**	MCB, MGCB, BTB
Description			
Actual date adjustment.			

back to List of setpoints

Time Stamp act

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Disabled / Condition / Always [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	10532	**Related applications**	MCB, MGCB, BTB
Description			

The setpoint selects the Time stamp function mode.

Disabled	The function is disabled.
Condition	While the binary input **TIME STAMP ACT (PAGE 433)** is active the Time stamps records are recorded into the history log with period adjusted by setpoint **Time Stamp Period (page 248)**.
Always	The Time stamps records are recorded into the history log with period adjusted by setpoint **Time Stamp Period (page 248)** all the time while the controler is switched on.

back to List of setpoints

Time Stamp Period

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	0 .. 240 [min]		
Default value	60 min	**Alternative config**	NO
Step	1 min		
Comm object	8979	**Related applications**	MCB, MGCB, BTB
Description			

Time interval for periodic history records.

Note: *History record is made only when engine is running.*

back to List of setpoints

#Summer Time Mode

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Disabled / Winter / Summer / Winter - S / Summer - S [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	8727	**Related applications**	MCB, MGCB, BTB
Description			

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.

back to List of setpoints

Subgroup: Timer 1

Timer 1 Setup

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	10969	**Related applications**	MCB, MGCB, BTB
Description			

Related setpoints for timer 1 are:

- Timer 1 Function (page 250)
- Timer 1 Repetition (page 250)
- Timer 1 First Occur. Date (page 251)
- Timer 1 First Occur. Time (page 251)
- Timer 1 Duration (page 251)
- Timer 1 Repeated (page 252)
- Timer 1 Repeat Day (page 254)
- Timer 1 Day (page 254)
- Timer 1 Repeated Day In Week (page 255)
- Timer 1 Repeat Day In Month (page 255)
- Timer 1 Repeat Week In Month (page 255)
- Timer 1 Refresh Period (page 253)
- Timer 1 Weekends (page 254)

back to List of setpoints

Timer 1 Function

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Disable / No Func / TEST / Test OnLd / MFail Blk / Mode OFF [-]		
Default value	Disable	**Alternative config**	NO
Step	[-]		
Comm object	15358	**Related applications**	MCB, MGCB, BTB

Description

It is possible to choose from following timer functions. Binary output **EXERCISE TIMER 1 (PAGE 458)** is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.

> **IMPORTANT: Binary output is activated always when timer should be activated e.g. even when controller is in different mode than AUTO.**

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.

Controller activates timer whenever it is powered up even in period, where timer should be already running.

Disable	The Timer is disabled.
No Func	There is no any other function, only binary output of timer is activated.
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.

back to List of setpoints

Timer 1 Repetition

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB

Description

Defines repetition of **Timer 1 Function (page 250)**.

Off	**Timer 1 Function (page 250)** will not be activated.
Once	**Timer 1 Function (page 250)** will be activated only one time.
Repeated	**Timer 1 Function (page 250)** will be repeatedly activated.

back to List of setpoints

Timer 1 First Occur. Date

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
Date of first occurrence of **Timer 1 Function (page 250)**.			

back to List of setpoints

Timer 1 First Occur. Time

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
Time of first occurrence of **Timer 1 Function (page 250)**.			

back to List of setpoints

Timer 1 Duration

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
Timer 1 Function (page 250) duration time.			

back to List of setpoints

Timer 1 Repeated

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB

Description

Repeated interval of **Timer 1 Function (page 250)**.

Daily	**Timer 1 Function (page 250)** is repeated every day.
Weekly	**Timer 1 Function (page 250)** is repeated every week in chosen days.
Monthly	**Timer 1 Function (page 250)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 1 Function (page 250)** is repeated in adjusted period.

back to List of setpoints

Timer 1 Refresh Period

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB

Description

Refresh period of **Timer 1 Function (page 250)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 1 Repeated (page 252)**.

Daily

Range [units]: 1 .. 1000 [day]. This setpoint adjust that every X day the timer will be activated.

> **Example:** If you have daily repetition and you set this setpoint to 2, then every second day from first occurrence of **Timer 1 Function (page 250)**, the **Timer 1 Function (page 250)** will be activated.

Weekly

Range [units]: 1 .. 60 [week]. This setpoint adjust that every X week the timer will be activated.

> **Example:** If you have weekly repetition and you set this setpoint to 2, then every second week from first occurrence of **Timer 1 Function (page 250)**, the **Timer 1 Function (page 250)** will be activated in selected days adjusted by **Timer 1 Day (page 254)**.

Monthly

Range [units]: 1 .. 12 [month]. This setpoint adjust that every X month the timer will be activated.

> **Example:** If you have monthly repetition and you set this setpoint to 2, then every second month from first occurrence of **Timer 1 Function (page 250)**, the **Timer 1 Function (page 250)** will be activated in selected day of month adjusted by **Timer 1 Repeat Day In Month (page 255)** or in selected days of week of month adjusted by **Timer 1 Day (page 254)** and **Timer 1 Repeat Week In Month (page 255)**.

Short Period

Range [units]: [HH:MM]. This setpoint adjust that every X short period the timer will be activated.

> **Example:** If you have short period repetition and you set this setpoint to 2, then every second minute from first occurrence of **Timer 1 Function (page 250)**, the **Timer 1 Function (page 250)** will be activated.

back to List of setpoints

Timer 1 Weekends

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			

Behavior of **Timer 1 Function (page 250)** on weekends.

Including	**Timer 1 Function (page 250)** counter is running on the weekends and **Timer 1 Function (page 250)** can be active.
Skip	**Timer 1 Function (page 250)** counter is running on the weekends but **Timer 1 Function (page 250)** isn't active.
Postpone	**Timer 1 Function (page 250)** counter isn't running on the weekends and **Timer 1 Function (page 250)** 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.

back to List of setpoints

Timer 1 Day

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			

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.

back to List of setpoints

Timer 1 Repeat Day

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 1 Function (page 250)**.

Repeated Day	Chose one day in month when **Timer 1 Function (page 250)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 1 Function (page 250)** will be activated.

back to List of setpoints

Timer 1 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
Use this setpoint to select the day of week when timer will be activated. ***Note:*** *More day can be selected. Timer will be activated on the day which happened like the first.*			

List of setpoints (page 165)

Timer 1 Repeat Day In Month

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	1..31 [day]		
Default value	0	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
Use this setpoint to chose the day in month when the **Timer 1 Function (page 250)** will be activated.			

back to List of setpoints

Timer 1 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint adjust the week of month in which the **Timer 1 Function (page 250)** will be activated.			

back to List of setpoints

Subgroup: Timer 2

Timer 2 Setup

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	10970	**Related applications**	MCB, MGCB, BTB
Description			

Related setpoints for timer 2 are:

- Timer 2 Function (page 257)
- Timer 2 Repetition (page 257)
- Timer 2 First Occur. Date (page 258)
- Timer 2 First Occur. Time (page 258)
- Timer 2 Duration (page 258)
- Timer 2 Repeated (page 259)
- Timer 2 Repeat Day (page 261)
- Timer 2 Day (page 261)
- Timer 2 Repeated Day In Week (page 262)
- Timer 2 Repeat Day In Month (page 262)
- Timer 2 Repeat Week In Month (page 262)
- Timer 2 Refresh Period (page 260)
- Timer 2 Weekends (page 261)

back to List of setpoints

Timer 2 Function

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Disable / No Func / TEST / Test OnLd / MFail Blk / Mode OFF [-]		
Default value	No Func	**Alternative config**	NO
Step	[-]		
Comm object	15359	**Related applications**	MCB, MGCB, BTB

Description

It is possible to choose from following Timer functions. Binary output **EXERCISE TIMER 2 (PAGE 458)** is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.

> **IMPORTANT: Binary output is activated always when timer should be activated e.g. even when controller is in different mode than AUTO.**

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.

Controller activates timer whenever it is powered up even in period, where timer should be already running.

Disable	The Timer is disabled.
No Func	There is no any other function, only binary output of timer is activated.
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.

back to List of setpoints

Timer 2 Repetition

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB

Description

Defines repetition of **Timer 2 Function (page 257)**.

Off	**Timer 2 Function (page 257)** will not be activated.
Once	**Timer 2 Function (page 257)** will be activated only one time.
Repeated	**Timer 2 Function (page 257)** will be repeatedly activated.

List of setpoints (page 165)

Timer 2 First Occur. Date

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
Date of first occurrence of**Timer 2 Function (page 257)**.			

back to List of setpoints

Timer 2 First Occur. Time

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
Time of first occurrence of **Timer 2 Function (page 257)**.			

back to List of setpoints

Timer 2 Duration

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
Timer 2 Function (page 257) duration time.			

back to List of setpoints

Timer 2 Repeated

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			

Repeated interval of **Timer 2 Function (page 257)**.

Daily	**Timer 2 Function (page 257)** is repeated every day.
Weekly	**Timer 2 Function (page 257)** is repeated every week in chosen days.
Monthly	**Timer 2 Function (page 257)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 2 Function (page 257)** is repeated in adjusted period.

List of setpoints (page 165)

Timer 2 Refresh Period

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB

Description

Refresh period of **Timer 2 Function (page 257)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 2 Repeated (page 259)**.

Daily

Range [units]: 1 .. 1000 [day]. This setpoint adjust that every X day the timer will be activated.

> **Example:** If you have daily repetition and you set this setpoint to 2, then every second day from first occurrence of **Timer 2 Function (page 257)**, the **Timer 2 Function (page 257)** will be activated.

Weekly

Range [units]: 1 .. 60 [week]. This setpoint adjust that every X week the timer will be activated.

> **Example:** If you have weekly repetition and you set this setpoint to 2, then every second week from first occurrence of **Timer 2 Function (page 257)**, the **Timer 2 Function (page 257)** will be activated in selected days adjusted by **Timer 2 Day (page 261)**.

Monthly

Range [units]: 1 .. 12 [month]. This setpoint adjust that every X month the timer will be activated.

> **Example:** If you have monthly repetition and you set this setpoint to 2, then every second month from first occurrence of **Timer 2 Function (page 257)**, the **Timer 2 Function (page 257)** will be activated in selected day of month adjusted by **Timer 2 Repeat Day In Month (page 262)** or in selected days of week of month adjusted by **Timer 2 Day (page 261)** and **Timer 2 Repeat Week In Month (page 262)**.

Short Period

Range [units]: [HH:MM]. This setpoint adjust that every X short period the timer will be activated.

> **Example:** If you have short period repetition and you set this setpoint to 2, then every second minute from first occurrence of **Timer 2 Function (page 257)**, the **Timer 2 Function (page 257)** will be activated.

back to List of setpoints

Timer 2 Weekends

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			

Behavior of **Timer 2 Function (page 257)** on weekends.

Including	**Timer 2 Function (page 257)** counter is running on the weekends and **Timer 2 Function (page 257)** can be active.
Skip	**Timer 2 Function (page 257)** counter is running on the weekends but **Timer 2 Function (page 257)** isn't active.
Postpone	**Timer 2 Function (page 257)** counter isn't running on the weekends and **Timer 2 Function (page 257)** 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

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			

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

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 2 Function (page 257)**.

Repeated Day	Chose one day in month when **Timer 2 Function (page 257)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 2 Function (page 257)** will be activated.

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Timer 2 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
Use this setpoint to select the day of week when timer will be activated. ***Note:*** *More day can be selected. Timer will be activated on the day which happened like the first.*			

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Timer 2 Repeat Day In Month

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	1..31 [day]		
Default value	0	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
Use this setpoint to chose the day in month when the **Timer 2 Function (page 257)** will be activated.			

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Timer 2 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	2.0.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint adjust the week of month in which the **Timer 2 Function (page 257)** will be activated.			

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Group: Plug-In Modules

Slot A

Setpoint group	Plug-In Modules	**Related FW**	2.0.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	24280	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enable or disable module in slot A.			

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Slot B

Setpoint group	Plug-In Modules	**Related FW**	2.0.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	24279	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enable or disable module in slot B.			

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Group: CM-RS232-485

COM1 Mode

Setpoint group	CM-RS232-485	**Related FW**	2.0.0
Range [units]	Direct / MODBUS [-]		
Default value	Direct	**Alternative config**	NO
Step	[-]		
Comm object	24522	**Related applications**	MCB, MGCB, BTB
Description			
Communication protocol switch for the COM1 channel.			
Direct	InteliConfig communication protocol via serial cable.		
MODBUS	MODBUS protocol.		

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COM1 Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	2.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24341	**Related applications**	MCB, MGCB, BTB
Description			
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.			
Note: *Winscope supports only 19200, 38400, 57600 speeds.*			

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COM1 MODBUS Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	2.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24477	**Related applications**	MCB, MGCB, BTB
Description			
If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here.			

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COM2 Mode

Setpoint group	CM-RS232-485	**Related FW**	2.0.0
Range [units]	Direct / MODBUS [-]		
Default value	Direct	**Alternative config**	NO
Step	[-]		
Comm object	24451	**Related applications**	MCB, MGCB, BTB
Description			
Communication protocol switch for the COM2 channel.			
Direct	InteliConfig communication protocol via serial cable.		
MODBUS	MODBUS protocol.		

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COM2 Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	2.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24340	**Related applications**	MCB, MGCB, BTB
Description			
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.			
Note: *Winscope supports only 19200, 38400, 57600 speeds.*			

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COM2 MODBUS Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	2.0.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24420	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	Email+SMS / SMS Only [-]		
Default value	Email+SMS	**Alternative config**	NO
Step	[-]		
Comm object	24315	**Related applications**	MCB, MGCB, BTB
Description			

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 **APN Name (page 275)** has to be adjusted.
SMS Only	Only SMS are sent. Internet-enabled SIM card is not required.

> **IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.**

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APN Name

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24363	**Related applications**	MCB, MGCB, BTB
Description			
APN (Access Point Name) of the GPRS/4G network, provided by GSM operator.			

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APN User Name

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24361	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24360	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24298	**Related applications**	MCB, MGCB, BTB
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

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Email Address 2

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24297	**Related applications**	MCB, MGCB, BTB
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

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Email Address 3

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24145	**Related applications**	MCB, MGCB, BTB
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

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Email Address 4

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24144	**Related applications**	MCB, MGCB, BTB
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

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Message Language

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	[-]		
Default value	English	**Alternative config**	NO
Step	[-]		
Comm object	24299	**Related applications**	MCB, MGCB, BTB
Description			
Use this setpoint to set the language of SMS and e-mail. ***Note:*** *Numbers correspond with languages in language list. See the chapter for* ***Language selection (page 72)*** *more information.* This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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SMTP User Name

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24313	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24312	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	airgate.comap.cz:9925	**Alternative config**	NO
Step	[-]		
Comm object	24311	**Related applications**	MCB, MGCB, BTB
Description			

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.

> ***Note:*** *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.*

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SMTP Sender Address

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24310	**Related applications**	MCB, MGCB, BTB
Description			

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.

> ***Note:*** *It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.*

> **IMPORTANT: This item is obligatory when emails are configured.**

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Time Zone

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Alternative config**	NO
Step	[-]		
Comm object	24366	**Related applications**	MCB, MGCB, BTB
Description			

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.

Note: *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.*

Note: *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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Event Message

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10926	**Related applications**	MCB, MGCB, BTB
Description			

This setpoint enables or disables Event Messages.

This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.

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Wrn Message

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8482	**Related applications**	MCB, MGCB, BTB
Description			

This setpoint enables or disables Wrn Messages.

This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.

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BOC Message

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10566	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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Sd Messages

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8484	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enables or disables Sd Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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Telephone Number 1

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24296	**Related applications**	MCB, MGCB, BTB
Description			

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.

> **IMPORTANT: Telephone number has to be entered without spaces.**

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Telephone Number 2

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24295	**Related applications**	MCB, MGCB, BTB
Description			

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.

> **IMPORTANT: Telephone number has to be entered without spaces.**

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Telephone Number 3

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24143	**Related applications**	MCB, MGCB, BTB
Description			

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.

> **IMPORTANT: Telephone number has to be entered without spaces.**

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Telephone Number 4

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24142	**Related applications**	MCB, MGCB, BTB
Description			

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.

> **IMPORTANT: Telephone number has to be entered without spaces.**

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DNS IP Address

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	Valid IP address [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24314	**Related applications**	MCB, MGCB, BTB
Description			
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.			

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AirGate Connection

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	24273	**Related applications**	MCB, MGCB, BTB
Description			

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 **AirGate Address (page 293)**.

> **IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.**

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AirGate Address

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	[-]		
Default value	airgate.comap.cz	**Alternative config**	NO
Step	[-]		
Comm object	24364	**Related applications**	MCB, MGCB, BTB
Description			

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.

> ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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ComAp TCP Port

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0 .. 65 535[-]		
Default value	23	**Alternative config**	NO
Step	[-]		
Comm object	24374	**Related applications**	MCB, MGCB, BTB
Description			

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. InteliConfig). 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.

> **IMPORTANT: If AirGate is used, this setpoint has to be adjusted to 23.**

> ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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Group: CM-4G-GPS

Mode

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	Email+SMS / SMS Only [-]		
Default value	Email+SMS	**Alternative config**	NO
Step	[-]		
Comm object	24315	**Related applications**	MCB, MGCB, BTB
Description			

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 **APN Name (page 275)** has to be adjusted.
SMS Only	Only SMS are sent. Internet-enabled SIM card is not required.

> **IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.**

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Required Connection Type

Setpoint group	CM-4G-GPS	**Related FW**	2.0.0
Range [units]	2G/3G/4G/Automatic [-]		
Default value	Automatic	**Alternative config**	NO
Step	[-]		
Comm object	24132	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint adjusts preferred connection type of CM-4G-GPS module.			

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APN Name

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24363	**Related applications**	MCB, MGCB, BTB
Description			
APN (Access Point Name) of the GPRS/4G network, provided by GSM operator.			

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APN User Name

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24361	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24360	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24298	**Related applications**	MCB, MGCB, BTB
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

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Email Address 2

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24297	**Related applications**	MCB, MGCB, BTB
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

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Email Address 3

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24145	**Related applications**	MCB, MGCB, BTB
Description			

Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send.

Note: *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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Email Address 4

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24144	**Related applications**	MCB, MGCB, BTB
Description			

Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send.

Note: *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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Message Language

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	[-]		
Default value	English	**Alternative config**	NO
Step	[-]		
Comm object	24299	**Related applications**	MCB, MGCB, BTB
Description			

Use this setpoint to set the language of SMS and e-mail.

Note: *Numbers correspond with languages in language list. See the chapter for* ***Language selection (page 72)*** *more information.*

This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.

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SMTP User Name

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24313	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24312	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	airgate.comap.cz:9925	**Alternative config**	NO
Step	[-]		
Comm object	24311	**Related applications**	MCB, MGCB, BTB
Description			

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.

> ***Note:*** *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.*

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SMTP Sender Address

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24310	**Related applications**	MCB, MGCB, BTB
Description			

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.

> ***Note:*** *It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.*

> **IMPORTANT: This item is obligatory when emails are configured.**

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Time Zone

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Alternative config**	NO
Step	[-]		
Comm object	24366	**Related applications**	MCB, MGCB, BTB
Description			

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.

> ***Note:*** *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.*

> ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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Event Message

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10926	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enables or disables Event Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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Wrn Message

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8482	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enables or disables Wrn Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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BOC Message

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10566	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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Sd Messages

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8484	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enables or disables Sd Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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Telephone Number 1

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24296	**Related applications**	MCB, MGCB, BTB
Description			
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. **IMPORTANT: Telephone number has to be entered without spaces.**			

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Telephone Number 2

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24295	**Related applications**	MCB, MGCB, BTB
Description			
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. **IMPORTANT: Telephone number has to be entered without spaces.**			

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Telephone Number 3

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24143	**Related applications**	MCB, MGCB, BTB
Description			

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.

> **IMPORTANT: Telephone number has to be entered without spaces.**

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Telephone Number 4

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24142	**Related applications**	MCB, MGCB, BTB
Description			

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.

> **IMPORTANT: Telephone number has to be entered without spaces.**

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AirGate Connection

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	2.0.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	24273	**Related applications**	MCB, MGCB, BTB
Description			

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 **AirGate Address (page 293)**.

> **IMPORTANT: When this setpoint is changed the controller has to be restarted to apply changes.**

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AirGate Address

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	[-]		
Default value	airgate.comap.cz	**Alternative config**	NO
Step	[-]		
Comm object	24364	**Related applications**	MCB, MGCB, BTB
Description			

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.

> ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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ComAp TCP Port

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0 .. 65 535[-]		
Default value	23	**Alternative config**	NO
Step	[-]		
Comm object	24374	**Related applications**	MCB, MGCB, BTB
Description			

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. InteliConfig). 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.

> **IMPORTANT: If AirGate is used, this setpoint has to be adjusted to 23.**

> ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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Group: CM-Ethernet

Email Address 1

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24298	**Related applications**	MCB, MGCB, BTB
Description			

Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send.

> ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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Email Address 2

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24297	**Related applications**	MCB, MGCB, BTB
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

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Email Address 3

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24145	**Related applications**	MCB, MGCB, BTB
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

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Email Address 4

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24144	**Related applications**	MCB, MGCB, BTB
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

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Message Language

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	[-]		
Default value	English	**Alternative config**	NO
Step	[-]		
Comm object	24299	**Related applications**	MCB, MGCB, BTB
Description			
Use this setpoint to set the language of SMS and e-mail. ***Note:*** *Numbers correspond with languages in language list. See the chapter for* ***Language selection (page 72)*** *more information.* This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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Time Zone

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Alternative config**	NO
Step	[-]		
Comm object	24366	**Related applications**	MCB, MGCB, BTB
Description			
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. ***Note:*** *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.* ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

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Event Message

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10926	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enables or disables Event Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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Wrn Message

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8482	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enables or disables Wrn Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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BOC Message

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10566	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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Sd Messages

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8484	**Related applications**	MCB, MGCB, BTB
Description			
This setpoint enables or disables Sd Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

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SMTP UserName

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24370	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24369	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	airgate.comap.cz:9925	**Alternative config**	NO
Step	[-]		
Comm object	24368	**Related applications**	MCB, MGCB, BTB
Description			

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.

> ***Note:*** *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.*

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SMTP Sender Address

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24367	**Related applications**	MCB, MGCB, BTB
Description			

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.

> ***Note:*** *It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.*

> **IMPORTANT: This item is obligatory when emails are configured.**

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IP Address Mode

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	FIXED / AUTOMATIC [-]		
Default value	AUTOMATIC	**Alternative config**	NO
Step	[-]		
Comm object	24259	**Related applications**	MCB, MGCB, BTB
Description			

The setpoint is used to select the method how the ethernet connection is adjusted.

DISABLED: The Ethernet connection is fixed by means of the setpoints IP Addr, NetMask, GateIP, DNS IP Address.

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).

ENABLED: The Ethernet connection setting is obtained **automatically from the DHCP server**. 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 *000.000.000.000* is copied to the setpoint IP address and the module continues to try to obtain the settings.

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IP Address

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	Valid IP address [-]		
Default value	192.168.1.254	**Alternative config**	NO
Step	[-]		
Comm object	24376	**Related applications**	MCB, MGCB, BTB
Description			
The setpoint is used to select the method how the IP Address is adjusted. If **IP Address Mode (page 289)** 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. If **IP Address Mode (page 289)** is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server.			

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Subnet Mask

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	Valid IP address [-]		
Default value	255.255.255.0	**Alternative config**	NO
Step	[-]		
Comm object	24375	**Related applications**	MCB, MGCB, BTB
Description			
The setpoint is used to select the method how the Subnet Mask is adjusted. If **IP Address Mode (page 289)** is FIXED this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting. If **IP Address Mode (page 289)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.			

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Gateway IP

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	Valid IP address [-]		
Default value	192.168.1.1	**Alternative config**	NO
Step	[-]		
Comm object	24373	**Related applications**	MCB, MGCB, BTB
Description			
The setpoint is used to select the method how the Gateway IP is adjusted. If **IP Address Mode (page 289)** is DISABLE this setpoint is used to adjust the IP address of the gateway of the network segment where the controller is connected. If **IP Address Mode (page 289)** is ENABLED this setpoint is used to display the gateway IP address which has been assigned by the DHCP server. A gateway is a device which connects the respective segment with the other segments and/or Internet.			

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DNS IP Address 1

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Alternative config**	NO
Step	[-]		
Comm object	24362	**Related applications**	MCB, MGCB, BTB
Description			
The setpoint is used to select the method how the DNS Address 1 is adjusted. If **IP Address Mode (page 289)** 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. If **IP Address Mode (page 289)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.			

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DNS IP Address 2

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Alternative config**	NO
Step	[-]		
Comm object	24331	**Related applications**	MCB, MGCB, BTB
Description			
The setpoint is used to select the method how the DNS Address 2 is adjusted. If **IP Address Mode (page 289)** 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. If **IP Address Mode (page 289)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.			

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MODBUS Server

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	DISABLED / ENABLED [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	24337	**Related applications**	MCB, MGCB, BTB
Description			
Enable or disable MODBUS communication via ethernet interface.			

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SNMP Agent

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	24336	**Related applications**	MCB, MGCB, BTB
Description			
Enable or disable SNMP v1 Agent.			

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SNMP RD Community String

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	public	**Alternative config**	NO
Step	[-]		
Comm object	24335	**Related applications**	MCB, MGCB, BTB
Description			
SNMP Community String only for reading.			

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SNMP WR Community String

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	0..31 characters [-]		
Default value	private	**Alternative config**	NO
Step	[-]		
Comm object	24334	**Related applications**	MCB, MGCB, BTB
Description			
SNMP Community String for writing and reading.			

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SNMP Traps IP Address 1

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	Valid IP address [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	24294	**Related applications**	MCB, MGCB, BTB
Description			
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

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	Valid IP address [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	24293	**Related applications**	MCB, MGCB, BTB
Description			
IP address 2 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

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AirGate Connection

Setpoint group	CM-Ethernet	**Related FW**	2.0.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	24365	**Related applications**	MCB, MGCB, BTB
Description			

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 **AirGate Address (page 293)**. Also the standard TCP/IP is enabled.

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AirGate Address

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	[-]		
Default value	airgate.comap.cz	**Alternative config**	NO
Step	[-]		
Comm object	24364	**Related applications**	MCB, MGCB, BTB
Description			

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.

Note: *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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ComAp TCP Port

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	2.0.0
Range [units]	0 .. 65 535[-]		
Default value	23	**Alternative config**	NO
Step	[-]		
Comm object	24374	**Related applications**	MCB, MGCB, BTB
Description			

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. InteliConfig). 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.

> **IMPORTANT: If AirGate is used, this setpoint has to be adjusted to 23.**

Note: *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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Group: Alternate Configuration

Subgroup: Configuration 1

Nominal Frequency 1

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	45 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	9913	**Related applications**	MCB, MGCB, BTB
Description			

Nominal system frequency (usually 50 or 60 Hz).

Note: *This value is used when any other alternate configuration is not active.*

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Nominal Voltage Ph-N 1

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	80 .. 20000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	12052	**Related applications**	MCB, MGCB, BTB
Description			

Nominal system voltage (phase to neutral).

Note: *This value is used when any other alternate configuration is not active.*

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Nominal Voltage Ph-Ph 1

Setpoint group		**Related FW**	2.0.0
Range [units]	80 .. 40000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	12055	**Related applications**	MCB, MGCB, BTB
Description			
Nominal system voltage (phase to phase). ***Note:*** *This value is used when any other alternate configuration is not active.*			

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Nominal Current 1

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	1 .. 10 000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	12049	**Related applications**	MCB, MGCB, BTB
Description			
It is current limit for current protections and means maximal continuous current. ***Note:*** *This value is used when any other alternate configuration is not active.*			

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Connection Type 1

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	Monophase / Splitphase / 3Ph3Wire / High Leg D / 3Ph4Wire[-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	12058	**Related applications**	MCB, MGCB, BTB
Description			

Connection type:

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)
Split Phase	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye

	Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 401)*** *is active.*

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Subgroup: Configuration 2

Nominal Frequency 2

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	45 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	9914	**Related applications**	MCB, MGCB, BTB
Description			
Nominal system frequency (usually 50 or 60 Hz). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 401)*** *is active.*			

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Nominal Voltage Ph-N 2

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	80 .. 20000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	12053	**Related applications**	MCB, MGCB, BTB
Description			
Nominal system voltage (phase to neutral). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 401)*** *is active.*			

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Nominal Voltage Ph-Ph 2

Setpoint group		**Related FW**	2.0.0
Range [units]	80 .. 40000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	12056	**Related applications**	MCB, MGCB, BTB
Description			

Nominal system voltage (phase to phase).

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2*** *(****PAGE 401****) is active.*

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Nominal Current 2

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	1 .. 10000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	12050	**Related applications**	MCB, MGCB, BTB
Description			

It is current limit for current protections and means maximal continuous current.

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2*** *(****PAGE 401****) is active.*

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Connection type 2

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	Monophase / Splitphase / 3Ph3Wire / High Leg D / 3Ph4Wire[-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	12059	**Related applications**	MCB, MGCB, BTB
Description			

Connection type:

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)
Split Phase	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye

	Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 401)*** *is active.*

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Subgroup: Configuration 3

Nominal Frequency 3

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	45 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	15197	**Related applications**	MCB, MGCB, BTB
Description			
Nominal system frequency (usually 50 or 60 Hz). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 401)*** *is active.*			

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Nominal Voltage Ph-N 3

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	80 .. 20 000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	12054	**Related applications**	MCB, MGCB, BTB
Description			
Nominal system voltage (phase to neutral). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 401)*** *is active.*			

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Nominal Voltage Ph-Ph 3

Setpoint group		**Related FW**	2.0.0
Range [units]	80 .. 40 000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	12057	**Related applications**	MCB, MGCB, BTB
Description			

Nominal system voltage (phase to phase).

Note: *This value is used when binary input* ***ALTERNATE CONFIG 3*** *(****PAGE 401****) is active.*

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Nominal Current 3

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	1 .. 10 000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	12051	**Related applications**	MCB, MGCB, BTB
Description			

It is current limit for current protections and means maximal continuous current.

Note: *This value is used when binary input* ***ALTERNATE CONFIG 3*** *(****PAGE 401****) is active.*

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Connection type 3

Setpoint group	Basic settings	**Related FW**	2.0.0
Range [units]	Monophase / Splitphase / 3Ph3Wire / High Leg D / 3Ph4Wire [-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	12060	**Related applications**	MCB, MGCB, BTB
Description			

Connection type:

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)
Split Phase	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye

	Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2*** *(****PAGE 401****) is active.*

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Group: PLC

PLC Setpoint 1

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10440	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

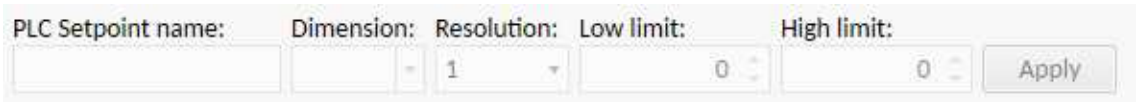

Image 8.42 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10441	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

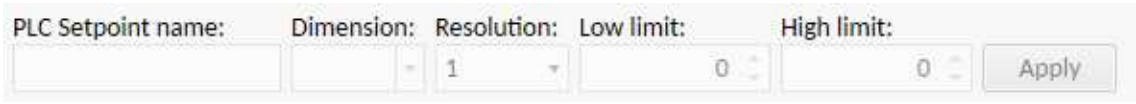

Image 8.43 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10442	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

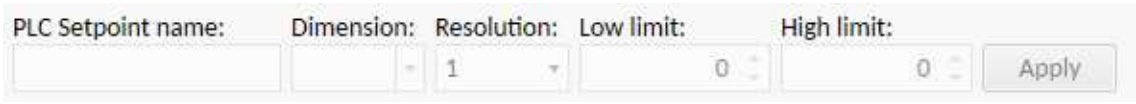

Image 8.44 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10443	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

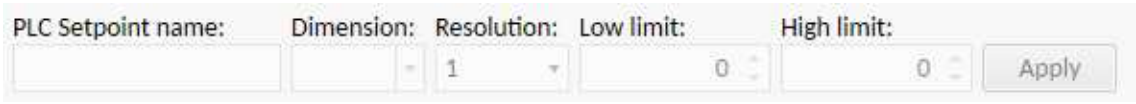

Image 8.45 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10444	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

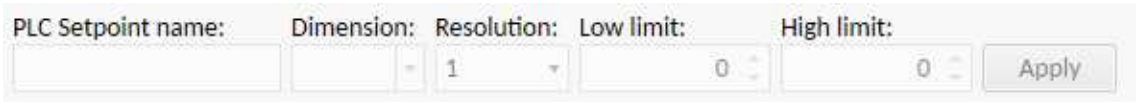

Image 8.46 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10445	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

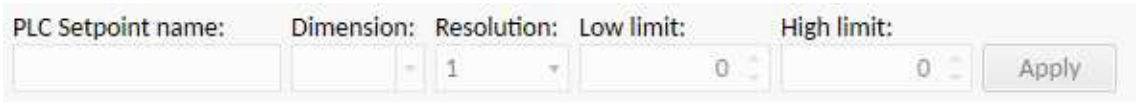

Image 8.47 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10446	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

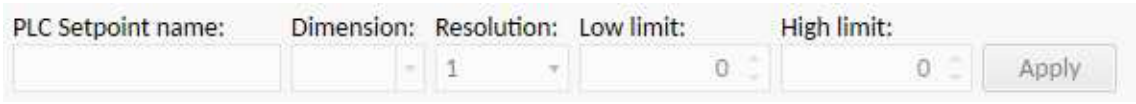

Image 8.48 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10447	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

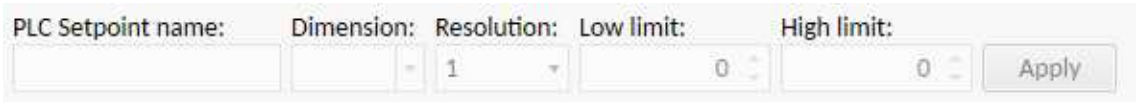

Image 8.49 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10448	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

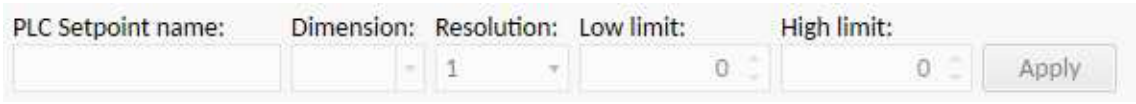

Image 8.50 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10449	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

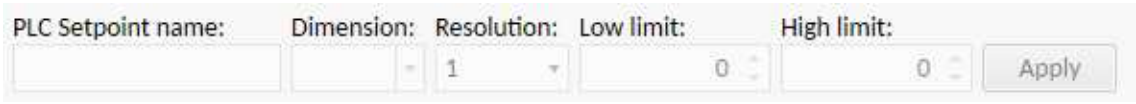

Image 8.51 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10450	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

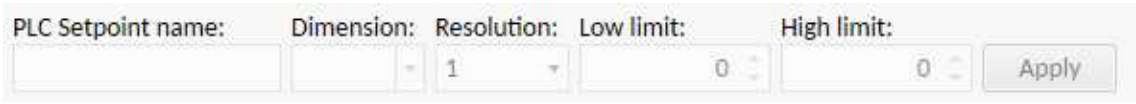

Image 8.52 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10451	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

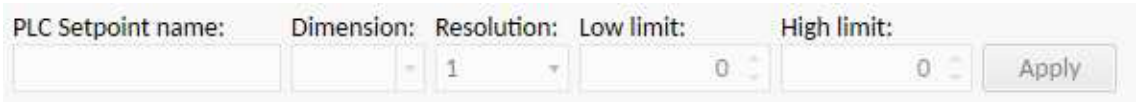

Image 8.53 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10452	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

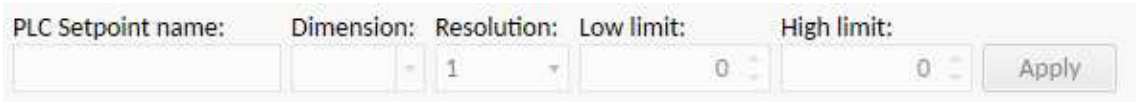

Image 8.54 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10453	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

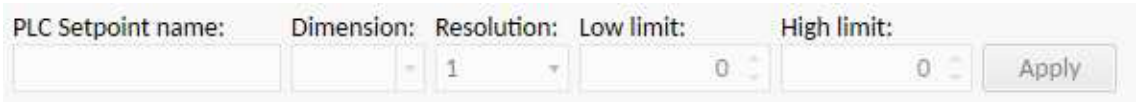

Image 8.55 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10454	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

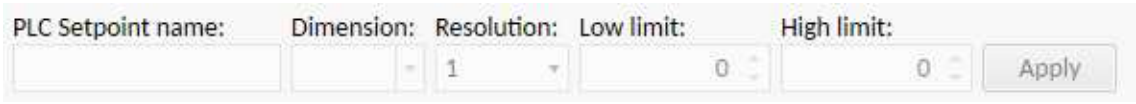

Image 8.56 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10455	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

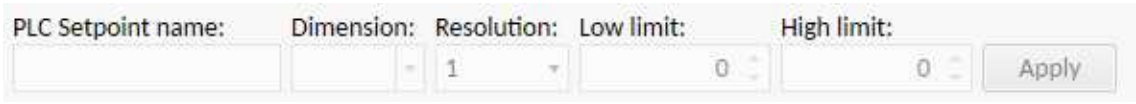

Image 8.57 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10456	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

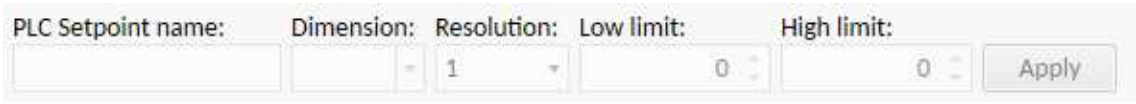

Image 8.58 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10457	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

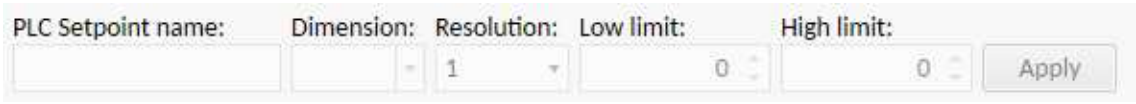

Image 8.59 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10458	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

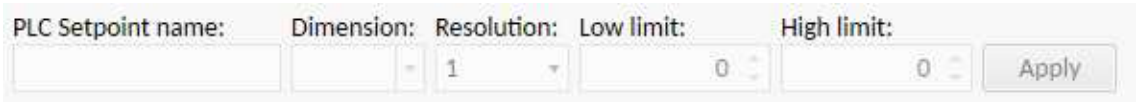

Image 8.60 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10459	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

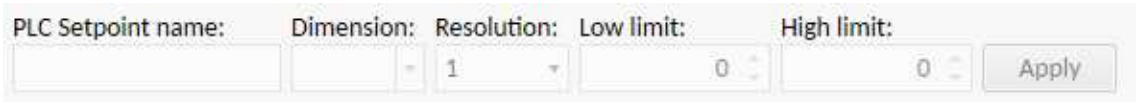

Image 8.61 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10460	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

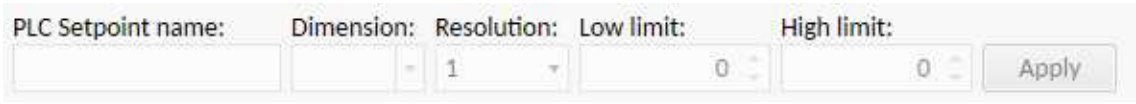

Image 8.62 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10461	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

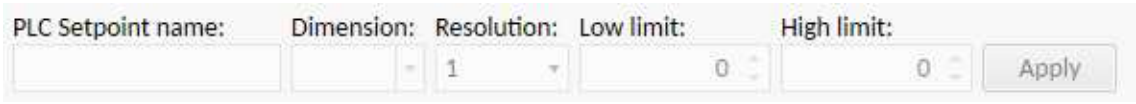

Image 8.63 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10462	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

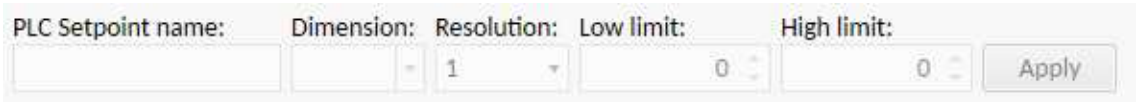

Image 8.64 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10463	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

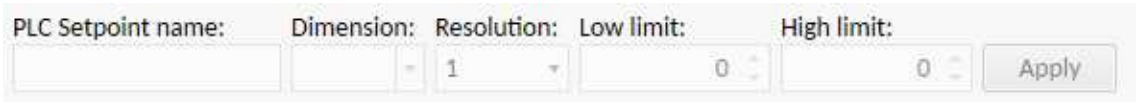

Image 8.65 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10464	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

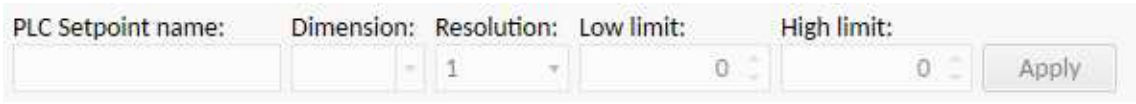

Image 8.66 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10465	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

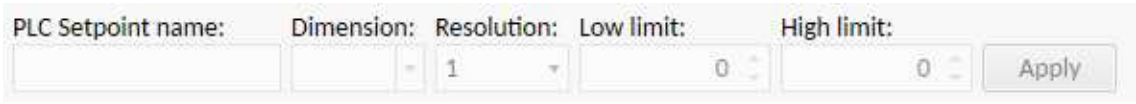

Image 8.67 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10466	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

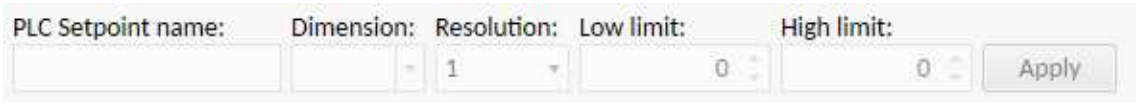

Image 8.68 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10467	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

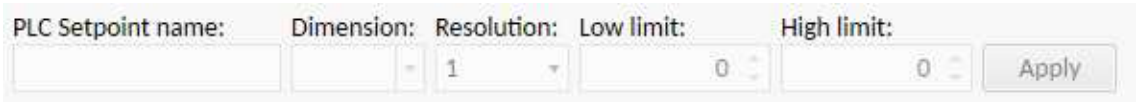

Image 8.69 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10468	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

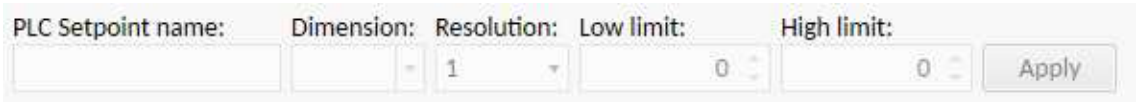

Image 8.70 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10469	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

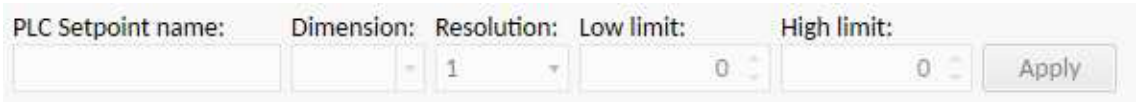

Image 8.71 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10470	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

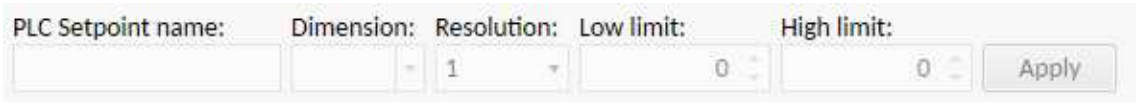

Image 8.72 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10471	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

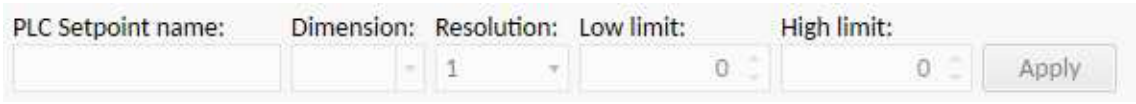

Image 8.73 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10472	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

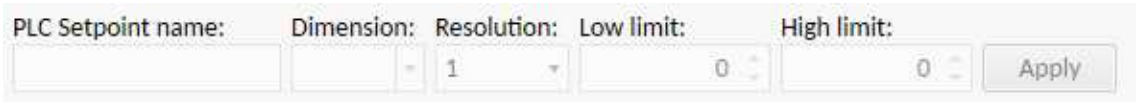

Image 8.74 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10473	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

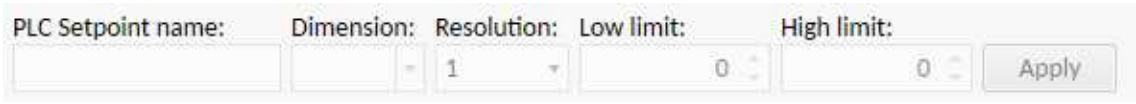

Image 8.75 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10474	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

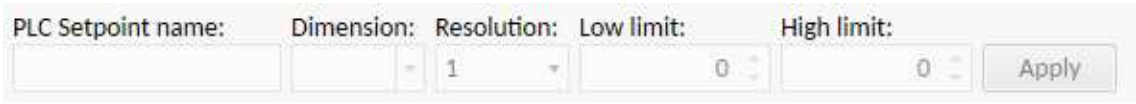

Image 8.76 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10475	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

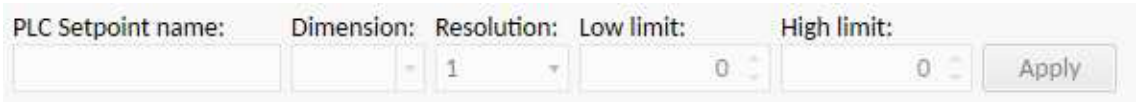

Image 8.77 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10476	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

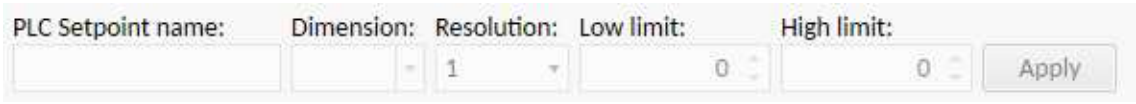

Image 8.78 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10477	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

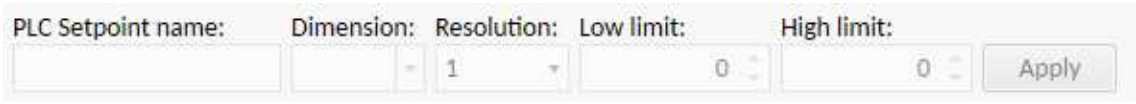

Image 8.79 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10478	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

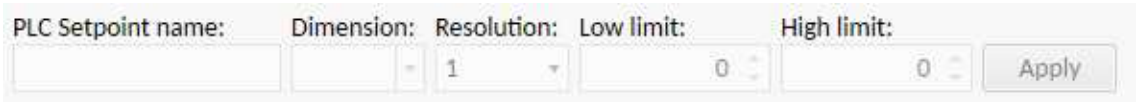

Image 8.80 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10479	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

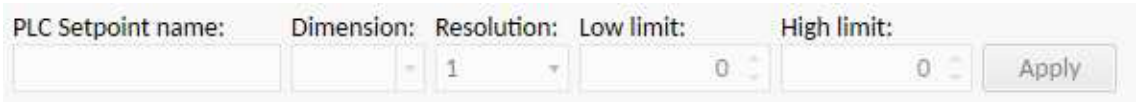

Image 8.81 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10480	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

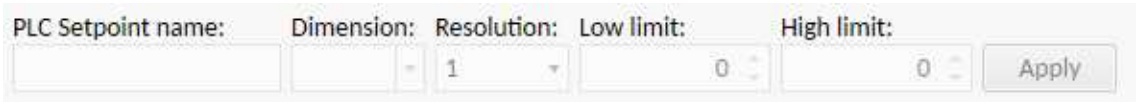

Image 8.82 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10481	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

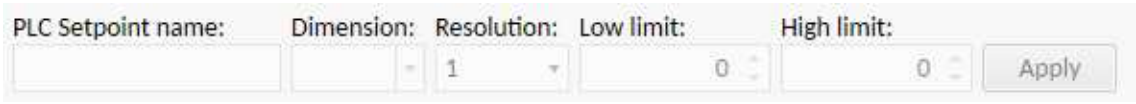

Image 8.83 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10482	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

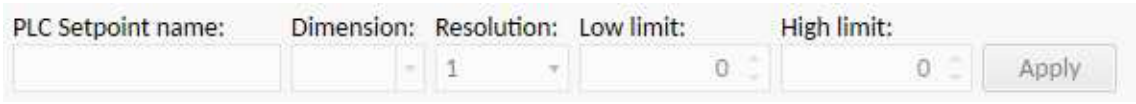

Image 8.84 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10483	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

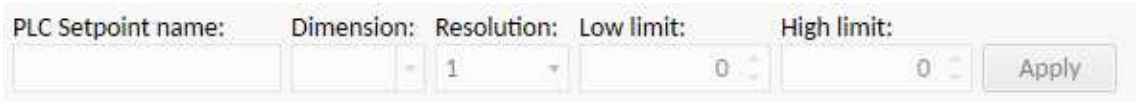

Image 8.85 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10484	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

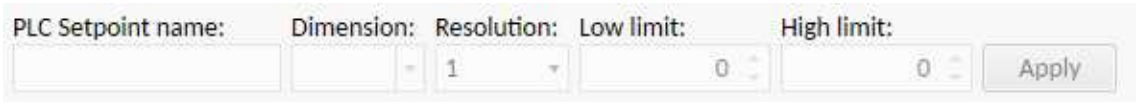

Image 8.86 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10485	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

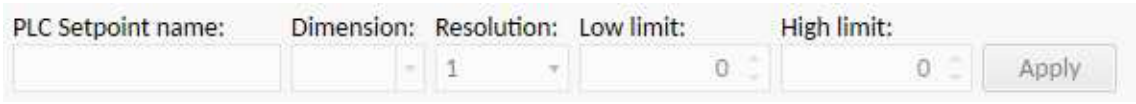

Image 8.87 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10486	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

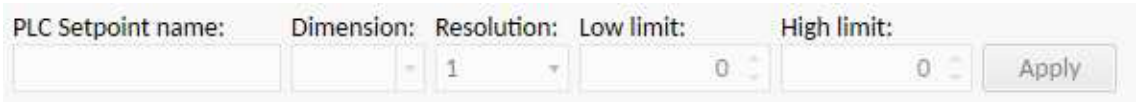

Image 8.88 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10487	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

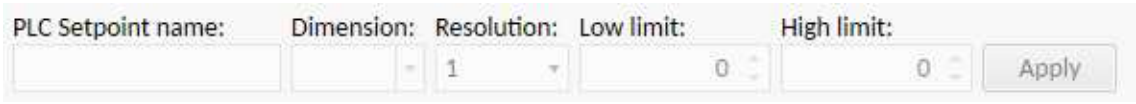

Image 8.89 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10488	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

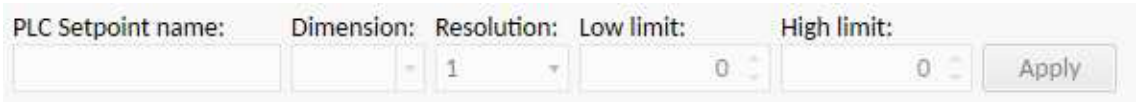

Image 8.90 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10489	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

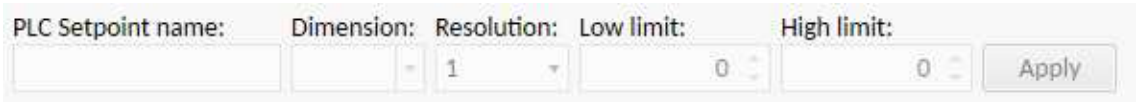

Image 8.91 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10490	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

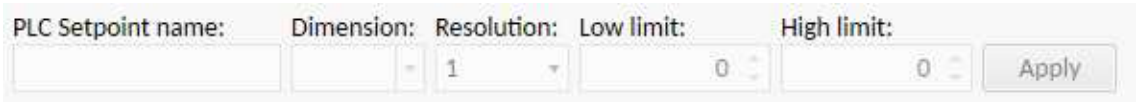

Image 8.92 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10491	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

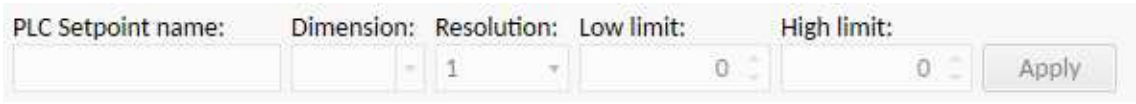

Image 8.93 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10492	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

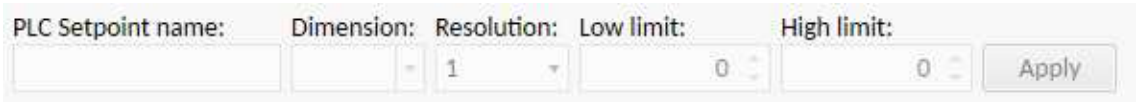

Image 8.94 Screen of configuration from InteliConfig

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

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10493	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

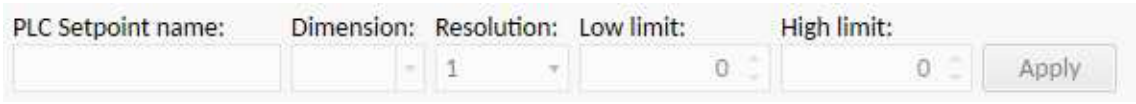

Image 8.95 Screen of configuration from InteliConfig

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.

back to List of setpoints

PLC Setpoint 55

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10494	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

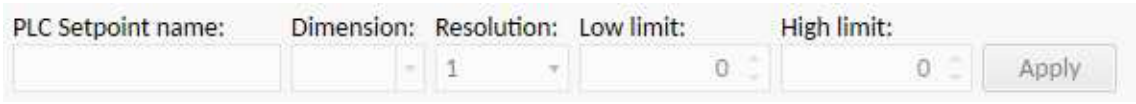

Image 8.96 Screen of configuration from InteliConfig

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.

back to List of setpoints

PLC Setpoint 56

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10495	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

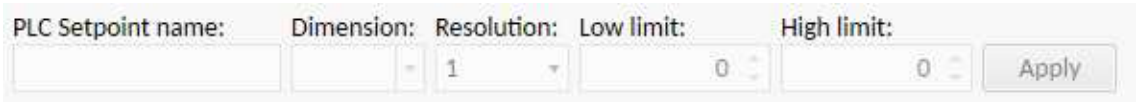

Image 8.97 Screen of configuration from InteliConfig

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.

back to List of setpoints

PLC Setpoint 57

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10496	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

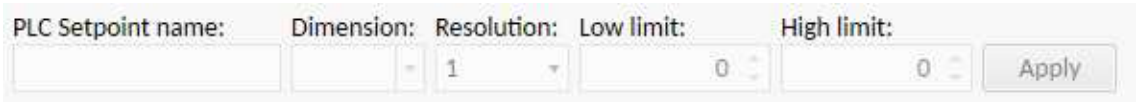

Image 8.98 Screen of configuration from InteliConfig

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.

back to List of setpoints

PLC Setpoint 58

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10497	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

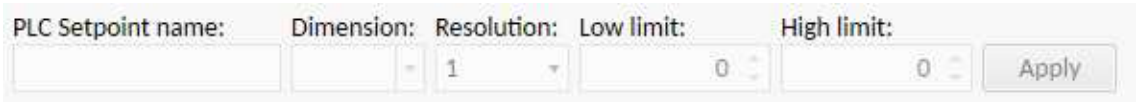

Image 8.99 Screen of configuration from InteliConfig

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.

back to List of setpoints

PLC Setpoint 59

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10498	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

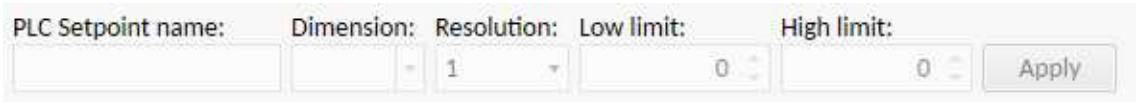

Image 8.100 Screen of configuration from InteliConfig

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.

back to List of setpoints

PLC Setpoint 60

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10499	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

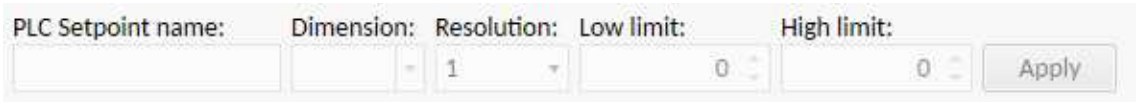

Image 8.101 Screen of configuration from InteliConfig

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.

back to List of setpoints

PLC Setpoint 61

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10500	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

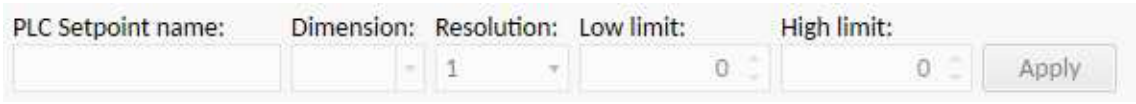

Image 8.102 Screen of configuration from InteliConfig

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.

back to List of setpoints

PLC Setpoint 62

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10501	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

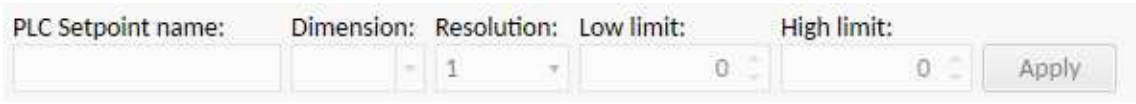

Image 8.103 Screen of configuration from InteliConfig

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.

back to List of setpoints

PLC Setpoint 63

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10502	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

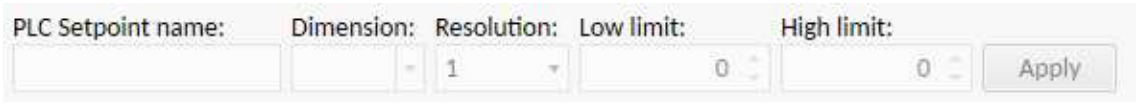

Image 8.104 Screen of configuration from InteliConfig

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.

back to List of setpoints

PLC Setpoint 64

Setpoint group	PLC	**Related FW**	2.0.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10503	**Related applications**	MCB, MGCB, BTB
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

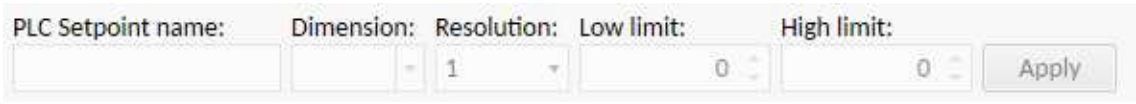

Image 8.105 Screen of configuration from InteliConfig

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.

back to List of setpoints

8.1.2 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 communication with extension module is interrupted.

A value containing the invalid flag is displayed as "####" in InteliConfig 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

For full list of setpoints go to the chapter **List of values (page 365)**.

List of values

Date/Time

Group: Bus Left

Bus Left Import

Value group	Bus Left	Related FW	2.0.0
Units	kW		
Comm object	8703	Related applications	MCBMGCB, BTB
Description			
Imported kW from Bus Left.			

back to List of values

Bus Left kW L1

Value group	Bus Left	Related FW	2.0.0
Units	kW		
Comm object	8805	Related applications	MCBMGCB, BTB
Description			
Bus Left active power in phase L1.			

back to List of values

Bus Left kW L2

Value group	Bus Left	Related FW	2.0.0
Units	kW		
Comm object	8806	Related applications	MCBMGCB, BTB
Description			
Bus Left active power in phase L2.			

back to List of values

Bus Left kW L3

Value group	Bus Left	Related FW	2.0.0
Units	kW		
Comm object	8807	Related applications	MCBMGCB, BTB
Description			
Bus Left active power in phase L3.			

back to List of values

Bus Left kVAr

Value group	Bus Left	Related FW	2.0.0
Units	kVAr		
Comm object	8704	Related applications	MCBMGCB, BTB
Description			
kVAr from Bus Left.			

back to List of values

Bus Left kVAr L1

Value group	Bus Left	Related FW	2.0.0
Units	kVAr		
Comm object	8808	Related applications	MCBMGCB, BTB
Description			
Bus Left reactive power in phase L1.			

back to List of values

Bus Left kVAr L2

Value group	Bus Left	Related FW	2.0.0
Units	kVAr		
Comm object	8809	Related applications	MCBMGCB, BTB
Description			
Bus Left reactive power in phase L2.			

back to List of values

Bus Left kVAr L3

Value group	Bus Left	Related FW	2.0.0
Units	kVAr		
Comm object	8810	Related applications	MCBMGCB, BTB
Description			
Bus Left reactive power in phase L3.			

back to List of values

Bus Left kVA

Value group	Bus Left	Related FW	2.0.0
Units	kVA		
Comm object	8811	Related applications	MCBMGCB, BTB
Description			
Bus Left apparent imported power.			

back to List of values

Bus Left kVA L1

Value group	Bus Left	Related FW	2.0.0
Units	kVA		
Comm object	8812	Related applications	MCBMGCB, BTB
Description			
Bus Left apparent power in phase L1.			

back to List of values

Bus Left kVA L2

Value group	Bus Left	Related FW	2.0.0
Units	kVA		
Comm object	8813	Related applications	MCBMGCB, BTB
Description			
Bus Left apparent power in phase L2.			

back to List of values

Bus Left kVA L3

Value group	Bus Left	Related FW	2.0.0
Units	kVA		
Comm object	8814	Related applications	MCBMGCB, BTB
Description			
Bus Left apparent power in phase L3.			

back to List of values

Bus Left Power Factor

Value group	Bus Left	Related FW	2.0.0
Units	Hz		
Comm object	8705	Related applications	MCBMGCB, BTB
Description			
Bus Left power factor.			

back to List of values

Bus Left Load Character

Value group	Bus Left	Related FW	2.0.0
Units	Hz		
Comm object	8709	Related applications	MCBMGCB, BTB
Description			
Character of Bus Left load. “L” means inductive load, “C” is capacitive and “R” is resistive load (power factor = 1).			

back to List of values

Bus Left Power Factor L1

Value group	Bus Left	Related FW	2.0.0
Units	Hz		
Comm object	8815	Related applications	MCBMGCB, BTB
Description			
Bus Left power factor in phase L1.			

back to List of values

Bus Left Load Character L1

Value group	Bus Left	**Related FW**	2.0.0
Units	Hz		
Comm object	8818	**Related applications**	MCBMGCB, BTB
Description			
Character of Bus Left load. “L” means inductive load, “C” is capacitive and “R” is resistive load (power factor = 1).			

back to List of values

Bus Left Power Factor L2

Value group	Bus Left	**Related FW**	2.0.0
Units	Hz		
Comm object	8816	**Related applications**	MCBMGCB, BTB
Description			
Bus Left power factor in phase L2.			

back to List of values

Bus Left Load Character L2

Value group	Bus Left	**Related FW**	2.0.0
Units	Hz		
Comm object	8819	**Related applications**	MCBMGCB, BTB
Description			
Character of Bus Left load. “L” means inductive load, “C” is capacitive and “R” is resistive load (power factor = 1).			

back to List of values

Bus Left Power Factor L3

Value group	Bus Left	**Related FW**	2.0.0
Units	Hz		
Comm object	8817	**Related applications**	MCBMGCB, BTB
Description			
Bus Left power factor in phase L3.			

back to List of values

Bus Left Load Character L3

Value group	Bus Left	**Related FW**	2.0.0
Units	Hz		
Comm object	8820	**Related applications**	MCBMGCB, BTB
Description			
Character of Bus Left load. “L” means inductive load, “C” is capacitive and “R” is resistive load (power factor = 1).			

back to List of values

Bus Left Frequency

Value group	Bus Left	Related FW	2.0.0
Units	Hz		
Comm object	8211	Related applications	MCBMGCB, BTB
Description			
Frequency of Bus Left.			

back to List of values

Bus Left Voltage L1-N

Value group	Bus Left	Related FW	2.0.0
Units	V		
Comm object	8195	Related applications	MCBMGCB, BTB
Description			
Bus Left voltage on phase 1.			

back to List of values

Bus Left Voltage L2-N

Value group	Bus Left	Related FW	2.0.0
Units	V		
Comm object	8196	Related applications	MCBMGCB, BTB
Description			
Bus Left voltage on phase 2.			

back to List of values

Bus Left Voltage L3-N

Value group	Bus Left	Related FW	2.0.0
Units	V		
Comm object	8197	Related applications	MCBMGCB, BTB
Description			
Bus Left voltage on phase 3.			

back to List of values

Bus Left Voltage L1-L2

Value group	Bus Left	Related FW	2.0.0
Units	V		
Comm object	9631	Related applications	MCBMGCB, BTB
Description			
Bus Left phase to phase voltage between L1 and L2 phases.			

back to List of values

Bus Left Voltage L2-L3

Value group	Bus Left	**Related FW**	2.0.0
Units	V		
Comm object	9632	**Related applications**	MCBMGCB, BTB
Description			
Bus Left phase to phase voltage between L2 and L3 phases.			

back to List of values

Bus Left Voltage L3-L1

Value group	Bus Left	**Related FW**	2.0.0
Units	V		
Comm object	9633	**Related applications**	MCBMGCB, BTB
Description			
Bus Left phase to phase voltage between L3 and L1 phases.			

back to List of values

Bus Left Current L1

Value group	Bus Left	**Related FW**	2.0.0
Units	A		
Comm object	8801	**Related applications**	MCB, MGCB, BTB
Description			
Bus Leftcurrent in phase L1.			

back to List of values

Bus Left Current L2

Value group	Bus Left	**Related FW**	2.0.0
Units	A		
Comm object	8802	**Related applications**	MCBMGCB, BTB
Description			
Bus Leftcurrent in phase L2.			

back to List of values

Bus Left Current L3

Value group	Bus Left	**Related FW**	2.0.0
Units	A		
Comm object	8803	**Related applications**	MCBMGCB, BTB
Description			
Bus Leftcurrent in phase L3.			

back to List of values

Slip Frequency

Value group	Bus Left	**Related FW**	2.0.0
Units	Hz		
Comm object	8224	**Related applications**	MCBMGCB, BTB
Description			
Differential frequency between the mains and bus.			

back to List of values

Slip Angle

Value group	Bus Left	**Related FW**	2.0.0
Units	°		
Comm object	8225	**Related applications**	MCBMGCB, BTB
Description			
Angle between tha phasors ot the mains and bus.			

back to List of values

Group: Bus Right

Bus Right Frequency

Value group	Bus Right	**Related FW**	2.0.0
Units	V		
Comm object	8210	**Related applications**	MCB, MGCB, BTB
Description			
Frequency of the Bus Right.			

back to List of values

Bus Right Voltage L1-N

Value group	Bus Right	**Related FW**	2.0.0
Units	V		
Comm object	8192	**Related applications**	MCB, MGCB, BTB
Description			
Bus Right voltage on phase L1.			

back to List of values

Bus Right Voltage L2-N

Value group	Bus Right	**Related FW**	2.0.0
Units	V		
Comm object	8193	**Related applications**	MCB, MGCB, BTB
Description			
Bus Right voltage on L2.			

back to List of values

Bus Right Voltage L3-N

Value group	Bus Right	Related FW	2.0.0
Units	V		
Comm object	8194	Related applications	MCB, MGCB, BTB
Description			
Bus Right voltage on phase L3.			

back to List of values

Bus Right Voltage L1-L2

Value group	Bus Right	Related FW	2.0.0
Units	V		
Comm object	9628	Related applications	MCB, MGCB, BTB
Description			
Phase to phase Bus Right voltage between L1-L2.			

back to List of values

Bus Right Voltage L2-L3

Value group	Bus Right	Related FW	2.0.0
Units	V		
Comm object	9629	Related applications	MCB, MGCB, BTB
Description			
Phase to phase Bus Right voltage between L2-L3.			

back to List of values

Bus Right Voltage L3-L1

Value group	Bus Right	Related FW	2.0.0
Units	V		
Comm object	9630	Related applications	MCB, MGCB, BTB
Description			
Phase to phase Bus Right voltage between L3-L1.			

back to List of values

Group: Power Management

Actual Reserve

Value group	Power Management	Related FW	2.0.0
Units	kW		
Comm object	15805	Related applications	MCB, MGCB, BTB
Description			
Actual absolute reserve in power management.			

back to List of values

Actual Relative Reserve

Value group	Power Management	Related FW	2.0.0
Units	%		
Comm object	10788	Related applications	MCB, MGCB, BTB
Description			
Actual relative reserve in power management.			

back to List of values

Start Reserve

Value group	Power Management	Related FW	2.0.0
Units	kW		
Comm object	15806	Related applications	MCB, MGCB, BTB
Description			
Actual absolute reserve for start.			

back to List of values

Stop Reserve

Value group	Power Management	Related FW	2.0.0
Units	kW		
Comm object	15807	Related applications	MCB, MGCB, BTB
Description			
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.			

back to List of values

Start Relative Reserve

Value group	Power Management	Related FW	2.0.0
Units	%		
Comm object	10786	Related applications	MCB, MGCB, BTB
Description			
Actual relative reserve for start.			

back to List of values

Stop Relative Reserve

Value group	Power Management	Related FW	2.0.0
Units	%		
Comm object	10787	Related applications	MCB, MGCB, BTB
Description			
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.			

back to List of values

Actual Active Power In PM

Value group	Power Management	**Related FW**	2.0.0
Units	kW		
Comm object	10657	**Related applications**	MCB, MGCB, BTB
Description			
Actual value of active power from all gen-sets running in power management.			

back to List of values

Actual Reactive Power In PM

Value group	Power Management	**Related FW**	2.0.0
Units	kVAr		
Comm object	10656	**Related applications**	MCB, MGCB, BTB
Description			
Actual value of reactive power from all gen-sets running in power management.			

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Running Nominal Power In PM

Value group	Power Management	**Related FW**	2.0.0
Units	kW		
Comm object	10658	**Related applications**	MCB, MGCB, BTB
Description			
Actual nominal power of all gen-sets in power management, which are running.			

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Running Nominal Power Of All

Value group	Power Management	**Related FW**	2.0.0
Units	kW		
Comm object	10999	**Related applications**	MCB, MGCB, BTB
Description			
Actual nominal power of all gen-sets, which are running.			

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Available Nominal Power

Value group	Power Management	**Related FW**	2.0.0
Units	kW		
Comm object	10998	**Related applications**	MCB, MGCB, BTB
Description			
Available nominal power of all gen-sets in power management.			

back to List of values

Minimal Running Nominal Power

Value group	Power Management	Related FW	2.0.0
Units	kW		
Comm object	10012	Related applications	MCB, MGCB, BTB
Description			
Actual minimal nominal power of all gen-sets, which are running.			

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Actual Power Band

Value group	Power Management	Related FW	2.0.0
Units	-		
Comm object	8974	Related applications	MCB, MGCB, BTB
Description			
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. ***Note:*** *This value is evaluated only in controller with the lowest CAN address.*			

back to List of values

Next Power Band

Value group	Power Management	Related FW	2.0.0
Units	-		
Comm object	8975	Related applications	MCB, MGCB, BTB
Description			
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. ***Note:*** *This value is evaluated only in controller with the lowest CAN address.*			

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Group: Load Control

Loadsharing Output

Value group	Load Control	Related FW	2.0.0
Units	%		
Comm object	10924	Related applications	MCB, MGCB, BTB
Description			
Load sharing regulation loop output.			

back to List of values

Group: Voltage/PF Control

Varsharing Output

Value group	Voltage/PF Control	**Related FW**	2.0.0
Units	kVAr		
Comm object	10925	**Related applications**	MCB, MGCB, BTB
Description			
Varsharing regulation loop output.			

back to List of values

Group: Controler I/O

Battery Volts

Value group	Controler I/O	**Related FW**	2.0.0
Units	V		
Comm object	8213	**Related applications**	MCB, MGCB, BTB
Description			
Controller supply voltage.			

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Binary Inputs

Value group	Controler I/O	**Related FW**	2.0.0
Units	[-]		
Comm object	8235	**Related applications**	MCB, MGCB; BTB
Description			
State of the binary inputs of the controller.			

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Binary Outputs

Value group	Controler I/O	**Related FW**	2.0.0
Units	[-]		
Comm object	8239	**Related applications**	MCB, MGCB, BTB
Description			
State of the binary outputs of the controller.			

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Group: Statistics

Bus Left kWh

Value group	Statistics	**Related FW**	2.0.0
Units	kWh		
Comm object	8205	**Related applications**	MCB, MGCB, BTB
Description			
Sum of kWh from the Bus Left. ***Note:*** *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.*			

back to List of values

Bus Left kVArh

Value group	Statistics	**Related FW**	2.0.0
Units	kVArh		
Comm object	8539	**Related applications**	MCB, MGCB, BTB
Description			
Sum of kVArh from the Bus Left. ***Note:*** *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.*			

back to List of values

Sum Bus kVAh

Value group	Statistics	**Related FW**	2.0.0
Units	kVAh		
Comm object	13663	**Related applications**	MCB, MGCB, BTB
Description			
This value shows sum of kVAh that were transfered through CB. ***Note:*** *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.*			

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Bus Right kVArh

Value group	Statistics	**Related FW**	2.0.0
Units	kVArh		
Comm object	11026	**Related applications**	MCB, MGCB, BTB
Description			
Sum of kWh from the Bus Left. ***Note:*** *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.*			

back to List of values

Bus Right kWh

Value group	Statistics	Related FW	2.0.0
Units	kWh		
Comm object	11025	Related applications	MCB, MGCB, BTB
Description			
Sum of kWh from the Bus Left. ***Note:*** *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.*			

back to List of values

Running Hours

Value group	Statistics	Related FW	2.0.0
Units	hours		
Comm object	8206	Related applications	MCB, MGCB, BTB
Description			
Engine operation hours counter. The engine hours are incremented in the controller while the engine is running. ***Note:*** *If an ECU is configured and it provides engine hours value, the value is taken from the ECU.*			

back to List of values

Group: Info

Application Mode

Value group	Info	Related FW	2.0.0
Units	[-]		
Comm object	14446	Related applications	MCB, MGCB, BTB
Description			
This Value mirrors the active application in the controller. The intend of use it to display the value of the active application in InteliConfig or at the screen of the controller.			

back to List of values

Breaker State

Value group	Info	Related FW	2.0.0
Units	[-]		
Comm object	9245	Related applications	MCB, MGCB, BTB
Description			
The value contains actual “breaker state” message which is shown on the main screen of the controller.			

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Timer Text

Value group	Info	**Related FW**	2.0.0
Units	[-]		
Comm object	10040	**Related applications**	MCB, MGCB, BTB
Description			
The value contains the numeric code of the “Current process timer” text which is shown on the main screen of the controller. The assignment of texts to the codes can be obtained using InteliConfig. Open any connection (also offline with a previously saved archive) and go to the Tools ribbon -> Generate CFG image (all). The resulting file will contain the assignment of texts to the codes.			

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Connection Type

Value group	Info	**Related FW**	2.0.0
Units	[-]		
Comm object	12944	**Related applications**	MCB, MGCB, BTB
Description			
The text of this value represents the connection type which is adjusted in setpoint **Connection type (page 176)**.			

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SPI Module A

Value group	Info	**Related FW**	2.0.0
Units	[-]		
Comm object	14447	**Related applications**	MCB, MGCB, BTB
Description			
The name of plug-in module which is inserted in slot A.			

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SPI Module B

Value group	Info	**Related FW**	2.0.0
Units	[-]		
Comm object	14448	**Related applications**	MCB, MGCB, BTB
Description			
The name of plug-in module which is inserted in slot B.			

back to List of values

Timer Value

Value group	Info	**Related FW**	2.0.0
Units	[HH:MM:SS]		
Comm object	14147	**Related applications**	MCB, MGCB, BTB
Description			
The value contains the "Current process timer" value which is shown on the main screen of the controller.			

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ID String

Value group	Info	**Related FW**	2.0.0
Units	[-]		
Comm object	24501	**Related applications**	MCB, MGCB, BTB
Description			
Name of controller which is used in InteliConfig in command bar.			

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FW Version

Value group	Info	**Related FW**	2.0.0
Units	[-]		
Comm object	24339	**Related applications**	MCB, MGCB, BTB
Description			
Major and minor firmware version number.			

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Application

Value group	Info	**Related FW**	2.0.0
Units	[-]		
Comm object	8480	**Related applications**	MCB, MGCB, BTB
Description			
The value contains actual application in controller.			

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FW Branch

Value group	Info	**Related FW**	2.0.0
Units	[-]		
Comm object	8707	**Related applications**	MCB, MGCB, BTB
Description			
The value contains actual branch of firmware in controller.			

back to List of values

Password Decode

Value group	Info	Related FW	2.0.0
Units	[-]		
Comm object	24202	Related applications	MCB, MGCB, BTB
Description			
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

Value group	Info	Related FW	2.0.0
Units	V		
Comm object	8546	Related applications	MCB, MGCB, BTB
Description			
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

Value group	Info	Related FW	2.0.0
Units	V		
Comm object	8827	Related applications	MCB, MGCB, BTB
Description			
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

Value group	Info	Related FW	2.0.0
Units			
Comm object	11081	Related applications	MCB, MGCB, BTB
Description			
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

Value group	Info	**Related FW**	2.0.0
Units			
Comm object	11082	**Related applications**	MCB, MGCB, BTB
Description			
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

Value group	Info	**Related FW**	2.0.0
Units	V		
Comm object	10196	**Related applications**	MCB, MGCB, BTB
Description			
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

Value group	Info	**Related FW**	2.0.0
Units	V		
Comm object	10197	**Related applications**	MCB, MGCB, BTB
Description			
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

Value group	Log Bout	**Related FW**	2.0.0
Units	[-]		
Comm object	9143	**Related applications**	MCB, MGCB, BTB
Description			
State of binary outputs.			

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Log Bout 2

Value group	Log Bout	Related FW	2.0.0
Units	[-]		
Comm object	9144	Related applications	MCB, MGCB, BTB
Description			
State of binary outputs.			

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Log Bout 3

Value group	Log Bout	Related FW	2.0.0
Units	[-]		
Comm object	9145	Related applications	MCB, MGCB, BTB
Description			
State of binary outputs.			

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Log Bout 4

Value group	Log Bout	Related FW	2.0.0
Units	[-]		
Comm object	9146	Related applications	MCB, MGCB, BTB
Description			
State of binary outputs.			

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Log Bout 5

Value group	Log Bout	Related FW	2.0.0
Units	[-]		
Comm object	9147	Related applications	MCB, MGCB, BTB
Description			
State of binary outputs.			

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Log Bout 6

Value group	Log Bout	Related FW	2.0.0
Units	[-]		
Comm object	9148	Related applications	MCB, MGCB, BTB
Description			
State of binary outputs.			

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Log Bout 7

Value group	Log Bout	Related FW	2.0.0
Units	[-]		
Comm object	9149	Related applications	MCB, MGCB, BTB
Description			
State of binary outputs.			

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Group: CM-GPRS

AirGate Status

Value group	CM-GPRS; CM-4G-GPS (4G part)	Related FW	2.0.0
Units	[-]		
Comm object	24308	Related applications	MCB, MGCB, BTB
Description			

Diagnostic code for AirGate connection. Helps in troubleshooting.

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

Value group	CM-GPRS; CM-4G-GPS (4G part)	Related FW	2.0.0
Units	[-]		
Comm object	24309	Related applications	MCB, MGCB, BTB
Description			

Identification string generated by AirGate server for the purpose of establishing communication via InteliConfig or any other supported PC tool.

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AirGate Status

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	2.0.0
Units	[-]		
Comm object	24308	**Related applications**	MCB, MGCB, BTB
Description			

Diagnostic code for AirGate connection. Helps in troubleshooting.

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

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	2.0.0
Units	[-]		
Comm object	24146	**Related applications**	MCB, MGCB, BTB
Description			

The type of data connection.

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Cell Diag Code

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	2.0.0
Units	[-]		
Comm object	24288	**Related applications**	MCB, MGCB, BTB
Description			

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

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	2.0.0
Units	%		
Comm object	24300	**Related applications**	MCB, MGCB, BTB
Description			
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

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	2.0.0
Units	%		
Comm object	24302	**Related applications**	MCB, MGCB, BTB
Description			
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

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	2.0.0
Units	[-]		
Comm object	24290	**Related applications**	MCB, MGCB, BTB
Description			
The text of this value represents the status of the GSM modem.			

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Last Email Result

Value group	CM-GPRS; CM-4G-GPS (4G part)	Related FW	2.0.0
Units	[-]		
Comm object	24307	**Related applications**	MCB, MGCB, BTB

Description

Result of last email, which was sent by controller.

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

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	2.0.0
Units	[-]		
Comm object	24147	**Related applications**	MCB, MGCB, BTB
Description			
The name of operator which to SIM card is connected. ***Note:*** *If roaming service is used then prefix "R" is added before the name of operator.*			

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Group: CM-Ethernet

AirGate Status

Value group	CM-Ethernet	**Related FW**	2.0.0
Units	[-]		
Comm object	24344	**Related applications**	MCB, MGCB, BTB
Description			

Diagnostic code for AirGate connection. Helps in troubleshooting.

Code	Description
0	Ethernet cable is disconected
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

Value group	CM-EthernetInfo	**Related FW**	2.0.0
Units	[-]		
Comm object	24345	**Related applications**	MCB, MGCB, BTB
Description			
Identification string generated by AirGate server for the purpose of establishing communication via InteliConfig or any other supported PC tool.			

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Current DNS

Value group	CM-Ethernet	Related FW	2.0.0
Units	[-]		
Comm object	24181	Related applications	MCB, MGCB, BTB
Description			
Current domain name server.			

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ETH Interface Status

Value group	CM-Ethernet	Related FW	2.0.0
Units	[-]		
Comm object	24180	Related applications	MCB, MGCB, BTB
Description			
Current status of ethernet communication.			

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Current Gateway

Value group	CM-Ethernet	Related FW	2.0.0
Units	[-]		
Comm object	24182	Related applications	MCB, MGCB, BTB
Description			
Current gateway address.			

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Current IP Address

Value group	CM-Ethernet	Related FW	2.0.0
Units	[-]		
Comm object	24184	Related applications	MCB, MGCB, BTB
Description			
Current IP address of the controller.			

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Last Email Result

Value group	CM-Ethernet	Related FW	2.0.0
Units	[-]		
Comm object	24332	Related applications	MCB, MGCB, BTB
Description			

Result of last email, which was sent by controller.

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 commnad 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

Value group	CM-Ethernet	Related FW	2.0.0
Units	[-]		
Comm object	24333	Related applications	MCB, MGCB, BTB
Description			

Current MAC address of the controller ethernet interface.

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Current Subnet Mask

Value group	CM-Ethernet	**Related FW**	2.0.0
Units	[-]		
Comm object	24183	**Related applications**	MCB, MGCB, BTB
Description			
Current subnet mask.			

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Group: Date/Time

Time

Value group	Date/Time	**Related FW**	2.0.0
Units	HH:MM:SS		
Comm object	24554	**Related applications**	MCB, MGCB, BTB
Description			
Shows setup time.			

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Date

Value group	Date/Time	**Related FW**	2.0.0
Units	DD.MM.YYYY		
Comm object	24553	**Related applications**	MCB, MGCB, BTB
Description			
Shows setup date.			

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Group: Plug-In I/O

EM BIO A

Value group	Plug-In I/O	**Related FW**	2.0.0
Units	[-]		
Comm object	14291	**Related applications**	MCB, MGCB, BTB
Description			
Binary inputs from extension module in slot A.			

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EM BIO B

Value group	Plug-In I/O	**Related FW**	2.0.0
Units	[-]		
Comm object	14292	**Related applications**	MCB, MGCB, BTB
Description			
Binary inputs from extension module in slot B.			

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Group: PLC

PLC Resource 1

Value group	PLC	**Related FW**	2.0.0
Units	[-]		
Comm object	10504	**Related applications**	MCB, MGCB, BTB
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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PLC Resource 2

Value group	PLC	**Related FW**	2.0.0
Units	[-]		
Comm object	10505	**Related applications**	MCB, MGCB, BTB
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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PLC Resource 3

Value group	PLC	**Related FW**	2.0.0
Units	[-]		
Comm object	10506	**Related applications**	MCB, MGCB, BTB
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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PLC Resource 4

Value group	PLC	**Related FW**	2.0.0
Units	[-]		
Comm object	10507	**Related applications**	MCB, MGCB, BTB
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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PLC Resource 5

Value group	PLC	Related FW	2.0.0
Units	[-]		
Comm object	10508	Related applications	MCB, MGCB, BTB
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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PLC Resource 6

Value group	PLC	Related FW	2.0.0
Units	[-]		
Comm object	10509	Related applications	MCB, MGCB, BTB
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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PLC Resource 7

Value group	PLC	Related FW	2.0.0
Units	[-]		
Comm object	10510	Related applications	MCB, MGCB, BTB
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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PLC Resource 8

Value group	PLC	Related FW	2.0.0
Units	[-]		
Comm object	10511	Related applications	MCB, MGCB, BTB
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

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PLC-BOUT 1

Value group	PLC	Related FW	2.0.0
Units	[-]		
Comm object	10424	Related applications	MCB, MGCB, BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 2

Value group	PLC	**Related FW**	2.0.0
Units	[-]		
Comm object	10425	**Related applications**	MCB, MGCB, BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 3

Value group	PLC	**Related FW**	2.0.0
Units	[-]		
Comm object	10426	**Related applications**	MCB, MGCB, BTB
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 4

Value group	PLC	**Related FW**	2.0.0
Units	[-]		
Comm object	10427	**Related applications**	MCB, MGCB, BTB
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 5

Value group	PLC	**Related FW**	2.0.0
Units	[-]		
Comm object	10428	**Related applications**	MCB, MGCB, BTB
Description			
State of binary outputs of PLC.			

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PLC-BOUT 6

Value group	PLC	**Related FW**	2.0.0
Units	[-]		
Comm object	10429	**Related applications**	MCB, MGCB, BTB
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 7

Value group	PLC	Related FW	2.0.0
Units	[-]		
Comm object	10430	Related applications	MCB, MGCB, BTB
Description			
State of binary outputs of PLC.			

back to List of values

8.1.3 Logical binary inputs

What Logical binary inputs are:

Logical binary inputs are inputs for binary values and functions.

Alphabetical groups of Logical binary inputs

For full list of Logical binary inputs go to the chapter **Logical binary inputs alphabetically (page 400)**.

Logical binary inputs alphabetically

LBI: A

Access Lock

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1		
Description			
When this input is closed, no setpoints can be adjusted from controller's front panel and controller mode (OFF / MAN / AUTO) cannot be changed. ***Note:*** *Access Lock does not protect setpoints and mode changing from InteliConfig. To avoid unqualified changes the selected setpoints have to be password protected.* *Also the buttons Fault Reset and Horn Reset are not blocked at all and buttons Start and Stop in MAN mode are not blocked.*			

back to Logical binary inputs alphabetically

Alternate Config 2

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	859		
Description			
This binary input can switch between configuration sets. When this binary input is active, setpoints in Alternate Configuration group are switched to the second set (setpoints with number 2).			

back to Logical binary inputs alphabetically

Alternate Config 3

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	860		
Description			
This binary input can switch between configuration sets. When this binary input is active, setpoints in Alternate Configuration group are switched to the third set (setpoints with number 3).			

back to Logical binary inputs alphabetically

LBI: B

BIN Protection 1

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9999		
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.
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 02

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9998		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9996		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9995		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9994		
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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9993		
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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9992		
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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9990		
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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9989		
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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9986		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9985		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9984		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9982		
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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9979		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9978		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9973		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9966		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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 36

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9964		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9962		
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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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.
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

Related FW	2.0.0	Related applications	AMF, MRS MINT, SPtM
Comm object	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.
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 42

Related FW	2.0.0	Related applications	AMF, MRS MINT, SPtM
Comm object	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.
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

Related FW	2.0.0	Related applications	AMF, MRS MINT, SPtM
Comm object	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.
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

Related FW	2.0.0	Related applications	AMF, MRS MINT, SPtM
Comm object	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.
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 45

Related FW	2.0.0	Related applications	AMF, MRS MINT, SPtM
Comm object	9955		
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.
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

Related FW	2.0.0	Related applications	AMF, MRS MINT, SPtM
Comm object	9954		
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.
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 47

Related FW	2.0.0	**Related applications**	AMF, MRS MINT, SPtM
Comm object	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.
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 48

Related FW	2.0.0	**Related applications**	AMF, MRS MINT, SPtM
Comm object	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.
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

BTB Button

Related FW	2.0.0	**Related applications**	MCB, MGCB
Comm object	194		
Description			
This binary input has the same function as BTB button I/O on the InteliMains 210 front panel. It is evaluated in MAN mode only.			

back to Logical binary inputs alphabetically

BTB Feedback

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	65		
Description			

Use this input for indication whether the bus circuit breaker is open or closed.

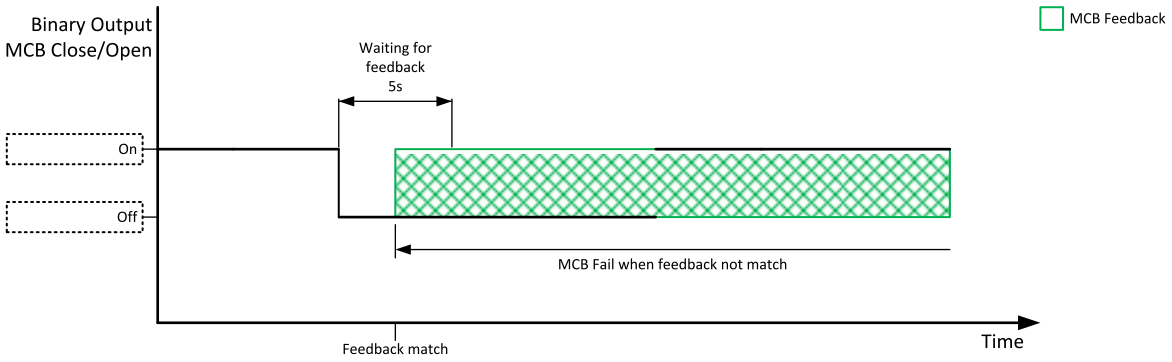

Image 8.106 BTB Feedback 1

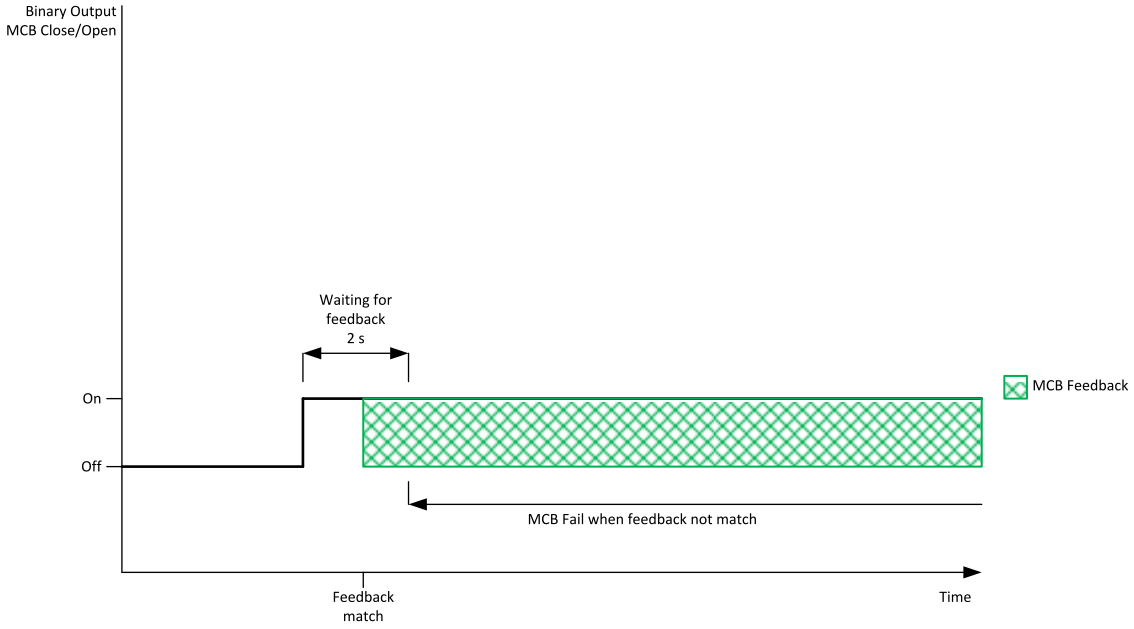

Image 8.107 BTB Feedback 2

back to Logical binary inputs alphabetically

LBI: E

Emergency MAN

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	45		
Description			
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. The controller behaves in the following way: ▶ Shows the text EmergMan in the engine status on the main screen. ▶ Stops all functions regarding the gen-set or breaker control, deactivates all outputs related to it. ▶ Stop Fail alarm is not being evaluated and stop solenoid is not activated if nonzero speed is detected. ▶ When the input is deactivated, the controller takes control according to the situation in the moment of deactivation.			

back to Logical binary inputs alphabetically

LBI: F

Fault Reset Button

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	191		
Description			
Binary input has the same function as Fault Reset button on the InteliMains 210 front panel.			

back to Logical binary inputs alphabetically

Force BTB Close

Related FW	2.0.0	Related applications	BTB
Comm object	952		
Description			
Close BTB regardless on the setpoint setting. Synchronize both sides regardless on the setpoints setting. **IMPORTANT: Setpoint Mains Coupling (page 171) has higher priority than this LBI.** ***Note:*** *When LBI is active, BTB can be opened only due to BTB open protection or BTB Fail.*			

back to Logical binary inputs alphabetically

LBI: G

Group link

Related FW	2.0.0	Related applications	MCB, MGCB
Comm object	59		
Description			

This input is used for logical connection and disconnection of two gen-set groups selected with setpoints **Group Link L (page 201)** and **Group Link R (page 202)**. If the input is active, then the two selected groups will perform power management, load sharing and kVAr sharing together as one large group.

Note: *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.*

Note: *This function is not supported in BTB application.*

back to Logical binary inputs alphabetically

LBI: H

Horn Reset Button

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	192		
Description			

Binary input has the same function as Horn reset button on the InteliMains 210 front panel.

back to Logical binary inputs alphabetically

LBI: L

Lang Selection 1

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	107		
Description			

Use this binary input with binary input **LANG SELECTION 2 (PAGE 430)** to choose required language of controller. The system is based on binary numbers.

Binary input	Binary number	Active language
Language Selection 1 is active	1	First language (English)
LANG SELECTION 2 (PAGE 430) is active	2	Second language
Language Selection 1 and **LANG SELECTION 2 (PAGE 430)** are active	3	Third language

back to Logical binary inputs alphabetically

Lang Selection 2

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	108		
Description			

Use this binary input with binary input **LANG SELECTION 1 (PAGE 429)** to choose required language of controller. The system is based on binary numbers.

Binary input	Binary number	Active language
LANG SELECTION 1 (PAGE 429) is active	1	First language (English)
Lang Selection 2 is active	2	Second language
LANG SELECTION 1 (PAGE 429) and Lang Selection 2 are active	3	Third language

back to Logical binary inputs alphabetically

Load Res 2 Active

Related FW	2.0.0	Related applications	MCB, MGCB
Comm object	49		
Description			

Activation of this logical binary input changes the set of load reserve setpoint, which are used in **Power management (page 78)**. This input is used to activate the load reserve set 2 instead of the set 1, which is active by default.

Note: *This function is not supported in BTB application.*

back to Logical binary inputs alphabetically

LBI: M

Min Run Power Active

Related FW	2.0.0	Related applications	MCB, MGCB
Comm object	52		
Description			

This input is used to activate the function minimal running power, which is adjusted via setpoint **#Min Run Power (page 197)**.

Note: *This function is not supported in BTB application.*

back to Logical binary inputs alphabetically

LBI: N

Not Used

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	184		
Description			
Binary input has no function. Use this configuration when binary input is not used.			

back to Logical binary inputs alphabetically

LBI: R

Remote AUTO

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	620		
Description			

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.

This binary input has the lowest priority from Remote OFF / MAN / AUTO / TEST binary inputs

Remote control priority:

- Remote OFF (Highest priority)
- Remote TEST
- Remote MAN
- Remote AUTO (Lowest Priority)

back to Logical binary inputs alphabetically

Remote Ctrl Lock

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	4		
Description			
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.			

back to Logical binary inputs alphabetically

Remote MAN

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	618		
Description			
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. Remote control priority: ▶ Remote OFF (Highest priority) ▶ Remote TEST ▶ Remote MAN ▶ Remote AUTO (Lowest Priority)			

back to Logical binary inputs alphabetically

Remote OFF

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	617		
Description			
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. Remote control priority: ▶ Remote OFF (Highest priority) ▶ Remote TEST ▶ Remote MAN ▶ Remote AUTO (Lowest Priority)			

back to Logical binary inputs alphabetically

Remote Start/Stop

Related FW	2.0.0	**Related applications**	MCB, MGCB
Comm object	38		
Description			

Use this input to start and stop the gen-set in AUTO mode and TEST mode.

Taken action in MCB, MGCB application (AUTO Mode)	
Active	▶ System Start/Stop is activated regardless the Mains is OK ▶ MGCB is closed in case of MGCB application ▶ Parallel operation - Baseload, import/export ▶ Reverse synchronising in case of mains return
Inactive	▶ System Start/Stop deactivated ▶ MGCB opened

Note: *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.*

Note: *This function is not supported in BTB application.*

back to Logical binary inputs alphabetically

LBI: T

Time Stamp Act

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	125		
Description			

Binary input activates time stamp writing to history depending on Date/Time:Time stamp act and Time Stamp Per setpoints.

back to Logical binary inputs alphabetically

8.1.4 Logical binary outputs

What Logical binary outputs are:

Logical binary outputs are outputs for binary values and functions.

Alphabetical groups of Logical binary outputs

For full list of Logical binary outputs go to the chapter **Logical binary outputs alphabetically (page 435)**.

Logical binary outputs alphabetically

LBO: A

AL Battery Voltage

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1293		
Description			
This output is active when the Wrn Battery Voltage (page 508)alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Bus Left Fail

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	197		
Description			
Output for signaling Bus LeftFailure. This output is active when at least one Bus Left frequency alarm or at least one Bus Left voltage alarm is present in alarmlist or isn't confirmed.			

back to Logical binary outputs alphabetically

AL Bus Left Frequency

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1271		
Description			
This output is active when at least one Bus Left frequency alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Bus Left > Frequency

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	2094		
Description			
Signalisation of released protection for Bus Left overfrequency.			

back to Logical binary outputs alphabetically

AL Bus Left > Voltage

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	2092		
Description			
Signalisation of released protection for Bus Left overvoltage.			

back to Logical binary outputs alphabetically

AL Bus Left < Frequency

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	2095		
Description			
Signalisation of released protection for Bus Left uderfrequency.			

back to Logical binary outputs alphabetically

AL Bus Left < Voltage

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	2093		
Description			
Signalisation of released protection for Bus Left undervoltage.			

back to Logical binary outputs alphabetically

AL Bus Left Voltage

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1270		
Description			
This output is active when at least one Bus Left voltage alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Bus Right Frequency

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1266		
Description			
This output is active when at least one Bus Right frequency alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Bus Right Voltage

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1263		
Description			
This output is active when at least one Bus Right voltage alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Common BOR

Related FW	2.0.0	**Related applications**	BTB
Comm object	9		
Description			
Signalisation of released common breaker open protection with reset.			

back to Logical binary outputs alphabetically

AL Common Fls

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	6		
Description			
Output closes when any sensor fail alarm appears. The output opens, if: ▶ No sensor fail alarm is active and ▶ Fault reset button is pressed			

back to Logical binary outputs alphabetically

AL Common Wrn

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	3		
Description			
Output closes when any warning alarm appears. The output opens, if: ▶ No warning alarm is active and ▶ Fault reset button is pressed			

back to Logical binary outputs alphabetically

AL Overcurrent

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	109		
Description			
This output is active when the **BOR Overcurrent IDMT (page 524)** or **MPR Short Circuit (page 525)** alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Overload BOR

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	1268		
Description			
This output is active when the **BOR Overload (page 525)** alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Overload Wrn

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	1269		
Description			
This output is active when the **Wrn Overload (page 512)** alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

Alarm

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	2		
Description			
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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 208)** and **Analog Switch 1 Off (page 208)**. The value is measured from **AIN SWITCH 01 (PAGE 484)** analog input.			

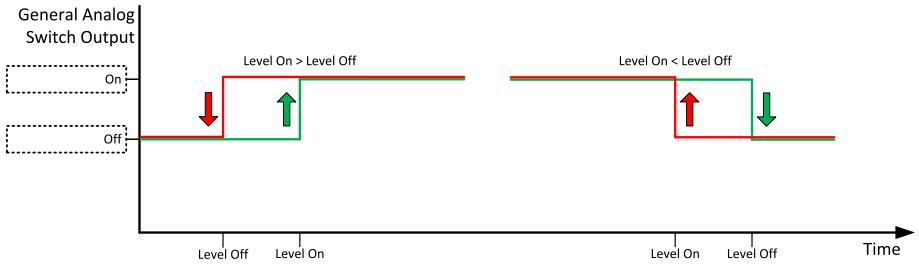

Image 8.108 General analog input 1 switch

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AIN Switch02

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 210)** and **Analog Switch 2 Off (page 210)**. The value is measured from **AIN SWITCH 02 (PAGE 484)** analog input.

Image 8.109 General analog input 2 switch

back to Logical binary outputs alphabetically

AIN Switch03

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 212)** and **Analog Switch 3 Off (page 212)**. The value is measured from **AIN SWITCH 03 (PAGE 484)** analog input.

Image 8.110 General analog input 3 switch

back to Logical binary outputs alphabetically

AIN Switch04

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 214)** and **Analog Switch 4 Off (page 214)**. The value is measured from **AIN SWITCH 04 (PAGE 485)** analog input.

Image 8.111 General analog input 4 switch

Logical binary outputs alphabetically (page 435)

AIN Switch05

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 216)** and **Analog Switch 5 Off (page 216)**. The value is measured from **AIN SWITCH 05 (PAGE 485)** analog input.

Image 8.112 General analog input 5 switch

Logical binary outputs alphabetically (page 435)

AIN Switch06

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 218)** and **Analog Switch 6 Off (page 218)**. The value is measured from **AIN SWITCH 06 (PAGE 485)** analog input.			

Image 8.113 General analog input 6 switch

Logical binary outputs alphabetically (page 435)

AIN Switch07

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 220)** and **Analog Switch 7 Off (page 220)**. The value is measured from **AIN SWITCH 07 (PAGE 486)** analog input.			

Image 8.114 General analog input 7 switch

Logical binary outputs alphabetically (page 435)

AIN Switch08

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 222)** and **Analog Switch 8 Off (page 222)**. The value is measured from **AIN SWITCH 08 (PAGE 486)** analog input.

Image 8.115 General analog input 8 switch

Logical binary outputs alphabetically (page 435)

AIN Switch09

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 224)** and **Analog Switch 9 Off (page 224)**. The value is measured from **AIN SWITCH 09 (PAGE 486)** analog input.

Image 8.116 General analog input 9 switch

Logical binary outputs alphabetically (page 435)

AIN Switch10

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 226)** and **Analog Switch 10 Off (page 226)**. The value is measured from **AIN SWITCH 10 (PAGE 487)** analog input.			

Image 8.117 General analog input 10 switch

Logical binary outputs alphabetically (page 435)

AIN Switch11

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 228)** and **Analog Switch 11 Off (page 228)**. The value is measured from **AIN SWITCH 11 (PAGE 487)** analog input.			

Image 8.118 General analog input 11 switch

Logical binary outputs alphabetically (page 435)

AIN Switch12

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 230)** and **Analog Switch 12 Off (page 230)**. The value is measured from **AIN SWITCH 12 (PAGE 487)** analog input.

Image 8.119 General analog input 12 switch

Logical binary outputs alphabetically (page 435)

AIN Switch13

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 232)** and **Analog Switch 13 Off (page 232)**. The value is measured from **AIN SWITCH 13 (PAGE 488)** analog input.

Image 8.120 General analog input 13 switch

Logical binary outputs alphabetically (page 435)

AIN Switch14

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 234)** and **Analog Switch 14 Off (page 234)**. The value is measured from **AIN SWITCH 14 (PAGE 488)** analog input.			

Image 8.121 General analog input 14 switch

Logical binary outputs alphabetically (page 435)

AIN Switch15

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 236)** and **Analog Switch 15 Off (page 236)**. The value is measured from **AIN SWITCH 15 (PAGE 488)** analog input.			

Image 8.122 General analog input 15 switch

Logical binary outputs alphabetically (page 435)

AIN Switch16

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 238)** and **Analog Switch 16 Off (page 238)**. The value is measured from **AIN SWITCH 16 (PAGE 489)** analog input.			

Image 8.123 General analog input 16 switch

Logical binary outputs alphabetically (page 435)

AIN Switch17

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 240)** and **Analog Switch 17 Off (page 240)**. The value is measured from **AIN SWITCH 17 (PAGE 489)** analog input.			

Image 8.124 General analog input 17 switch

Logical binary outputs alphabetically (page 435)

AIN Switch18

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 242)** and **Analog Switch 18 Off (page 242)**. The value is measured from **AIN SWITCH 18 (PAGE 489)** analog input.			

Image 8.125 General analog input 18 switch

Logical binary outputs alphabetically (page 435)

AIN Switch19

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 244)** and **Analog Switch 19 Off (page 244)**. The value is measured from **AIN SWITCH 19 (PAGE 490)** analog input.			

Image 8.126 General analog input 19 switch

Logical binary outputs alphabetically (page 435)

AIN Switch20

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	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 246)** and **Analog Switch 20 Off (page 246)**. The value is measured from **AIN SWITCH 20 (PAGE 490)** analog input.

Image 8.127 General analog input 20 switch

Logical binary outputs alphabetically (page 435)

LBO: B

BIN 1 Status

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	1374		
Description			

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.*

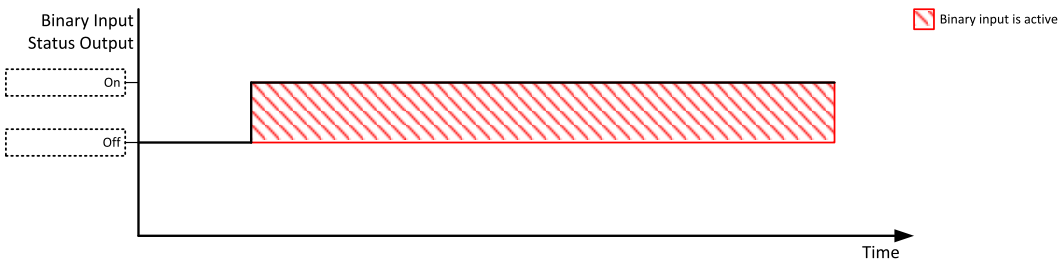

Image 8.128 Binary Input 1 Status

back to Logical binary outputs alphabetically

BIN 2 Status

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1375		
Description			

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.

Note: *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.*

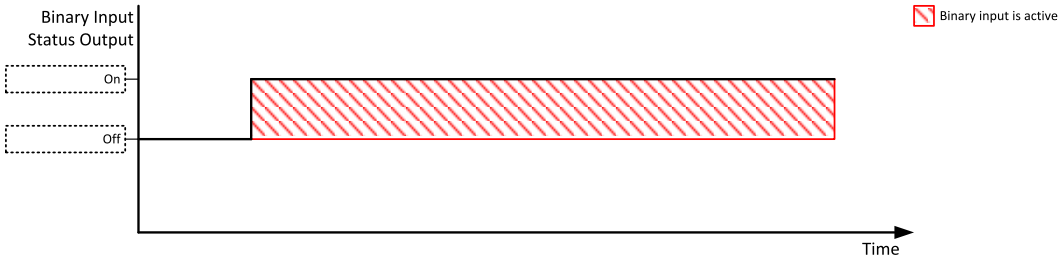

Image 8.129 Binary Input 2 Status

back to Logical binary outputs alphabetically

BIN 3 Status

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1376		
Description			

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.

Note: *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.*

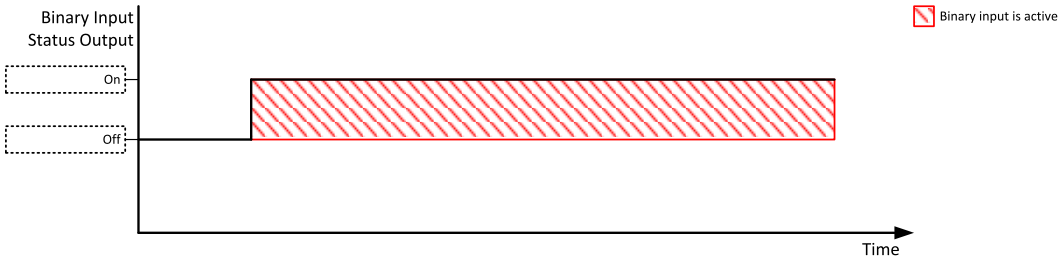

Image 8.130 Binary Input 3 Status

back to Logical binary outputs alphabetically

BIN 4 Status

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1377		
Description			

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.

Note: *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.*

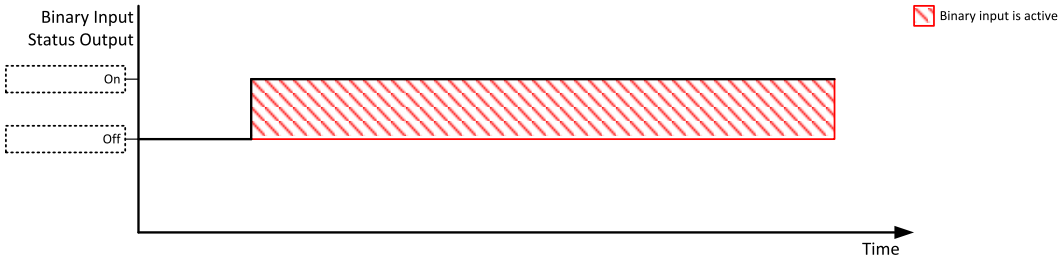

Image 8.131 Binary Input 4 Status

back to Logical binary outputs alphabetically

BIN 5 Status

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1378		
Description			

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.

Note: *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.*

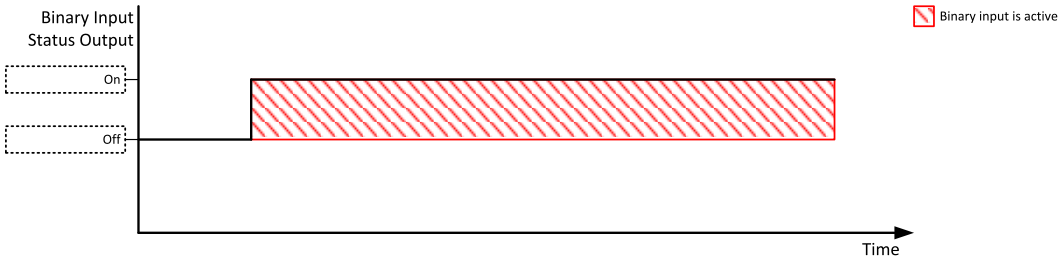

Image 8.132 Binary Input 5 Status

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BIN 6 Status

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1379		
Description			

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.

Note: *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.*

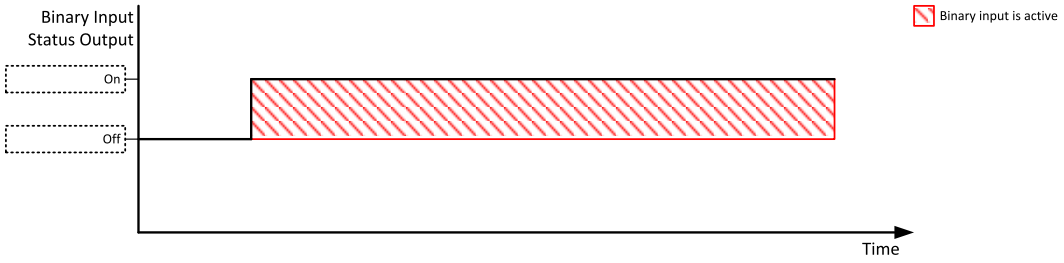

Image 8.133 Binary Input 6 Status

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BIN 7 Status

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1380		
Description			

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.

Note: *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.*

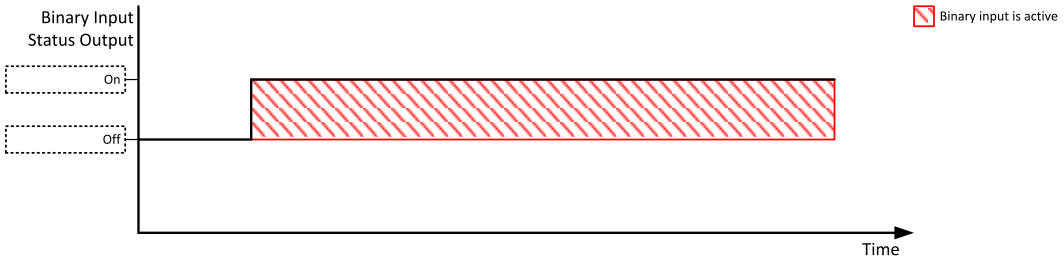

Image 8.134 Binary Input 7 Status

back to Logical binary outputs alphabetically

BIN 8 Status

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	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.*

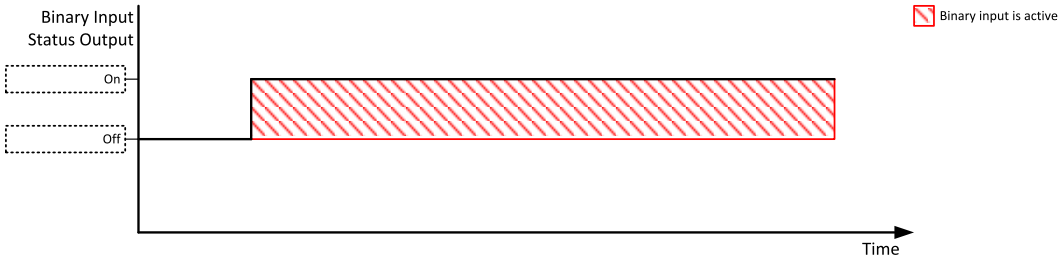

Image 8.135 Binary Input 8 Status

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BTB Close/Open

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	45		
Description			

The output controls the bus 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.

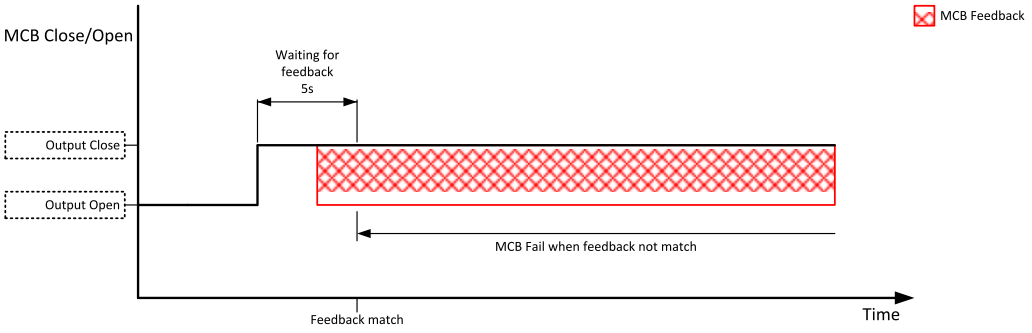

Image 8.136 BTB Close command

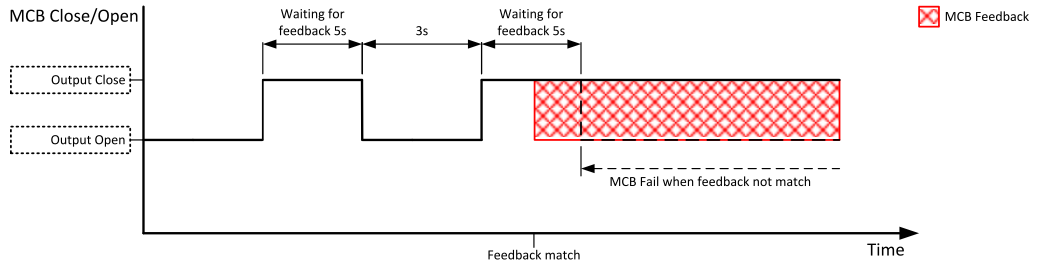

Image 8.137 Repeated BTB Close command

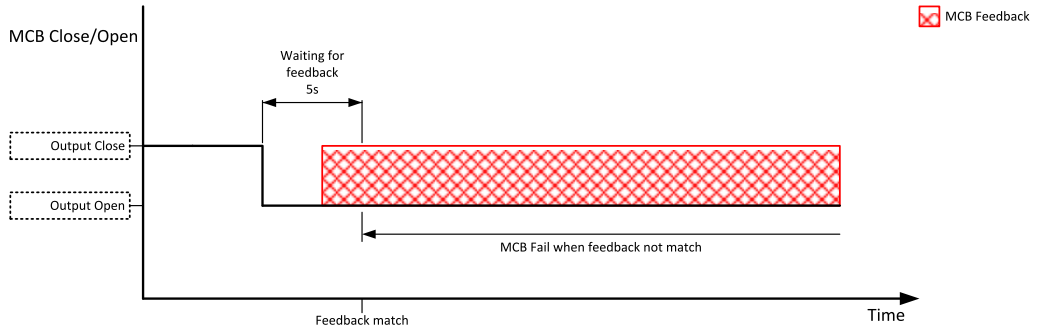

Image 8.138 BTB Open command

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BTB OFF Coil

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	47		

Description

The output is intended for control of open coil of bus 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.

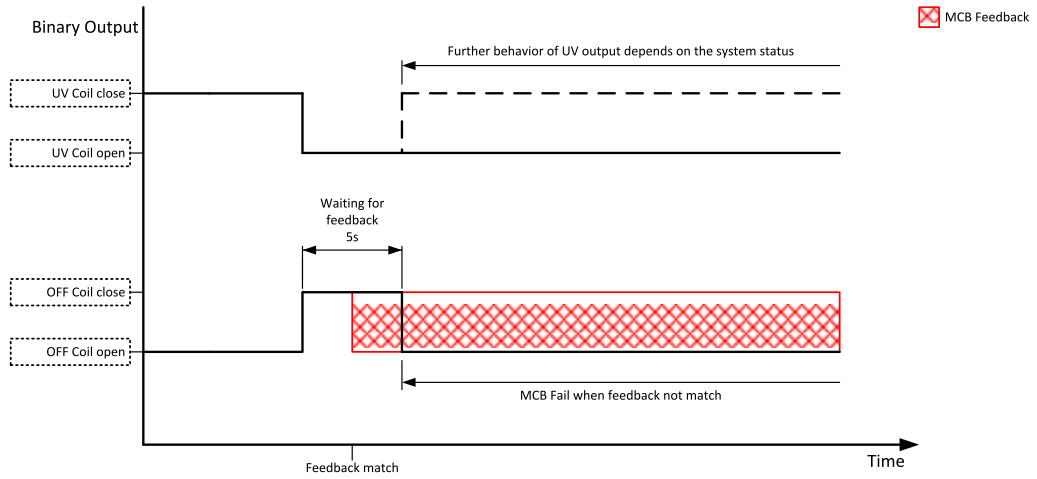

Image 8.139 BTB OFF Coil command

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BTB ON Coil

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	46		

Description

The output is intended for control of close coil of bus circuit breaker. The output gives at least 5 second pulse in the moment the breaker has to be closed.

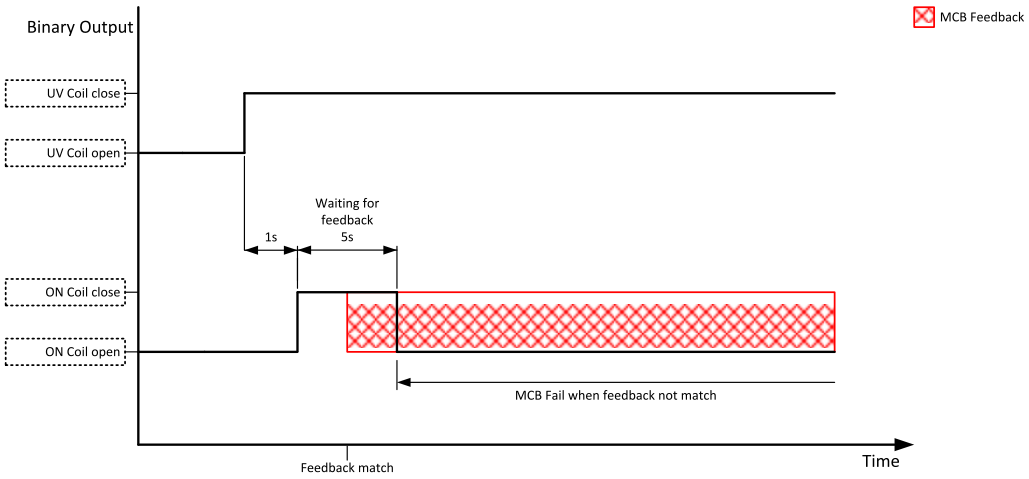

Image 8.140 BTB ON Coil close command

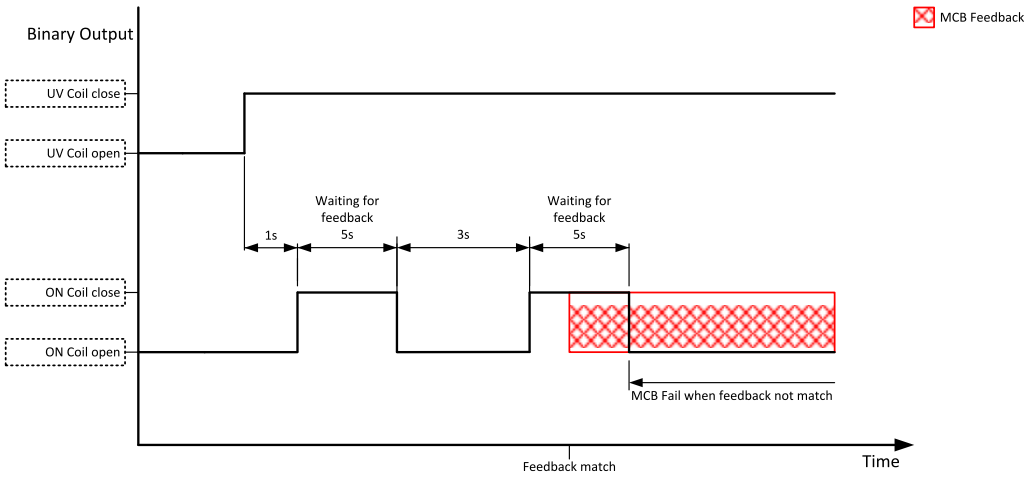

Image 8.141 Repeated BTB ON coil close command

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BTB UV Coil

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	48		

Description

The output is intended for control of undervoltage coil of bus 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.

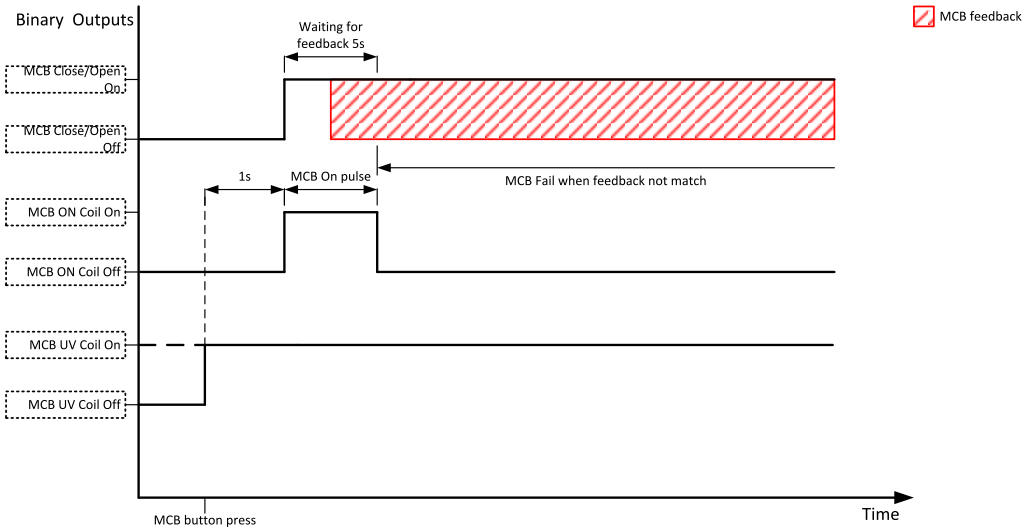

Image 8.142 BTB UV Coil close command

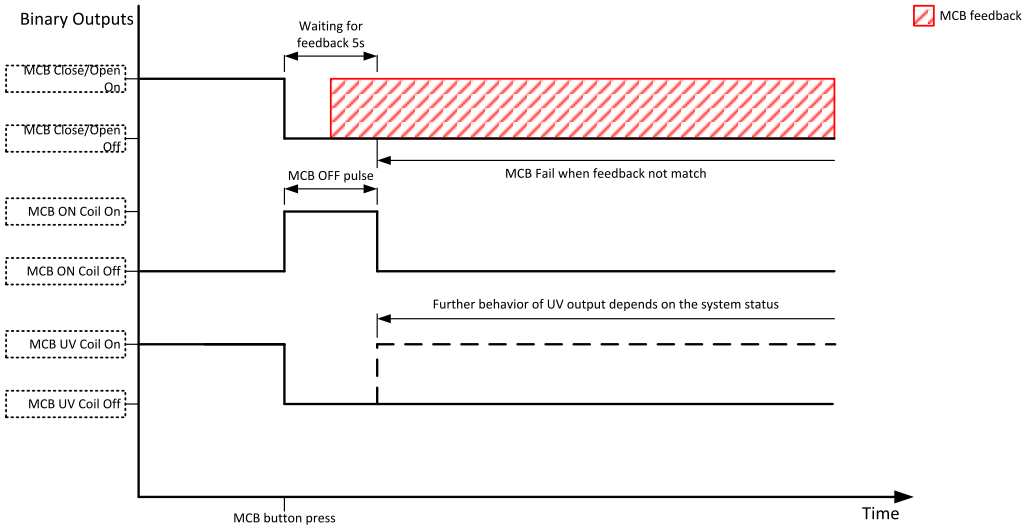

Image 8.143 BTB UV Coil open command

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Bus Right Healthy

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	77		
Description			
This output is active when the Bus Right voltage and frequency is within limits.			

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Bus Left Healthy

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	78		
Description			
This output is active while Bus Left failure is not detected and Bus Left voltage and frequency is within limits.			

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LBO: E

Exercise Timer 1

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1250		
Description			

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 **Subgroup: Timer 1 (page 249)** subgroup. This output is active when Timer 1 is active.

> ***Note:*** *In the event that both Timers are active at the same time,* ***Subgroup: Timer 1 (page 249)*** *has a higher priority than* ***Subgroup: Timer 2 (page 256)****.*

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Exercise Timer 2

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1251		
Description			

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 **Subgroup: Timer 2 (page 256)** subgroup. This output is active when Timer 2 is active.

> ***Note:*** *In the event that both Timers are active at the same time,* ***Subgroup: Timer 1 (page 249)*** *has a higher priority than* ***Subgroup: Timer 2 (page 256)****.*

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LBO: F

Fault Reset

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	592		
Description			
When the Fault Reset button is pressed the output is active for 1 s.			

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LBO: H

Heartbeat

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	81		
Description			
This output toggles on/off in a period of 500 ms whenever the controller is switched on and functional.			

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Horn

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1		
Description			
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: ▶ Fault reset is pressed ▶ Horn reset is pressed ▶ **Horn Timeout (page 179)** has elapsed			

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LBO: M

Mode AUTO

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	19		
Description			
This output is active whenever the controller is in AUTO mode.			

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Mode MAN

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	18		
Description			
This output is active whenever the controller is in MAN mode.			

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Mode OFF

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	17		
Description			
This output is active whenever the controller is in OFF mode.			

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LBO: N

Not In AUTO

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	1248		
Description			
This output is active when controller isn't in AUTO mode.			

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Not Used

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	286		
Description			
Output has no function.			

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LBO: S

Still Log 0

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	26		
Description			
Logical binary output which is still in logical 0.			

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Still Log 1

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	27		
Description			
Logical binary output which is still in logical 1.			

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Synchro

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	69		
Description			
The output is active in case the synchronisation is active.			

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System Reserve OK

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	87		
Description			
This LBO is active when System Reserve is higher than the actual reserve for start of next gen-sets.			

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8.1.5 Logical analog inputs

What Logical analog inputs are:

Logical analog inputs are inputs for analog values.

Note: *Functions related to analog inputs are available only in case of configured analog extension module.*

Alphabetical groups of Logical analog inputs

For full list of Logical analog inputs go to the chapter **Logical analog inputs alphabetically (page 463)**.

Logical analog inputs alphabetically

LAI: A

AIN Prot01

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9999		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 1 Wrn (page 207)** and **Analog Protection 1 Sd (page 207)**. Delay is adjusted by setpoint **Analog Protection 1 Delay (page 207)**.

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

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 Prot02

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9998		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 2 Wrn (page 209)** and **Analog Protection 2 Sd (page 209)**. Delay is adjusted by setpoint **Analog Protection 2 Delay (page 209)**.

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

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 Prot03

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9997		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 3 Wrn (page 211)** and **Analog Protection 3 Sd (page 211)**. Delay is adjusted by setpoint **Analog Protection 3 Delay (page 211)**.

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

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 Prot04

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9996		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 4 Wrn (page 213)** and **Analog Protection 4 Sd (page 213)**. Delay is adjusted by setpoint **Analog Protection 4 Delay (page 213)**.

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

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 Prot05

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9995		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 5 Wrn (page 215)** and **Analog Protection 5 Sd (page 215)**. Delay is adjusted by setpoint **Analog Protection 5 Delay (page 215)**.

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

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 Prot06

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9994		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 6 Wrn (page 217)** and **Analog Protection 6 Sd (page 217)**. Delay is adjusted by setpoint **Analog Protection 6 Delay (page 217)**.

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

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 Prot07

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9993		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 7 Wrn (page 219)** and **Analog Protection 7 Sd (page 219)**. Delay is adjusted by setpoint **Analog Protection 7 Delay (page 219)**.

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

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 Prot08

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9992		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 8 Wrn (page 221)** and **Analog Protection 8 Sd (page 221)**. Delay is adjusted by setpoint **Analog Protection 8 Delay (page 221)**.

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

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 Prot09

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9991		
Description			

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 9 Wrn (page 223)** and **Analog Protection 9 Sd (page 223)**. Delay is adjusted by setpoint **Analog Protection 9 Delay (page 223)**.

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

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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9990		
Description			

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 10 Wrn (page 225)** and **Analog Protection 10 Sd (page 225)**. Delay is adjusted by setpoint **Analog Protection 10 Delay (page 225)**.

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

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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9989		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 11 Wrn (page 227)** and **Analog Protection 11 Sd (page 227)**. Delay is adjusted by setpoint **Analog Protection 11 Delay (page 227)**.

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

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

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	9988		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 12 Wrn (page 229)** and **Analog Protection 12 Sd (page 229)**. Delay is adjusted by setpoint **Analog Protection 12 Delay (page 229)**.

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

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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9987		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 13 Wrn (page 231)** and **Analog Protection 13 Sd (page 231)**. Delay is adjusted by setpoint **Analog Protection 13 Delay (page 231)**.

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

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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9986		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 14 Wrn (page 233)** and **Analog Protection 14 Sd (page 233)**. Delay is adjusted by setpoint **Analog Protection 14 Delay (page 233)**.

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

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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9985		
Description			

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 15 Wrn (page 235)** and **Analog Protection 15 Sd (page 235)**. Delay is adjusted by setpoint **Analog Protection 15 Delay (page 235)**.

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

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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9984		
Description			

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 16 Wrn (page 237)** and **Analog Protection 16 Sd (page 237)**. Delay is adjusted by setpoint **Analog Protection 16 Delay (page 237)**.

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

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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9983		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 17 Wrn (page 239)** and **Analog Protection 17 Sd (page 239)**. Delay is adjusted by setpoint **Analog Protection 17 Delay (page 239)**.

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

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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9982		

Description

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 18 Wrn (page 241)** and **Analog Protection 18 Sd (page 241)**. Delay is adjusted by setpoint **Analog Protection 18 Delay (page 241)**.

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

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

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9981		
Description			

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 19 Wrn (page 243)** and **Analog Protection 19 Sd (page 243)**. Delay is adjusted by setpoint **Analog Protection 19 Delay (page 243)**.

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

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 Prot20

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	9980		
Description			

Logical analog input designed for general value received from analog sensor. Limits for this protection are adjusted by setpoints **Analog Protection 20 Wrn (page 245)** and **Analog Protection 20 Sd (page 245)**. Delay is adjusted by setpoint **Analog Protection 20 Delay (page 245)**.

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

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 Switch 01

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	209		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH01 (PAGE 439)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 1 On (page 208)** and **Analog Switch 1 Off (page 208)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 02

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	210		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH02 (PAGE 440)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 2 On (page 210)** and **Analog Switch 2 Off (page 210)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 03

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	211		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH03 (PAGE 440)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 3 On (page 212)** and **Analog Switch 3 Off (page 212)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 04

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	212		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH04 (PAGE 441)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 4 On (page 214)** and **Analog Switch 4 Off (page 214)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 05

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	278		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH05 (PAGE 441)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 5 On (page 216)** and **Analog Switch 5 Off (page 216)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 06

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	279		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH06 (PAGE 442)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 6 On (page 218)** and **Analog Switch 6 Off (page 218)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 07

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	280		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH07 (PAGE 442)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 7 On (page 220)** and **Analog Switch 7 Off (page 220)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 08

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	281		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH08 (PAGE 443)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 8 On (page 222)** and **Analog Switch 8 Off (page 222)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 09

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	282		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH09 (PAGE 443)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 9 On (page 224)** and **Analog Switch 9 Off (page 224)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 10

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	283		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH10 (PAGE 444)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 10 On (page 226)** and **Analog Switch 10 Off (page 226)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 11

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	284		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH11 (PAGE 444)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 11 On (page 228)** and **Analog Switch 11 Off (page 228)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 12

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	285		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH12 (PAGE 445)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 12 On (page 230)** and **Analog Switch 12 Off (page 230)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 13

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	286		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH13 (PAGE 445)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 13 On (page 232)** and **Analog Switch 13 Off (page 232)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 14

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	287		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH14 (PAGE 446)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 14 On (page 234)** and **Analog Switch 14 Off (page 234)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 15

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	288		
Description			

Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH15 (PAGE 446)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 15 On (page 236)** and **Analog Switch 15 Off (page 236)**.

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 16

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	289		
Description			
Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH16 (PAGE 447)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 16 On (page 238)** and **Analog Switch 16 Off (page 238)**. **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

AIN Switch 17

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	290		
Description			
Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH17 (PAGE 447)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 17 On (page 240)** and **Analog Switch 17 Off (page 240)**. **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

AIN Switch 18

Related FW	2.0.0	**Related applications**	MCB, MGCB, BTB
Comm object	291		
Description			
Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH18 (PAGE 448)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 18 On (page 242)** and **Analog Switch 18 Off (page 242)**. **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

AIN Switch 19

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	292		
Description			
Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH19 (PAGE 448)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 19 On (page 244)** and **Analog Switch 19 Off (page 244)**. **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

AIN Switch 20

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	293		
Description			
Logical analog input designed for general value received from analog sensor. This analog input controls logical binary output **AIN SWITCH20 (PAGE 449)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 20 On (page 246)** and **Analog Switch 20 Off (page 246)**. **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

LAI: B

Bus Import Measurement

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	5		
Description			
Value from this input is used for measurement of transferred bus power.			

back to Logical analog inputs alphabetically

LAI: N

Not Used

Related FW	2.0.0	Related applications	MCB, MGCB, BTB
Comm object	230		
Description			
Input has no function.			

back to Logical analog inputs alphabetically

8.1.6 PLC

List of PLC groups

For full list of PLC blocks go to the chapter **List of PLC blocks (page 492)**.

List of PLC blocks

Group: Basic logical functions

Group: Comparison of analog inputs

Group: Time functions

Group: Other functions

Group: Basic Logical functions

OR/AND

PLC group	Basic logical functions
Related FW	2.0.0
Related applications	AMF, MRS MINT, SPtM
Comm object	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.

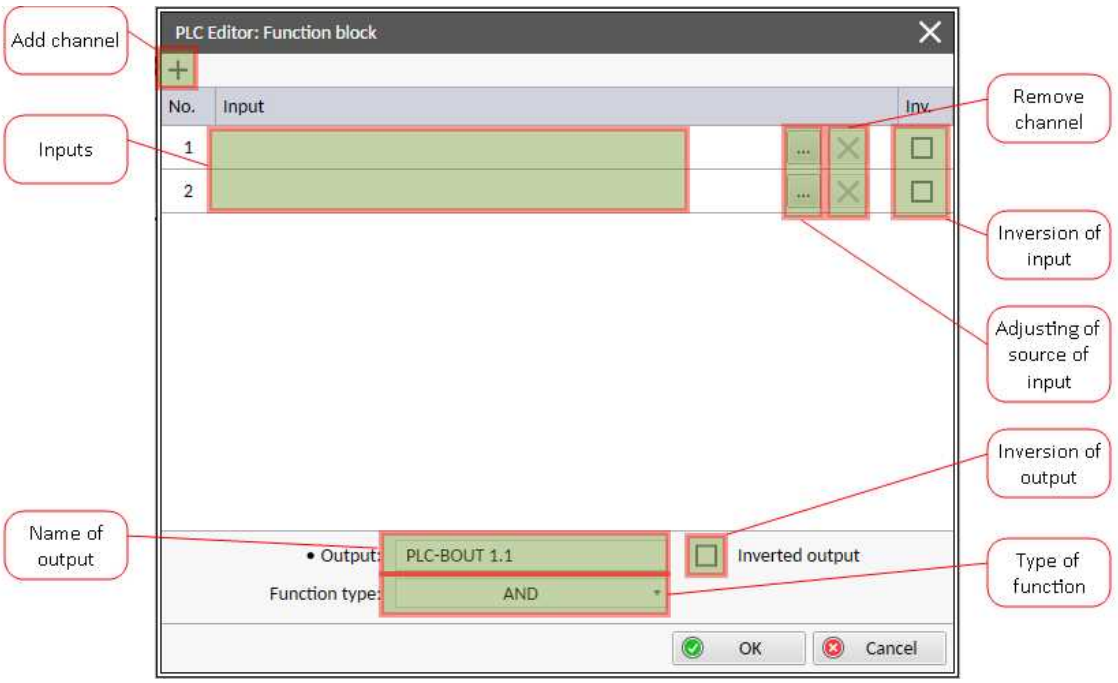

Image 8.144 Configuration of OR/AND block

back to List of PLC blocks

XOR/RS

PLC group	Basic logical functions
Related FW	2.0.0
Related applications	AMF, MRS MINT, SPtM
Comm object	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_{n+1}
0	0	Q_n
0	1	1
1	0	0
1	1	0

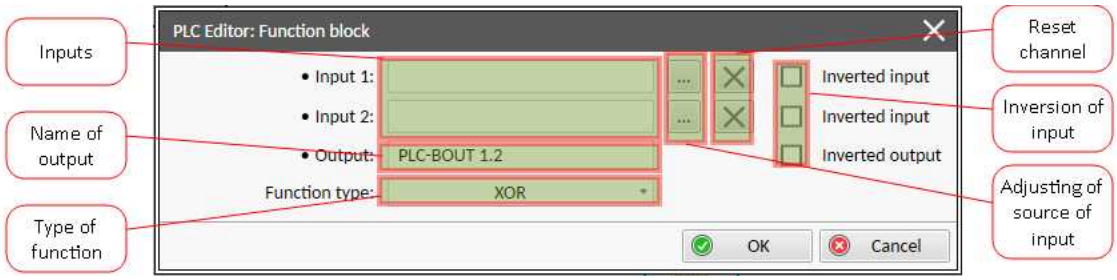

Image 8.145 Configuration of XOR/RS block

back to List of PLC blocks

Group: Comparison of analog inputs

Comparator With Hysteresis

PLC group	Comparison of analog inputs
Related FW	2.0.0
Related applications	AMF, MRS MINT, SPtM
Comm object	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.

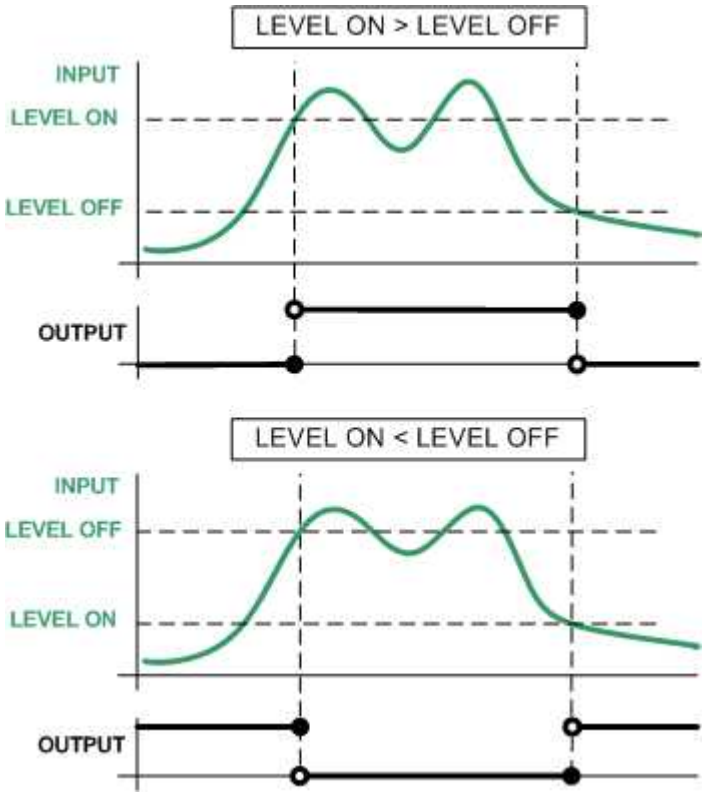

Image 8.146 Different On and Off levels

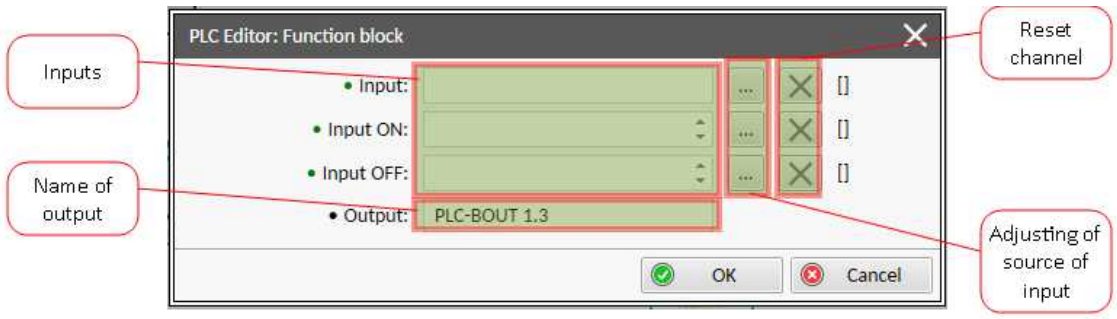

Image 8.147 Configuration of Comp Hyst block

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.**

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Comparator With Delay

PLC group	Comparison of analog inputs
Related FW	2.0.0
Related applications	AMF, MRS MINT, SPtM
Comm object	4

Inputs

Input	Type	Negation	Range	Function
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

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Comparator output

Description

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.

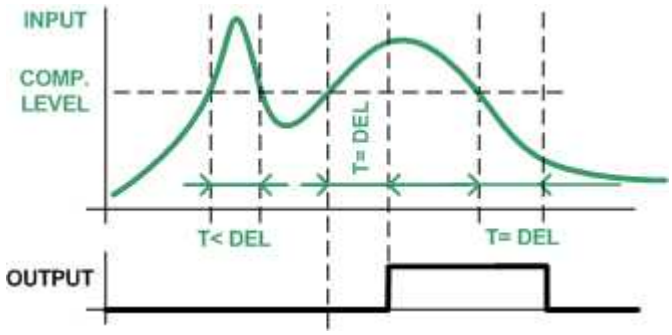

Image 8.148 Principle of delay

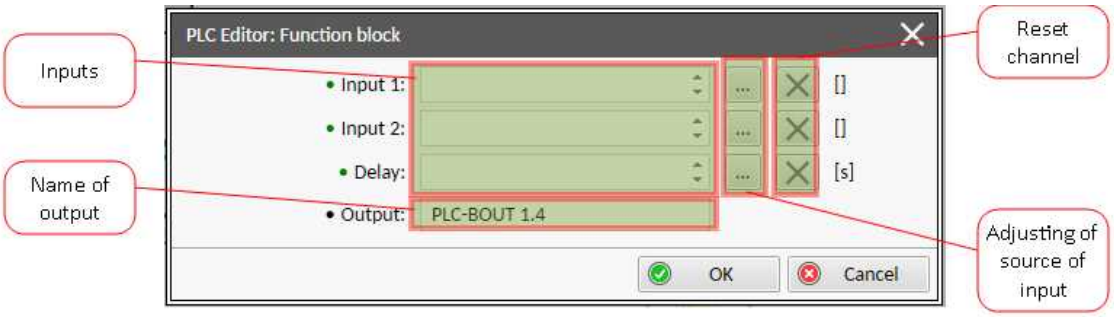

Image 8.149 Configuration of Comp Time block

Note: *Input 2 and Delay can be constants or values from controller.*

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Group: Time functions

Timer

PLC group	Time functions
Related FW	2.0.0
Related applications	AMF, MRS MINT, SPtM
Comm object	14

Inputs

Input	Type	Negation	Range	Function
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

Outputs

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.

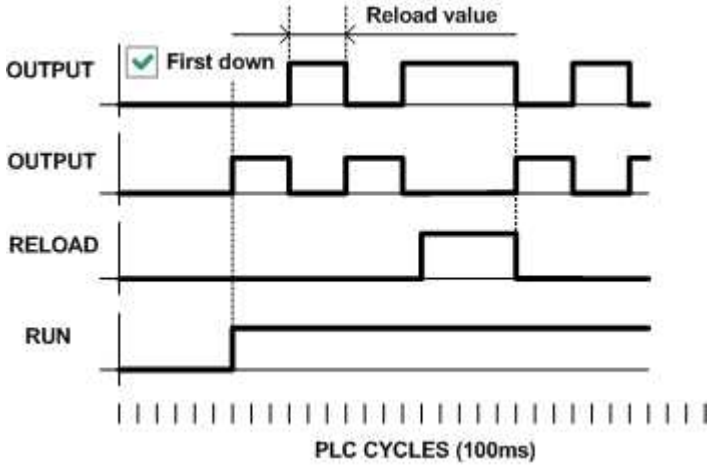

Image 8.150 Principle of timer

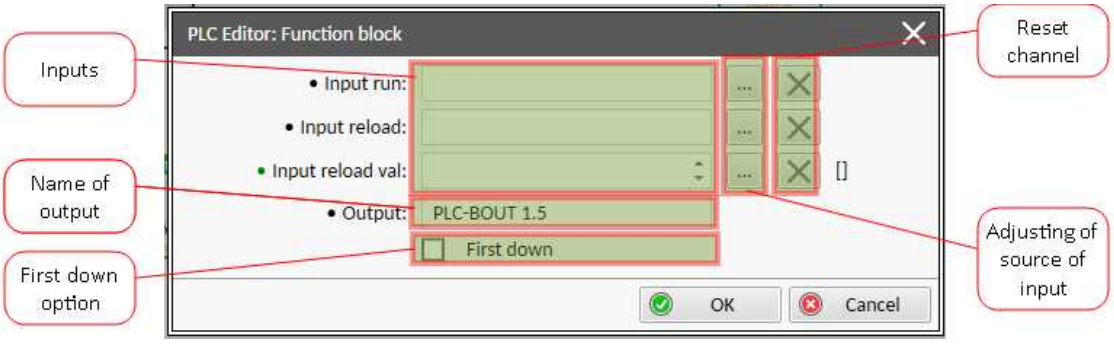

Image 8.151 Configuration of Timer block

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.**

back to List of PLC blocks

Delay

PLC group	Time functions
Related FW	2.0.0
Related applications	AMF, MRS MINT, SPtM
Comm object	33

Inputs

Input	Type	Negation	Range	Function
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)

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Output signal

Description

This block can work in two modes of operation:

- 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.
- 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.

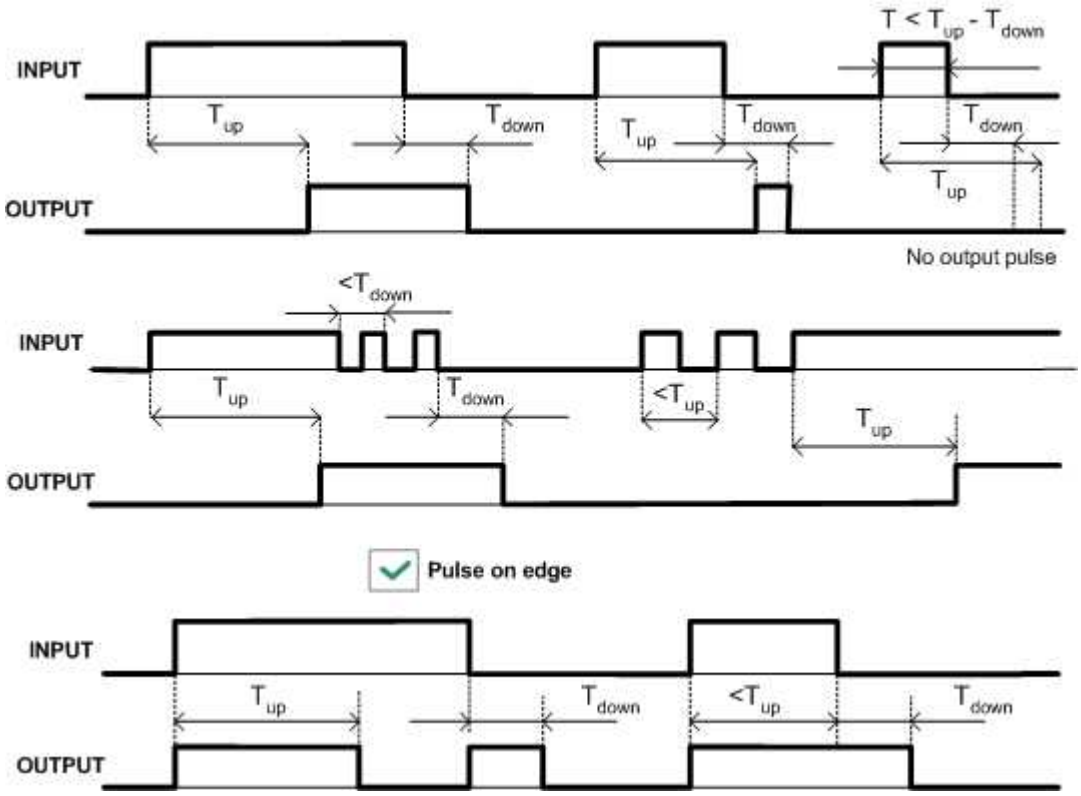

Image 8.152 Delay modes principles

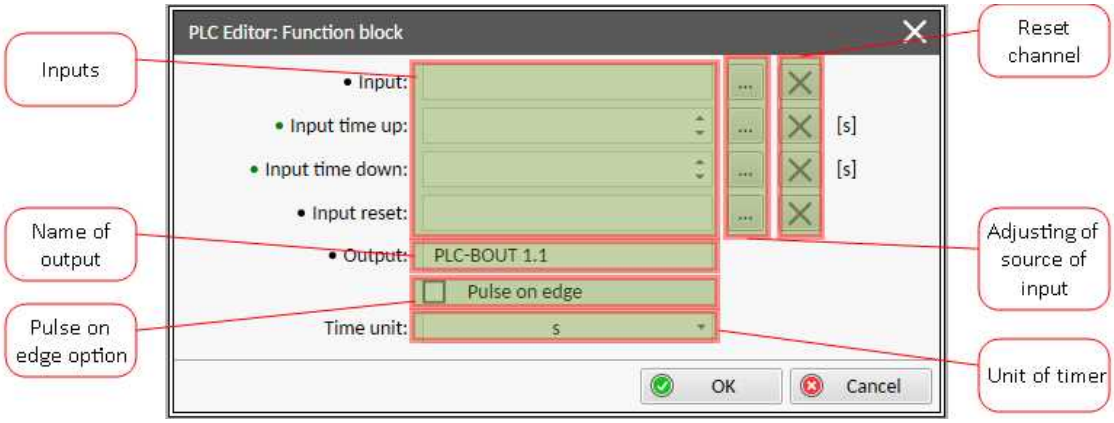

Image 8.153 Configuration of Delay block

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.*

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Group: Other functions

Force History Record

PLC group	Other functions
Related FW	2.0.0
Related applications	AMF, MRS MINT, SPtM
Comm object	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.

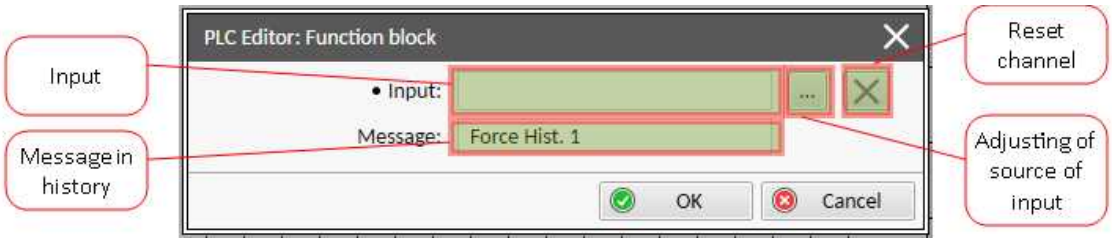


Image 8.154 Configuration of Force Hist block

Note: *Maximal number of characters for history message is 15.*

back to List of PLC blocks

Force Protection

PLC group	Other functions
Related FW	2.0.0
Related applications	AMF, MRS MINT, SPtM
Comm object	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
Fls	Binary	No	0/1	The input activates sensor fail if a fls protection is configured

Outputs
No outputs.
Description
This block issues alarms of configured type and text when appropriate binary input is activated.

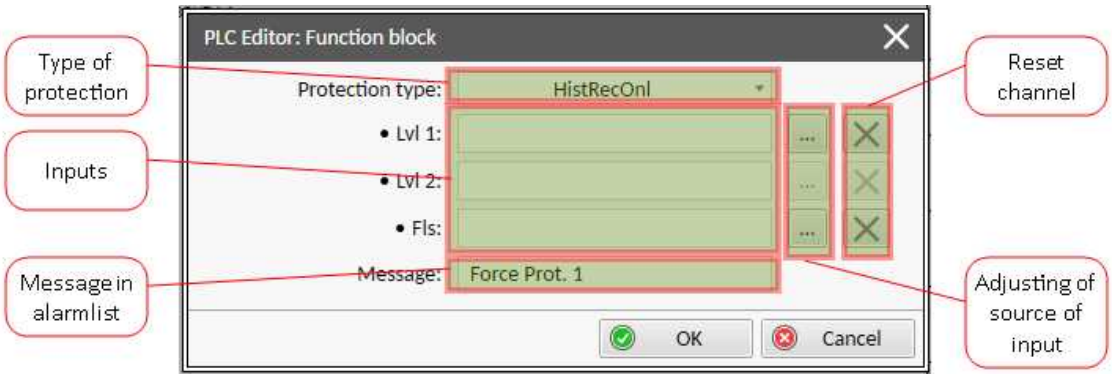


Image 8.155 Configuration of Force Prot block

Available protections are:

- Monitoring
- HistRecOnl
- AL Indic
- Wrn
- Wrn+BOC
- BOC
- Wrn+Sd
- Sd

Note: *Maximal number of characters for alarmlist message is 15.*

Note: *Prefix of protection (e.g. Wrn, Sd, BOC) is added automatically into alarmlist message.*

back to List of PLC blocks

8.2 Alarms

What alarms are:

The controller evaluates two levels of alarms. For more information **see Alarm management on page 103**.

8.2.1 Alarms level 1

For full list of Alarms level 1 go to **List of alarms level 1 (page 505)**.

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 104**.

List of alarms level 1

Warnings

Alarm Email 1 Fail

Alarm Type	Other
Alarmlist message	Alarm Email 1 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 1 (page 284)** and email wasn't send.

back to List of alarms level 1

Alarm Email 2 Fail

Alarm Type	Other
Alarmlist message	Alarm Email 2 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 2 (page 285)** and email wasn't send.

back to List of alarms level 1

Alarm Email 3 Fail

Alarm Type	Other
Alarmlist message	Alarm Email 3 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 3 (page 285)** and email wasn't send.

back to List of alarms level 1

Alarm Email 4 Fail

Alarm Type	Other
Alarmlist message	Alarm Email 4 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 4 (page 285)** and email wasn't send.

back to List of alarms level 1

Alarm SMS 1 Fail

Alarm Type	Other
Alarmlist message	Alarm SMS 1 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 1 (page 281)** and SMS wasn't send.

back to List of alarms level 1

Alarm SMS 2 Fail

Alarm Type	Other
Alarmlist message	Alarm SMS 2 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 2 (page 281)** and SMS wasn't send.

back to List of alarms level 1

Alarm SMS 3 Fail

Alarm Type	Other
Alarmlist message	Alarm SMS 3 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 3 (page 282)** and SMS wasn't send.

back to List of alarms level 1

Alarm SMS 4 Fail

Alarm Type	Other
Alarmlist message	Alarm SMS 4 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 4 (page 282)** and SMS wasn't send.

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	MCB, MGCB, BTB
Description	This alarm informs the operator that the controller supply voltage is out of limits. The following setpoints are related to it: ▶ **Battery Undervoltage (page 180)** ▶ **Battery Overvoltage (page 180)** ▶ **Battery <> Voltage Delay (page 181)**

back to List of alarms level 1

Event Email 1 Fail

Alarm Type	Other
Alarmlist message	Event Email 1 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 1 (page 284)** and email wasn't send.

back to List of alarms level 1

Event Email 2 Fail

Alarm Type	Other
Alarmlist message	Event Email 2 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 2 (page 285)** and email wasn't send.

back to List of alarms level 1

Event Email 3 Fail

Alarm Type	Other
Alarmlist message	Event Email 2 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 3 (page 285)** and email wasn't send.

back to List of alarms level 1

Event Email 4 Fail

Alarm Type	Other
Alarmlist message	Event Email 4 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 4 (page 285)** and email wasn't send.

back to List of alarms level 1

Event SMS 1 Fail

Alarm Type	Other
Alarmlist message	Event SMS 1 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 1 (page 281)** and SMS wasn't send.

back to List of alarms level 1

Event SMS 2 Fail

Alarm Type	Other
Alarmlist message	Event SMS 2 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 2 (page 281)** and SMS wasn't send.

back to List of alarms level 1

Event SMS 3 Fail

Alarm Type	Other
Alarmlist message	Event SMS 3 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 3 (page 282)** and SMS wasn't send.

back to List of alarms level 1

Event SMS 4 Fail

Alarm Type	Other
Alarmlist message	Event SMS 4 Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 4 (page 282)** and SMS wasn't send.

back to List of alarms level 1

Bus CCW Rotation

Alarm Type	Alarm indication
Alarmlist message	Bus CCW Rotation
Alarm evaluated	All the time
Related applications	MCB, MGCB
Description	The controller detects phase sequence on bus voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. There is a fixed defined phase sequence in InteliMains 210 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

Bus Left CCW Rotation

Alarm Type	Alarm indication
Alarmlist message	Bus Left CCW Rotation
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The controller detects phase sequence on Bus Left voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection.

back to List of alarms level 1

Wrn AIN Prot

Alarm Type	Warning
Alarmlist message	Wrn + Name of analog input
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm indicates that value the general analog protection is out of warning protection limit.

back to List of alarms level 1

Wrn BadPwrCfg

Alarm Type	Warning
Alarmlist message	Wrn BadPwrCfg
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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 BIN Protection

Alarm Type	Warning
Alarmlist message	Wrn + Name of binary input
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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.

back to List of alarms level 1

Wrn BTB Fail

Alarm Type	Warning
Alarmlist message	Wrn MCB Fail
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm will occur when the **BTB FEEDBACK (PAGE 427)** input does not match the expected position given by the **BTB CLOSE/OPEN (PAGE 453)** output. It stays active until the mismatch between the output and feedback disappears. ▶ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately. ▶ 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 **BTB CLOSE/OPEN (PAGE 453)** is deactivated again and the next attempt to close the breaker will occur first after the alarm is reset.

back to List of alarms level 1

Wrn Overload

Alarm Type	Warning
Alarmlist message	Wrn Overload
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm is issued when the Bus Left power is over the limit for time period longer than the delay. The following setpoints are related to it: ▶ **Overload Wrn (page 185)** adjusts the overload limit. ▶ **Overload Delay (page 185)** Overload Del adjusts the delay.

back to List of alarms level 1

Synchronization Fail

Alarm Type	Warning
Alarmlist message	Synchronization Fail
Alarm evaluated	During synchronization
Related applications	MCB, MGCB, BTB
Description	This alarm is issued when bus left is synchronizing to the bus right or vice versa, via BTB and **Synchronization Timeout (page 204)** gets elapsed.

back to List of alarms level 2

Bus Measurement Error

Alarm Type	Warning
Alarmlist message	Bus Measurement Error
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm is issued when the voltage on the bus is out of limits for 20 seconds under these conditions: MCB application: ▶ MCB is closed in AUTO mode ▶ Any GCB in the same control group was closed MGCB application: ▶ MCB and MGCB are closed in AUTO mode ▶ Any GCB in the same control group was closed. MGCB closing is blocked BTB application: ▶ BTB feedback was closed in AUTO mode ▶ Any GCB in power management group (on CAN bus) was closed. BTB closing is blocked

back to List of alarms level 2

Other type

Bus Right L1 Overvoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right phase voltage in phases. The following setpoints are related to it: ▶ **Bus Right Overvoltage (page 182)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire or MonoPhase.*

back to List of alarms level 2

Bus Right L1 Undervoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right phase voltage in phases. The following setpoints are related to it: ▶ **Bus Right Undervoltage (page 183)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire or MonoPhase.*

back to List of alarms level 2

Bus Right L1L2 Overvoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right voltage between phases L1 a L2. The following setpoints are related to it: ▶ **Bus Right Overvoltage (page 182)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D.*

back to List of alarms level 2

Bus Right L1L2 Undervoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right voltage between phases L1 a L2. The following setpoints are related to it: ▶ **Bus Right Undervoltage (page 183)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D.*

back to List of alarms level 2

Bus Right L2 Overvoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right phase voltage in phases. The following setpoints are related to it: ▶ **Bus Right Overvoltage (page 182)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire.*

back to List of alarms level 2

Bus Right L2 Undervoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right phase voltage in phases. The following setpoints are related to it: ▶ **Bus Right Undervoltage (page 183)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire.*

back to List of alarms level 2

Bus Right L2L3 Overvoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right voltage between phases L2 a L3. The following setpoints are related to it: ▶ **Bus Right Overvoltage (page 182)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D.*

back to List of alarms level 2

Bus Right L2L3 Undervoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right voltage between phases L2 a L3. The following setpoints are related to it: ▶ **Bus Right Undervoltage (page 183)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D.*

back to List of alarms level 2

Bus Right L3 Overvoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right phase voltage in phases. The following setpoints are related to it: ▶ **Bus Right Overvoltage (page 182)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire.*

back to List of alarms level 2

Bus Right L3 Undervoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right phase voltage in phases. The following setpoints are related to it: ▶ **Bus Right Undervoltage (page 183)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire.*

back to List of alarms level 2

Bus Right L3L1 Overvoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right voltage between phases L3 a L1. The following setpoints are related to it: ▶ **Bus Right Overvoltage (page 182)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D or SplitPhase.*

back to List of alarms level 2

Bus Right L3L1 Undervoltage

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right voltage between phases L3 a L1. The following setpoints are related to it: ▶ **Bus Right Undervoltage (page 183)** ▶ **Bus Right < > Voltage Delay (page 183)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D or SplitPhase.*

back to List of alarms level 2

Bus Right Overfrequency

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right frequency. The following setpoints are related to it: ▶ **Bus Right Overfrequency (page 184)** ▶ **Bus Right < > Frequency Delay (page 184)**

back to List of alarms level 2

Bus Right Underfrequency

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right frequency. The following setpoints are related to it: ▶ **Bus Right Underfrequency (page 184)** ▶ **Bus Right < > Frequency Delay (page 184)**

back to List of alarms level 2

Bus Right Voltage Unbalance

Alarm Type	History record
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Right phase voltage unbalance. The following setpoints are related to it: ▶ **Bus Right Voltage Unbalance (page 183)** ▶ **Bus Right Voltage Unbalance Delay (page 183)**

back to List of alarms level 2

EM(A) - a message lost

Alarm Type	Other
Alarmlist message	EM(A) - a message lost
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 1

EM(A) - configuration mistake

Alarm Type	Other
Alarmlist message	EM(A) - configuration mistake
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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(A) - insufficient

Alarm Type	Other
Alarmlist message	EM(A) - insufficient
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm indicates that module does not support all required features.

back to List of alarms level 1

EM(A) - missing or damaged

Alarm Type	Other
Alarmlist message	EM(A) - missing or damaged
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	Other
Alarmlist message	EM(B) - a message lost
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	Other
Alarmlist message	EM(B) - configuration mistake
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	Other
Alarmlist message	EM(B) - insufficient
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm indicates that module does not support all required features.

back to List of alarms level 1

EM(B) - missing or damaged

Alarm Type	Other
Alarmlist message	EM(B) - missing or damaged
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Module(slotA) - comm. outage

Alarm Type	Other
Alarmlist message	Module(slotA) - comm. outage
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	Other
Alarmlist message	Module(slotA) - fake module
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm indicates that false module is inserted in slot.

back to List of alarms level 1

Module(slotA) - unattended

Alarm Type	Other
Alarmlist message	Module(slotA) - unattended
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	Other
Alarmlist message	Module(slotA) - unexpected
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	Other
Alarmlist message	Module(slotA) - unknown module
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm indicates that unknown module is inserted in slot.

back to List of alarms level 1

Module(slotB) - comm. outage

Alarm Type	Other
Alarmlist message	Module(slotB) - comm. outage
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	Other
Alarmlist message	Module(slotB) - fake module
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm indicates that false module is inserted in slot.

back to List of alarms level 1

Module(slotB) - unattended

Alarm Type	Other
Alarmlist message	Module(slotB) - unattended
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	Other
Alarmlist message	Module(slotB) - unexpected
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	Other
Alarmlist message	Module(slotB) - unknown module
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm indicates that unknown module is inserted in slot.

back to List of alarms level 1

8.2.2 Alarms level 2

For full list of Alarms level 2 go to **List of alarms level 2 (page 523)**.

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 104**.

List of alarms level 2

Other type

BOR AIN Prot

Alarm Type	BOR
Alarmlist message	BOR + Name of analog input
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm indicates that the value of general analog protection is out of BOR protection limit.

back to List of alarms level 2

BOR BIN Protection

Alarm Type	BOR
Alarmlist message	BOR + Name of binary input
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	Binary input also can be adjusted like alarm. In this case message in alarmlist contains prefix - BOR and binary input name. This alarm occurs, when appropriate binary input is active.

back to List of alarms level 2

Current Unbalance

Alarm Type	BOR
Alarmlist message	BOR Current Unbalance
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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: ▶ **Current Unbalance (page 188)** adjusts the maximum allowed difference between the highest and lowest phase current at any given time. ▶ **Current Unbalance Delay (page 188)** adjusts the alarm delay.

back to List of alarms level 2

BOR Overcurrent IDMT

Alarm Type	BOR
Alarmlist message	BOR Overcurrent IDMT
Alarm evaluated	All the time

Related applications	MCB, MGCB. BTB
Description	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 above the limit (**Nominal Current (page 175)**). The higher is the overcurrent, the shorter the reaction time will be. All mains phases are evaluated. The behavior of the overcurrent alarm is adjusted by the following setpoints: ▶ **IDMT Overcurrent (page 187)** defines the reaction time of the protection when the current is twice the amount of nominal value. ▶ **Nominal Current (page 175)** set the nominal current level, where the alarm starts to be evaluated. The reaction time is infinite at this point.

back to List of alarms level 2

BOR Overload

Alarm Type	BOR
Alarmlist message	BOR Overload
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	The alarm is issued when the Bus Left power is over the limit for time period longer than the delay. The behavior of the overload alarm is adjusted by the following setpoints: ▶ **Overload BOR (page 185)** adjusts the overload limit. ▶ **Overload Delay (page 185)** adjusts the delay

back to List of alarms level 2

MPR Short Circuit

Alarm Type	Mains protect
Alarmlist message	MPR Short Circuit
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This is a fast overcurrent protection. The following setpoints are related to this alarm: ▶ **Short Circuit BOR (page 186)** adjusts the short current limit ▶ **Short Circuit BOR Delay (page 186)** adjusts the delay in fine steps

back to List of alarms level 2

Bus Left L1 Overvoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time

Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left phase voltage in phases. The following setpoints are related to it: ▶ **Bus Left Overvoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire or MonoPhase.*

back to List of alarms level 2

Bus Left L1 Undervoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left phase voltage in phases. The following setpoints are related to it: ▶ **Bus Left Undervoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire or MonoPhase.*

back to List of alarms level 2

Bus Left L1L2 Overvoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left voltage between phases L1 a L2. The following setpoints are related to it: ▶ **Bus Left Overvoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D.*

back to List of alarms level 2

Bus Left L1L2 Undervoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time

Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left voltage between phases L1 a L2. The following setpoints are related to it: ▶ **Bus Left Undervoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D.*

back to List of alarms level 2

Bus Left L2 Overvoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left phase voltage in phases. The following setpoints are related to it: ▶ **Bus Left Overvoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire.*

back to List of alarms level 2

Bus Left L2 Undervoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left phase voltage in phases. The following setpoints are related to it: ▶ **Bus Left Undervoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire.*

back to List of alarms level 2

Bus Left L2L3 Overvoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time

Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left voltage between phases L2 a L3. The following setpoints are related to it: ▶ **Bus Left Overvoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D.*

back to List of alarms level 2

Bus Left L2L3 Undervoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left voltage between phases L2 a L3. The following setpoints are related to it: ▶ **Bus Left Undervoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D.*

back to List of alarms level 2

Bus Left L3 Overvoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left phase voltage in phases. The following setpoints are related to it: ▶ **Bus Left Overvoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire.*

back to List of alarms level 2

Bus Left L3 Undervoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time

Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left phase voltage in phases. The following setpoints are related to it: ▶ **Bus Left Undervoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph4Wire.*

back to List of alarms level 2

Bus Left L3L1 Overvoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left voltage between phases L3 a L1. The following setpoints are related to it: ▶ **Bus Left Overvoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D or SplitPhase.*

back to List of alarms level 2

Bus Left L3L1 Undervoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left voltage between phases L3 a L1. The following setpoints are related to it: ▶ **Bus Left Undervoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)** ***Note:*** *Alarm is active only in case the setpoint* ***Connection type (page 176)*** *is set to 3Ph3Wire or High Leg D or SplitPhase.*

back to List of alarms level 2

Bus Left L1 Overvoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time

Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left phase voltage in phases 1. The following setpoints are related to it: ▶ **Bus Left Overvoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)**

back to List of alarms level 2

Bus Left L1 Overvoltage

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left phase voltage in phases 1. The following setpoints are related to it: ▶ **Bus Left Overvoltage (page 188)** ▶ **Bus Left < > Voltage Delay (page 189)**

back to List of alarms level 2

Bus Left Voltage Unbalance

Alarm Type	Breaker open
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm evaluates the Bus Left voltage unbalance. The following setpoints are related to it: ▶ **Bus Left Voltage Unbalance (page 189)** ▶ **Bus Left Voltage Unbalance Delay (page 189)**

back to List of alarms level 2

8.2.3 Fail sensor and other types

For full list of Fails sensor and other types of alarms go to **List of fail sensor alarms (page 531)**.

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 105**.

Note: *Functions related to analog inputs are available only in case of configured analog extension module.*

List of fail sensor alarms

Fail sensor

FIs AIN Prot 1

Alarm Type	FIs
Alarmlist message	FIs + name of analog input 1
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm indicates that the value of general analog protection is out of range or is missing.

back to List of fail sensor alarms

FIs AIN Protect 2

Alarm Type	FIs
Alarmlist message	FIs + name of analog input 2
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	FIs
Alarmlist message	FIs + name of analog input 3
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	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

Alarm Type	FIs
Alarmlist message	FIs + name of analog input 4
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 4 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 5

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 5
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 5 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 6

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 6
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 6 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 7

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 7
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 7 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 8

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 8
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 8 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 9

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 9
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 9 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 10

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 10
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 10 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 11

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 11
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 11 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 12

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 12
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 12 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 13

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 13
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 13 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 14

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 14
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 14 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 15

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 15
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 15 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 16

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 16
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 16 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 17

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 17
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 17 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 18

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 18
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 18 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 19

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 19
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 19 is out of range or is missing.

back to List of fail sensor alarms

Fls AIN Protect 20

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 20
Alarm evaluated	All the time
Related applications	MCB, MGCB, BTB
Description	This alarm occurs when measurement value of analog input 20 is out of range or is missing.

back to List of fail sensor alarms

8.3 Modules

8.3.1 Plug-In modules

IMPORTANT: 2nd generation of InteliMains 210 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
- CM-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 and with earth fault current protection

Note: *Controller has 12 plug-in module slots.*

Supported combinations of plug-in modules

Module	CM-Ethernet	CM-4G-GPS	CM-GPRS	CM-RS232-485	EM-BIO8-EFCP
CM-Ethernet	✗	✓	✓	✓	✓
CM-4G-GPS	✓	✗	✗	✓	✓
CM-GPRS	✓	✗	✗	✓	✓
CM-RS232-485	✓	✓	✓	✗	✓
EM-BIO8-EFCP	✓	✓	✓	✓	✓

Communication modules

CM-RS232-485

CM-RS232-485 is optional plug-in card to enable InteliMains 210 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 8.156 CM-RS232-485 interface

IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.

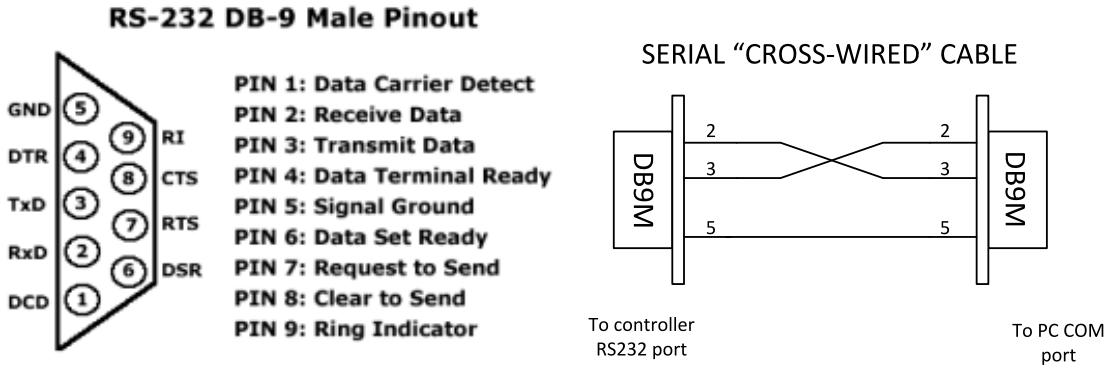


Image 8.157 Pinout of RS-232 line

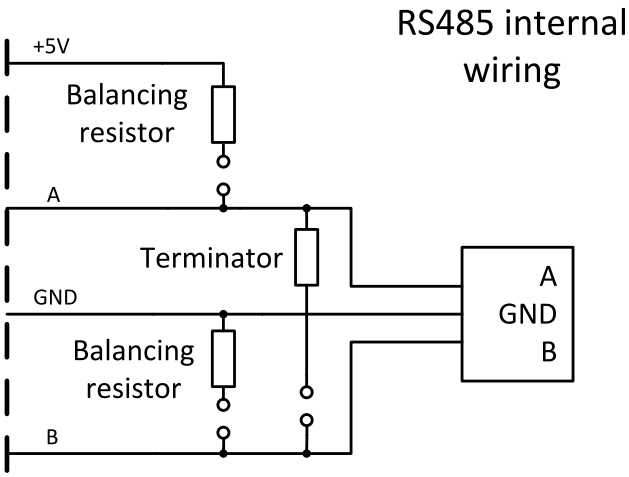


Image 8.158 Pinout of RS-485 line

Image 8.159 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

Power consumption	40 mA / 8 VDC 26 mA / 12 VDC 14 mA / 24 VDC 10 mA / 36 VDC
Isolation	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-Ethernet

CM-Ethernet is a plug-in card with Ethernet 10/100 Mbit interface in RJ45 connector. It provides an interface for connecting a PC with through ethernet/internet network, for sending active e-mails and for integration of the controller into a building management (MODBUS TCP and SNMP protocols). This card also enables to monitor and control the gen-set over web browser from any location with internet access using appropriate security measures.

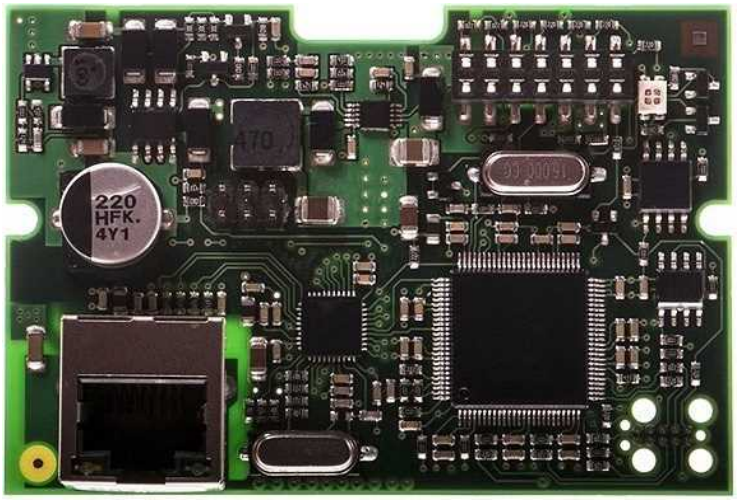


Image 8.160 CM-Ethernet interface

IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.

Use an Ethernet UTP cable with a RJ45 connector for linking the module with your Ethernet network. The module can also be connected directly to a PC using cross-wired UTP cable.

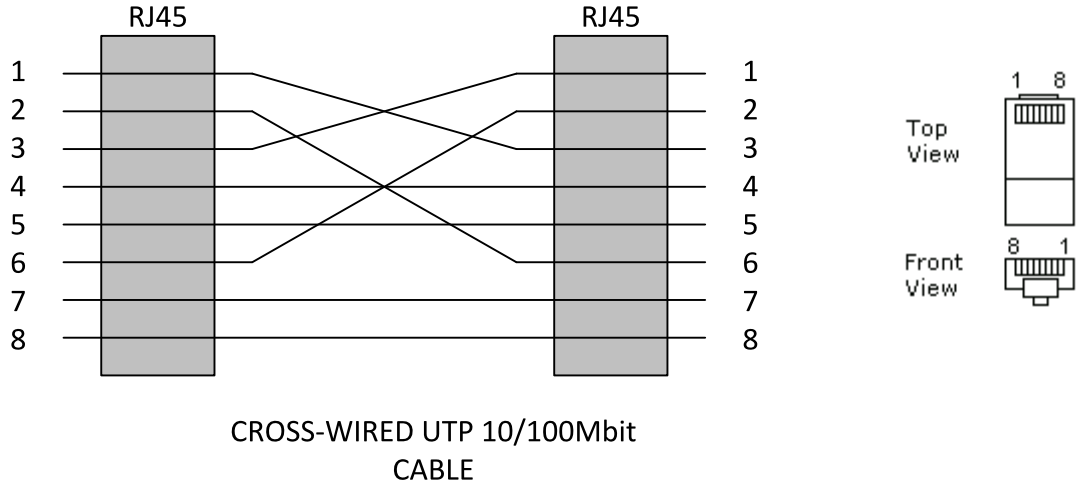


Image 8.161 Cross-wired cable

Technical data

Power consumption	120 mA / 8 VDC 82 mA / 12 VDC 35 mA / 24 VDC 25 mA / 36 VDC

Module setup

All settings related to the module are to be adjusted via the controller setpoints. The respective setpoints are located in the setpoint **Group: CM-Ethernet (page 284)**.

All actual operational values like actual IP address etc. are available in controller values in a specific group as well.

On module is also indication LED. Following states are indicated via this LED:

- bootloader mode with communication with controller - green LED is blinking in period 50ms/50ms
- bootloader mode without communication with controller - red LED is blinking in period 50ms/50ms
- operating mode with communication with controller - green LED is blinking in period 500ms/500ms
- operating mode without communication with controller - red LED is blinking in period 500ms/500ms
- test mode - green LED is blinking in period 250ms/250ms

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

CM-GPRS plug-in module is a GSM/GPRS modem which can works in two modes of operation based on the settings in the setpoint **Mode (page 274)**.

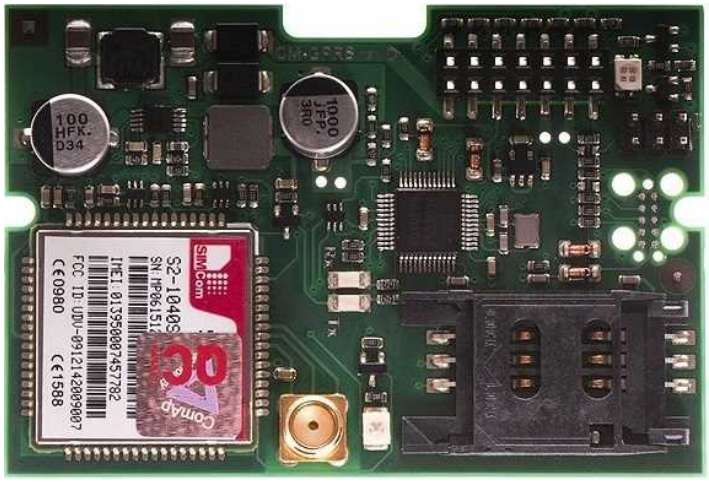


Image 8.162 CM-GPRS module

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.*

CM-GPRS module works with:

- WebSupervisor – internet-based remote monitoring solution
- AirGate – powerful connection technology to make internet access as simple as possible

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.

- Contact your mobile operator for getting packet data APN (APN = Access Point Name), username and password.

Example: APN Name = "internet", UserName = [blank], Password = [blank].

- 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.
- Select the mode of CM-GPRS module by adjusting setpoint Mode.
- Enter correct APN Name, APN User Name and APN User Password in controller's setpoint group CM-GPRS which is accessible by PAGE button from any measurement screen on controller. Setpoints can be set on controller's front panel keyboard or by InteliConfig.
- Switch the controller off and on.
- Wait for approx 2 - 4 minutes for first connection of the system to AirGate. AirGate will generate automatically the AirGate ID value. Then navigate to measurement screens where you will find signal strength bar and AirGate ID identifier.

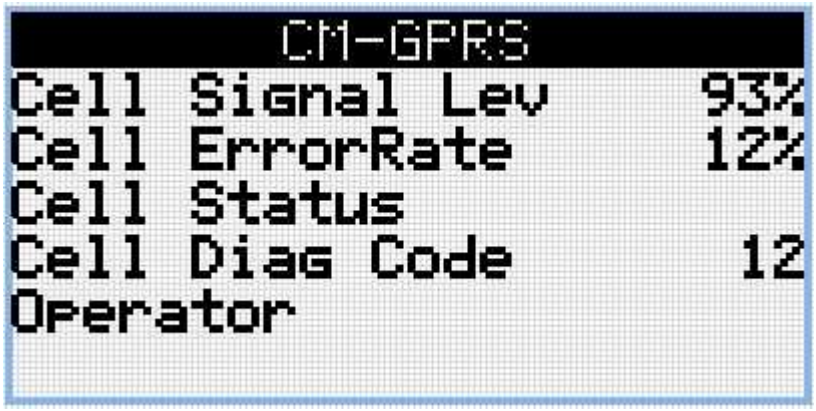


Image 8.163 Main screen of CM-GPRS module

Image 8.164 Screen of AirGate

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

AirGate Diag – Diagnostic Code for AirGate connection

Code	Description
0	Waiting for connection to AirGate Server
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

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

CM-4G-GPS plug-in module containing a GPS receiver and GSM/WCDMA/LTE modem which can works in two modes of operation based on the settings in the setpoint **Mode (page 274)**.

Image 8.165 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.*

CM-4G-GPS module works with:

- WebSupervisor – internet-based remote monitoring solution
- AirGate – powerful connection technology to make internet access as simple as possible
- Locate – Celluar network based localization service

CM-4G-GPS module also works like GPS locator. Geo-fencing function can be used with this module.

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 SIM 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.*

- Contact your mobile operator for getting packet data APN (APN = Access Point Name), username and password.

Example: APN Name = "internet", UserName = [blank], Password = [blank].

- 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.
- If you want to use the built-in GPS receiver connect also an **active** GPS antenna to the GPS antenna connector.
- Switch off the controller.
- Insert CM-4G-GPS module into controller
- Power up the controller.
- Select the mode of CM-4G-GPS module by adjusting setpoint Mode.
- Enter correct APN Name, APN User Name and APN User Password in controller's setpoint group CM-4G-GPS which is accessible by PAGE button from any measurement screen on controller. Setpoints can be set on controller's front panel keyboard or by InteliConfig.
- Switch the controller off and on.
- Wait for approx 2 - 4 minutes for first connection of the system to AirGate. AirGate will generate automatically the AirGate ID value. Then navigate to measurement screens where you will find signal strength bar and AirGate ID identifier.

Image 8.166 Main screen of CM-4G-GPS module

Image 8.167 Screen of AirGate

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

AirGate Diag – Diagnostic Code for AirGate connection

Code	Description
0	Waiting for connection to AirGate Server
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

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

EM-BIO8-EFCP is optional plug-in card. Through this card controller can accommodate one AC current (CT) measuring input (1A or 5A input) and up to 8 binary inputs or outputs. In InteliConfig PC configuration tool it is possible to easily choose if particular I/O will be binary input or output.

Image 8.168 EM-BIO8-EFCP interface

IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.

IMPORTANT: Earth fault current measurement is supported by controller only in slot A.

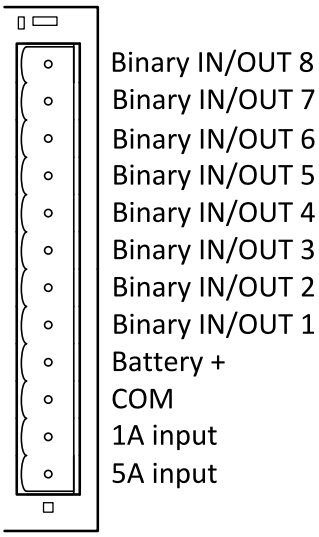


Image 8.169 Overview of EM-BIO8-EFCP

Note: *Current inputs are supported only in MRS16 and AMF25 controllers.*

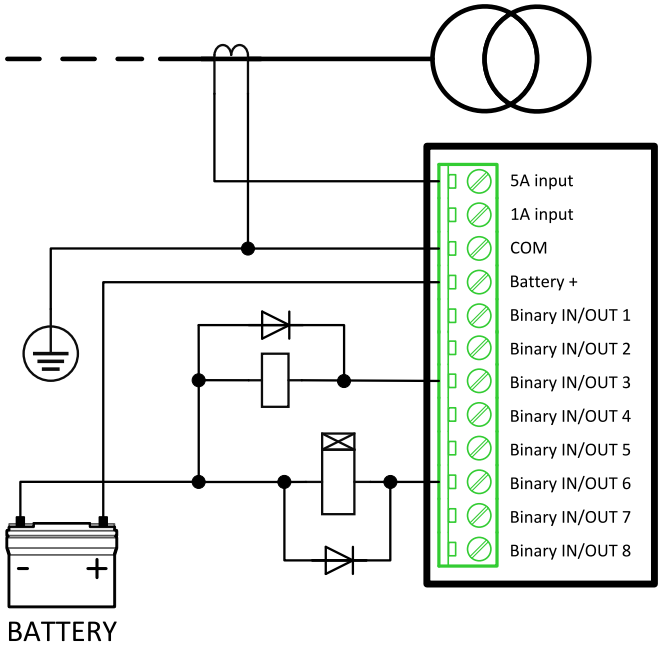


Image 8.170 EM-BIO8-EFCP wiring

Note: *Current inputs are supported only in MRS16 and AMF25 controllers.*

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 >6 VDC open contact

Binary outputs

Number	Up to 8 , non-isolated
Max. current	0,5A
Switching to	positive supply terminal

Current measuring input

Number of inputs	2
Nominal input current	1A/5A
Load (CT output impedance)	< 0,1
Max measured current from CT	10 A
Current measurement tolerance	2% from Nominal current
Max peak current from CT	150 A / 1 s
Max continuous current	10 A

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.

8.3.2 CAN modules

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	✓	✓	✓	✓	✓	✗	✗
4	✓	✓	✓	✓	✓	✗	✗
5	✗	✗	✓	✓	✗	✗	✗

IMPORTANT: In slot 3, 4 and 5 CAN modules Inteli IO8/8 and Inteli 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

Inteli AIN8

Inteli AIN8 module is extension module equipped with analog inputs. Inteli AIN8 module is connected to controller by CAN1 bus.

Image 8.171 Inteli AIN8

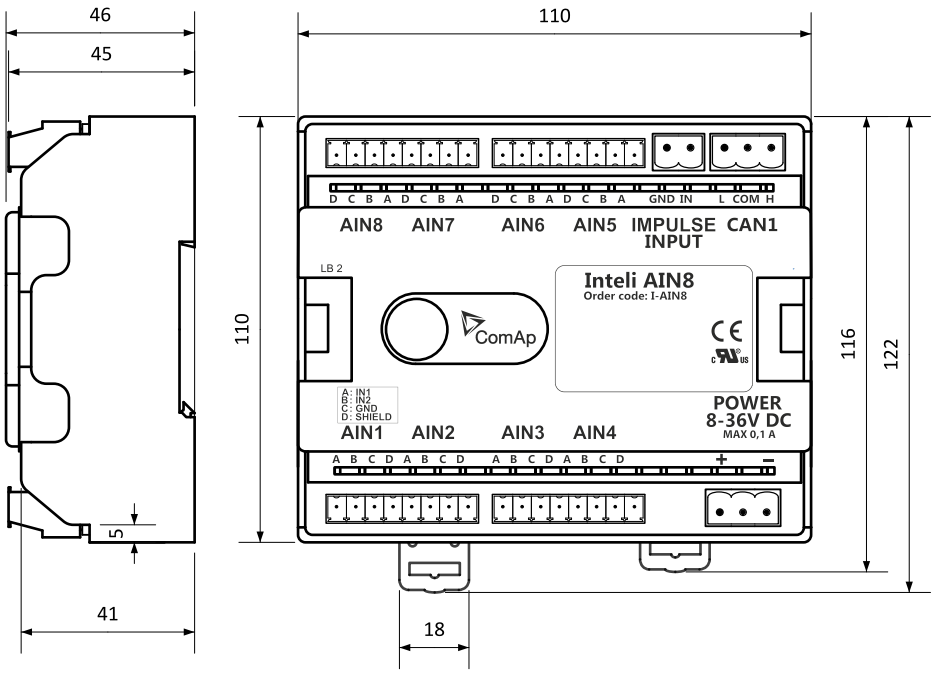
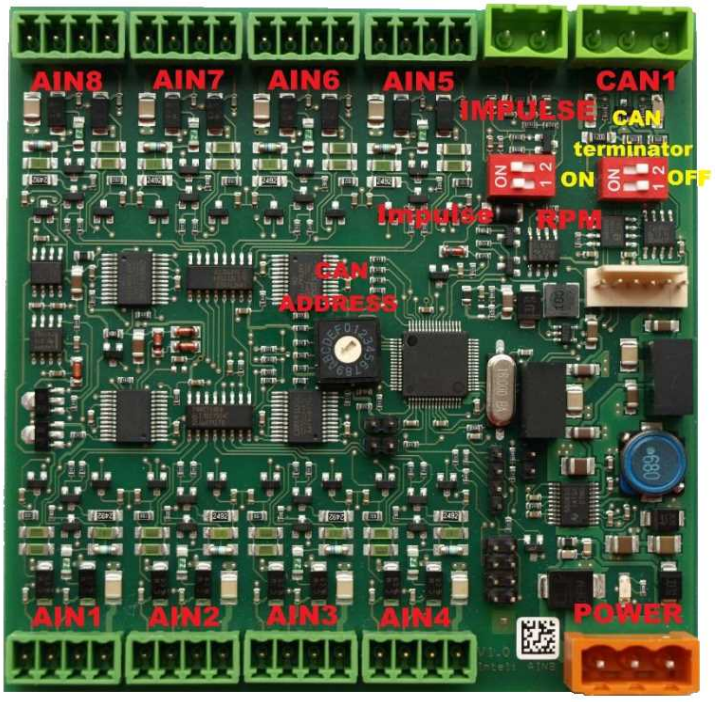


Image 8.172 Inteli AIN8 dimensions

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.

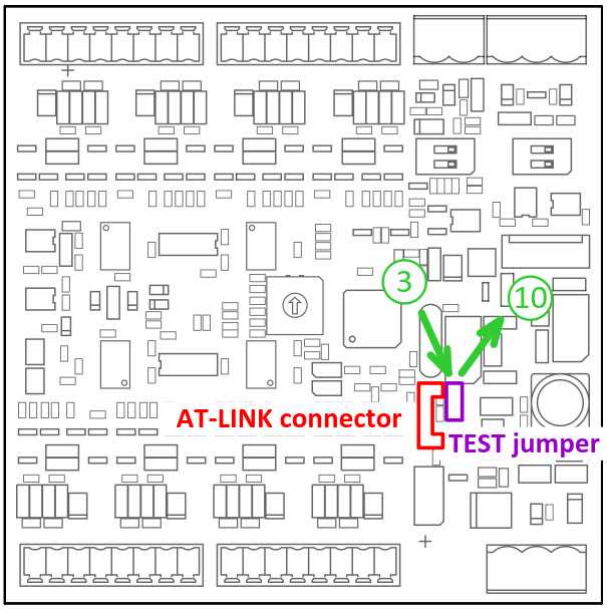
Note: *In case of setting the CAN address to zero, the appropriate group of signals is deactivated.*

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

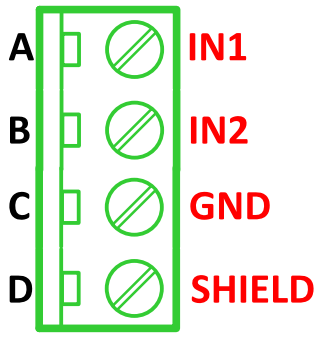
LED indication

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. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller).

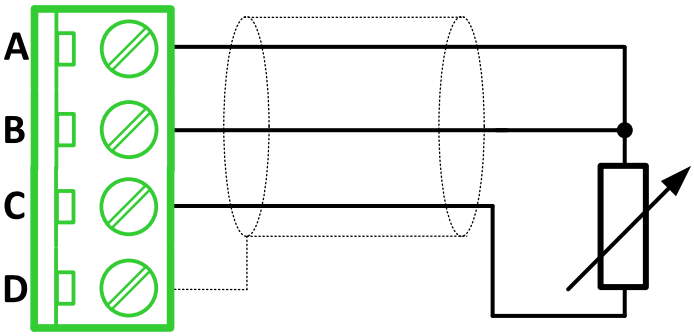
Wiring

The following diagrams show the correct connection of sensors.

Terminator

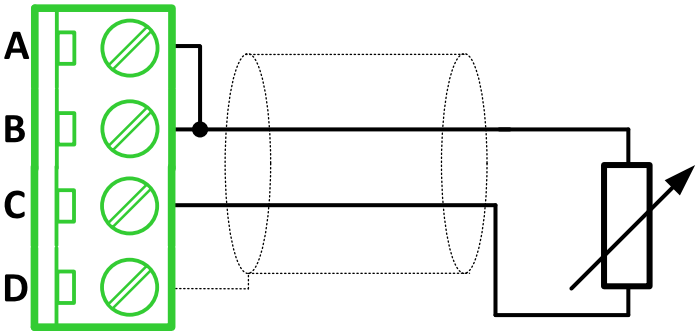


Resistance sensor - 3 wires



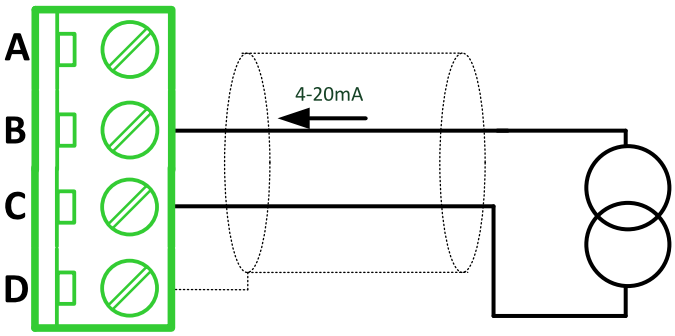
Note: *Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400 Ω, 0 – 10 kΩ*

Resistance sensor - 2 wires



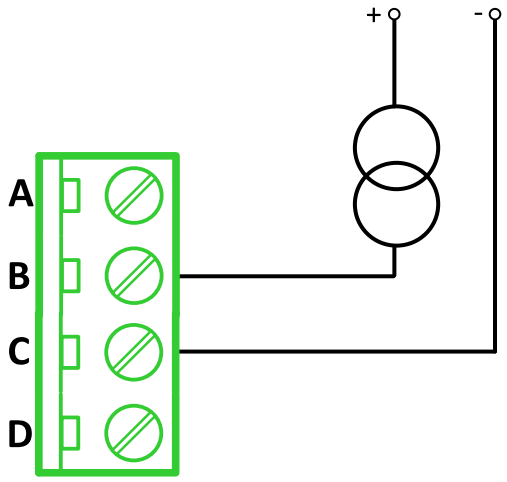
Note: *Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400 Ω, 0 – 10 kΩ*

Current sensor - active



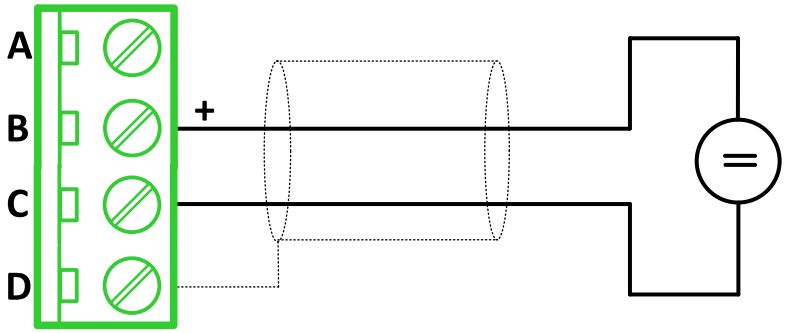
Note: *Ranges: ±20 mA, 4 – 20 mA*

Current sensor - passive



Note: *Ranges: 0 – 20 mA, 4 – 20 mA*

Voltage sensor



Note: *Ranges: ±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 Accuracy: ± 0,25 % of actual value + ± 25 mV
Current	Range: ±20 mA

	Accuracy: ± 0,25 % of actual value + ± 50 µA
Resistive	Range: 0- 10 kΩ Accuracy: ± 0,5 % of actual value + ± 2 Ω

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 8.173 Inteli IO8/8

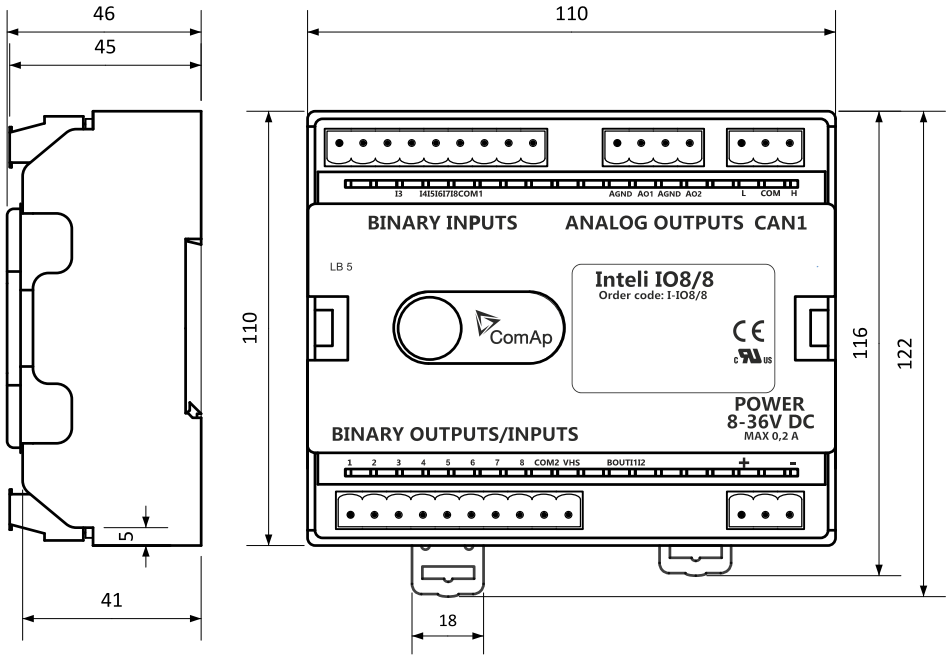
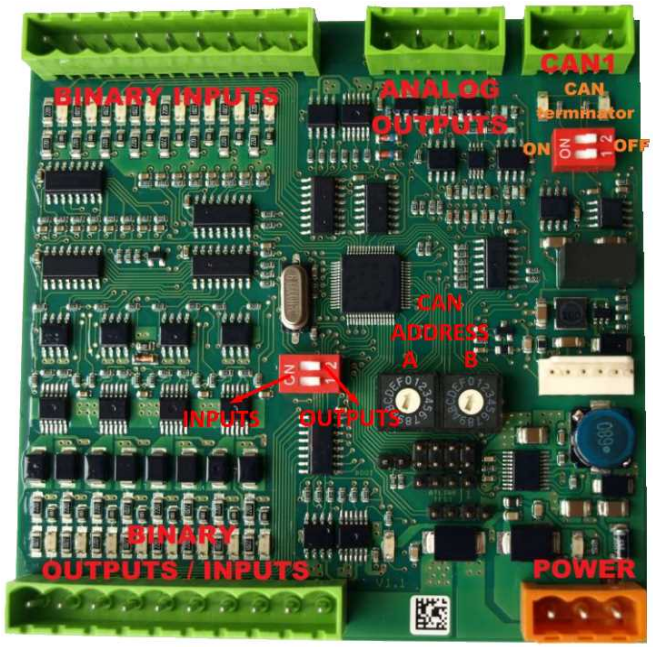


Image 8.174 Inteli IO8/8 dimensions

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 (Inteli IO8/8 to Inteli 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 Inteli 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.

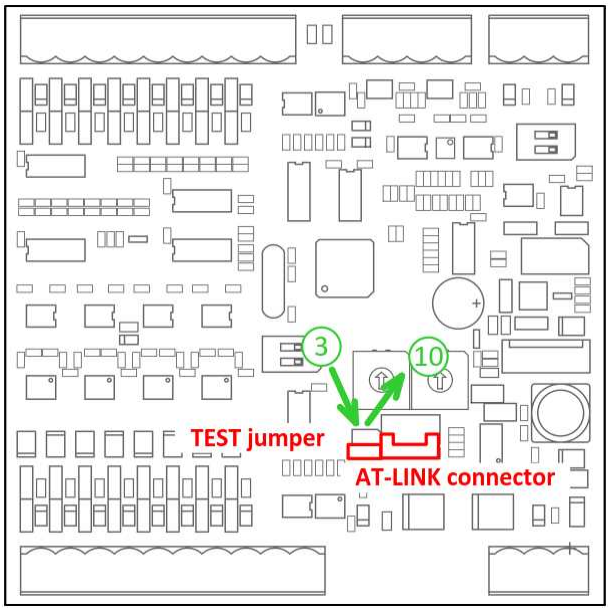
In Inteli IO16/0 mode CAN address for binary inputs is determined by DIP switch A, first group of 8 input has address A, second group of 8 inputs has address A+1. CAN address of analog outputs is set by DIP switch B.

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.

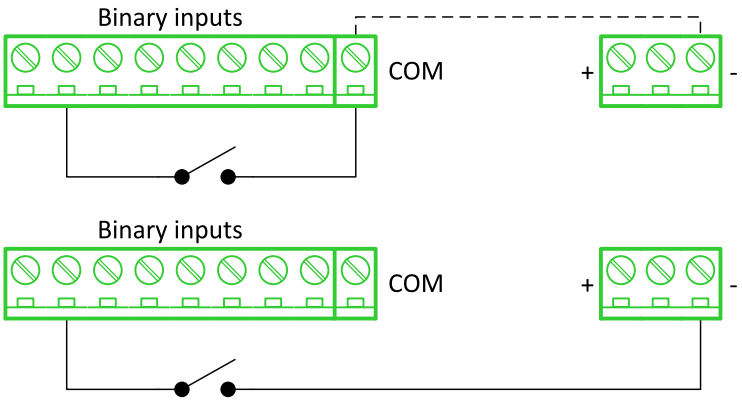
LED at power connector - status LED

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. 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.

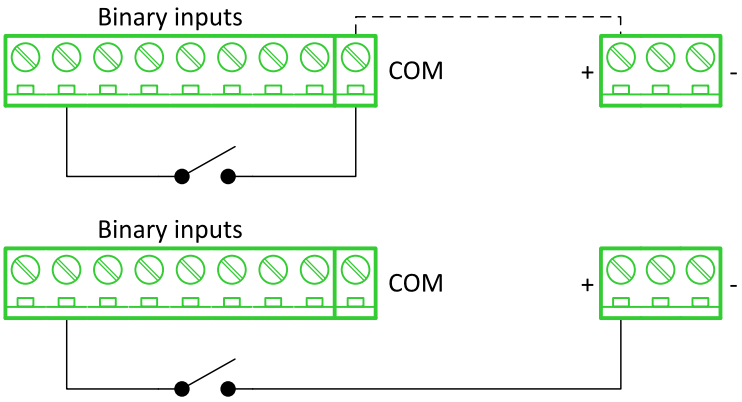
Binary inputs - pull up



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.

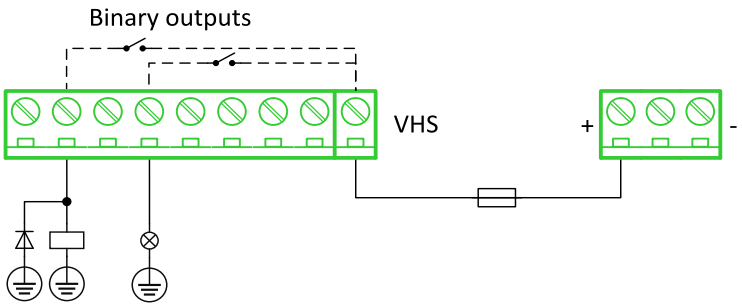
Binary inputs - pull down



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).

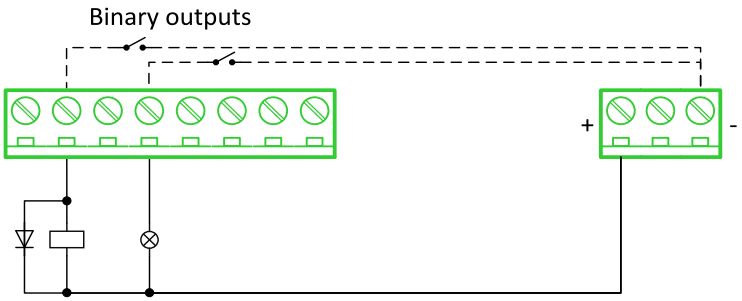
On lower picture is case of wiring between BIN2 and Ucc (+). Both ways are correct.

Binary outputs - high side



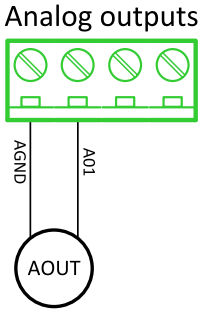
When high side setting of outputs is chosen - binary output must be connected to the minus potential directly Terminal VHS (voltage High side) has to be connected to positive potential directly. Maximal current of each binary output is 500 mA. Size of fuse depends on load.

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



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 Accuracy: ± 20 mV + ±0,5 % of actual value Imax 5 mA
Current	Range: 0-20 mA Accuracy: ± 100 µA + ±0,5 % of actual value Rmax 500 Ω
PWM	Level 5 V Frequency - adjustable 200÷2400 Hz Imax 20 mA

Binary inputs

Number of channels	8 for Inteli IO8/8, 16 for Inteli IO16/0
Input resistance	4400 Ω
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 Inteli IO8/8, 0 for Inteli 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 8.175 IGS-PTM

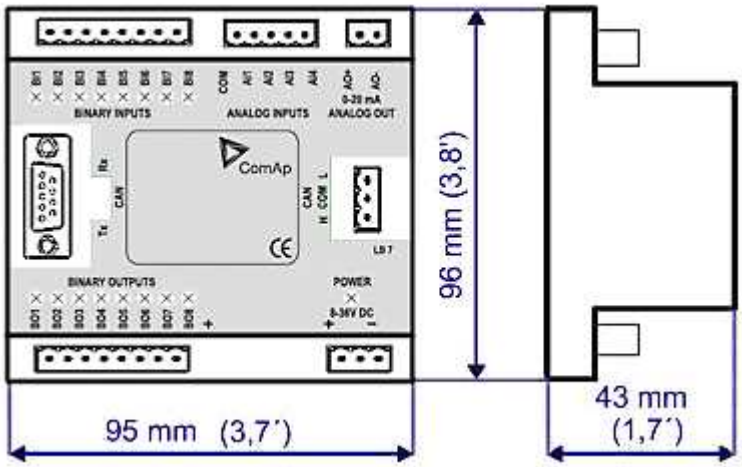
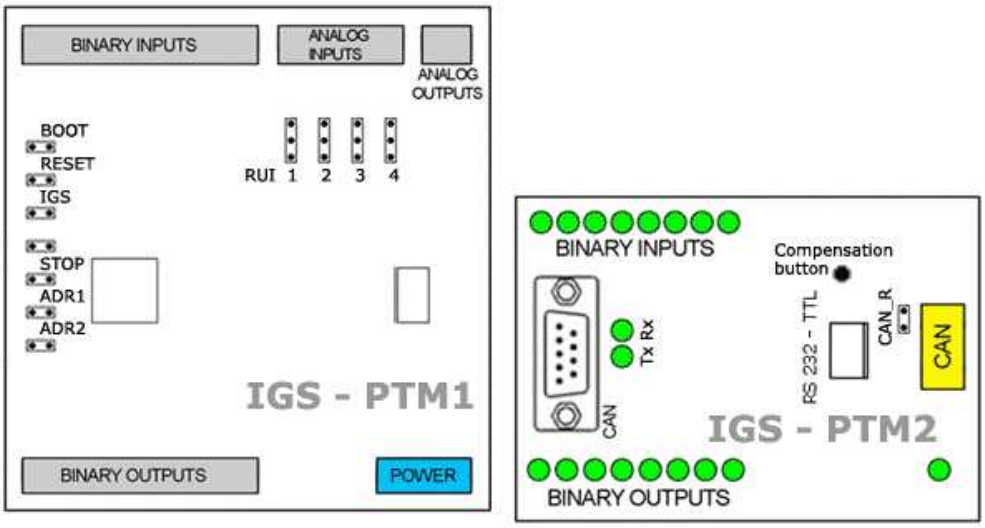


Image 8.176 IGS-PTM dimensions

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, InteliGen

Address configuration

If InteliGen 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

Programing 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

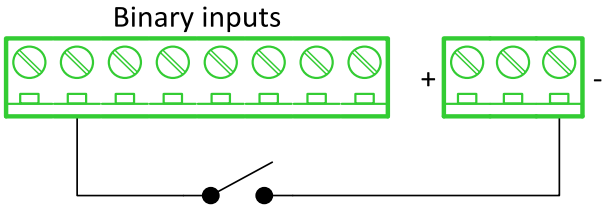
Each binary output has LED which indicates output signal. Binary output LED is shining when binary output is set.

LED at power connector - status LED

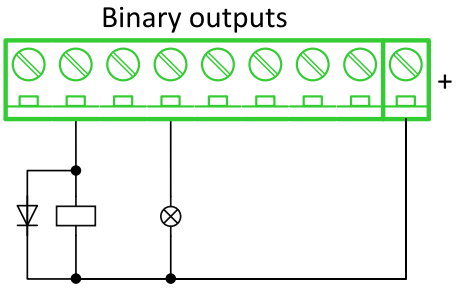
LED status	Description
Dark	No required power connected.
Quick flashing	Program check failure.
One flash and pause	Compensation fail.
Three flashes and pause	Compensation successful.
Flashes	There is no communication between IGS-PTM and the controller.
Lights	Power supply is in the range and communication between IGS-PTM and controller properly works.

Wiring

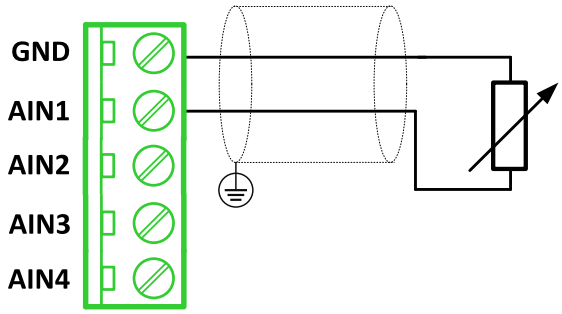
Binary inputs



Binary outputs



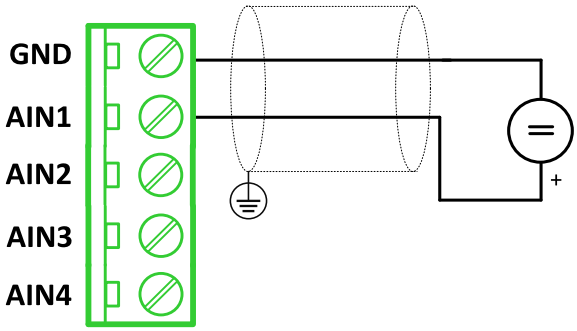
Resistance sensor



Note: *Range: 0- 2400 Ω*

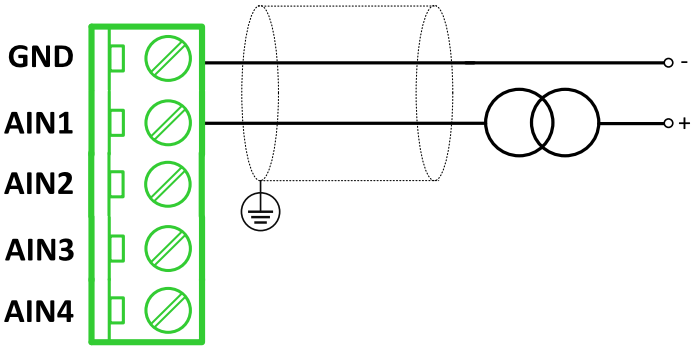
IMPORTANT: Physical analog input range is 0-250 Ω. In sensor configuration in PC tool it is necessary to chose 0-2400 Ω sensor HW type to ensure proper function of analog input.

Voltage sensor



Note: *Range 0-100 mV*

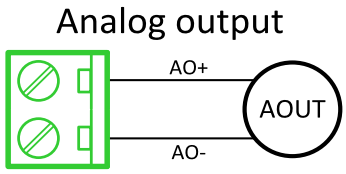
Current sensor - passive



Note: *Range: ± 0-20 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



Note: *Range: 0 to 20 mA ± 0,33 mA*

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	100 mA at 24V ÷ 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 Accuracy: 1,5 % ± 1 mV out of measured value
Current	Range: 0-20 mA Accuracy: 2.5 % ± 0,5 ohm out of measured value
Resistive	Range: 0- 250 Ω Accuracy: 1 % ± 2 ohm out of measured value

Analog outputs

Number of channels	1
Current	Range: 0 to 20 mA ± 0,33 mA Resolution 10 bit

Binary inputs

Number of channels	8
Input resistance	4700 Ω
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 Accuracy: 1,5 % ± 1 mV out of measured value
Current	Range: 0-20 mA Accuracy: 2.5 % ± 0,5 ohm out of measured value
Resistive	Range: 0- 250 Ω Accuracy: 1 % ± 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 8.177 IGL-RA15

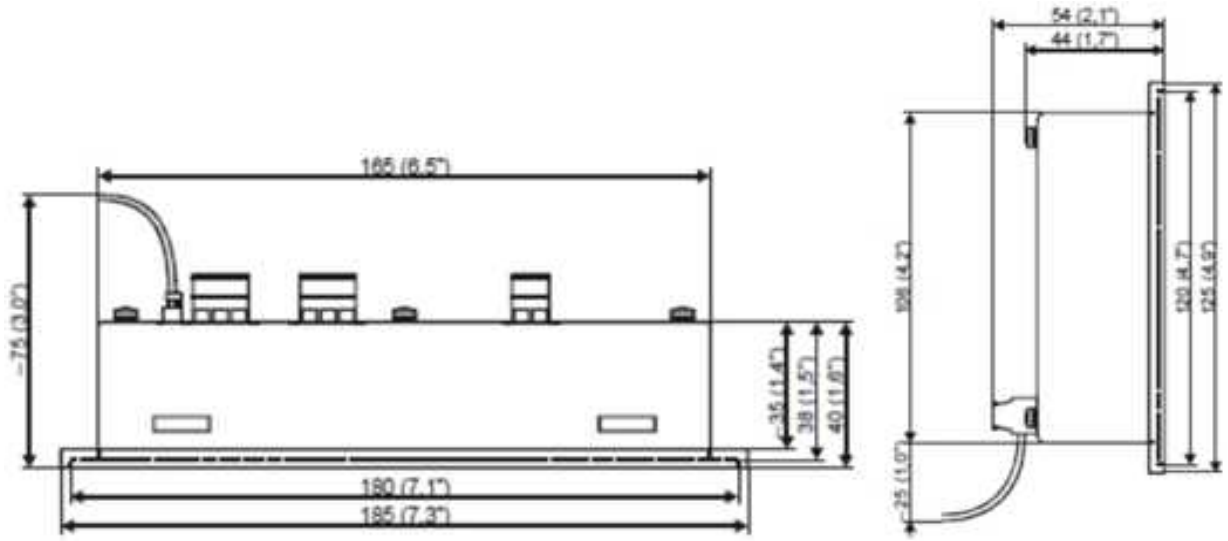


Image 8.178 IGL-RA15 dimensions

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 by adjust 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 by 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 575)**

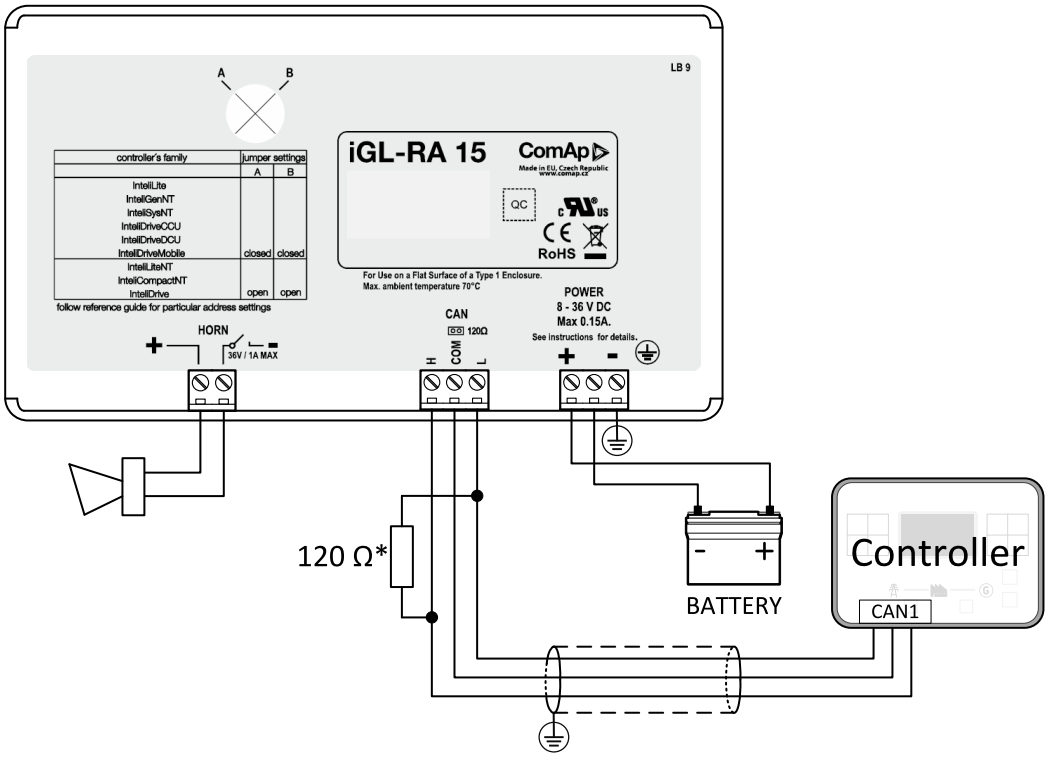
The horn can be silenced:

- 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 575)*** *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 Ω
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^2
Maximal attenuation (at 1 MHz)	2 dB/100m
Recommended Industrial Automation & Process Control Cables	
BELDEN (www.belden.com)	▶ 3082A DeviceBus for Allen-Bradley DeviceNet ▶ 3083A DeviceBus for Allen-Bradley DeviceNet ▶ 3086A DeviceBus for Honeywell SDS ▶ 3087A DeviceBus for Honeywell SDS ▶ 3084A DeviceBus for Allen-Bradley DeviceNet ▶ 3085A DeviceBus for Allen-Bradley DeviceNet ▶ 3105A Paired EIA Industrial RS485 cable
LAPP CABLE (www.lappcable.com)	▶ Unitronic BUS DeviceNet Trunk Cable ▶ Unitronic BUS DeviceNet Drop Cable ▶ Unitronic BUS CAN ▶ Unitronic-FD BUS P CAN UL/CSA