Compact Controller for Stand-by and Parallel Operating Gen-sets

Inteli New Technology Modular Gen-set Controller

Single Parallel Island – SW configuration SPI

IG-NT, IG-NTC, IG-EE, IG-EEC, IS-NT,IG-NT-BB, IG-NTC-BB, IS-NTC-BB

Software version IGS-NT-3.1.0, August 2014

ComAp

LEADER IN GEN–SET COMMUNICATION SOLUTION

REFERENCE GUIDE

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Document information

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DOCUMENT HISTORY

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1	3.1.0	31.8.2014

Pressing F1 in the GenConfig and InteliMonitor setpoint, values or configuration window will open the help with the context of currently selected setpoint, value and binary input or output function.

Available related documentation

PDF files	Description
IGS-NT-SPTM-3.1.0 Reference Guide.pdf	General description of SPtM applications for InteliGen NT and InteliSys NT. Contains description of engine and generator control, control of power in parallel to mains operation, list of all Setpoints, Values, Logical Binary Inputs and Logical Binary Output.
IGS-NT-SPI-3.1.0 Reference Guide.pdf	General description of SPI applications for InteliGen NT and InteliSys NT. Contains description of engine and generator control, control of power in parallel to mains operation, list of all Setpoints, Values, Logical Binary Inputs and Logical Binary Output.
IGS-NT-MINT-3.1.0 Reference Guide.pdf	General description of MINT applications for InteliGen NT and InteliSys NT. Contains description of engine and generator control, powermanagement, list of all Setpoints, Values, Logical Binary Inputs and Logical Binary Output.
IGS-NT-Combi-3.1.0 Reference Guide.pdf	General description of Combi applications for InteliGen NT and InteliSys NT. Contains description of engine, and generator control in SPTM, SPI and MINT mode, powermanagement, list of all Setpoints, Values, Logical Binary Inputs and Logical Binary Output.
IGS-NT-COX-3.1.0 Reference Guide.pdf	General description of COX applications for InteliGen NT and InteliSys NT. Contains description of engine and generator control, powermanagement, list of all Setpoints, Values, Logical Binary Inputs and Logical Binary Output.
IGS-NT Application Guide 05-2013.pdf	Applications of InteliGen NT, InteliSys NT and InteliMains NT, examples of connection, description of PLC functions, Virtual and Shared peripheries.
IGS-NT Operator Guide 01-2014.pdf	Operator Guide for all hardware variation of InteliGen NT and InteliSys NT, InteliVision 5 and InteliVision 8.
IGS-NT Installation Guide 08-2014.pdf	Thorough description of installation and technical information about InteliGen NT, InteliSys NT and InteliMains NT and related accessories.
IGS-NT Communication Guide 05-2013.pdf	Thorough description of connectivity and communication for InteliGen NT, InteliSys NT and InteliMains NT and related accessories.
IGS-NT Troubleshooting Guide 08-2014.pdf	How to solve most common troubles with InteliGen NT and InteliSys NT controllers. Including the list of alarm massages.
IGS-NT & ID-DCU Accessory Modules 07-2014.pdf	Thorough description of accessory modules for IGS-NT family, technical data, information about installation of the modules, how to connect them to controller and set them properly.

General guidelines

What is described in this manual?

This manual describes Single Parallel Island „SPI“ software configuration. The software configuration is designed for single set, parallel with mains applications.

What is the purpose of this manual?
This manual provides general information on how to configure and operate the controller.
This manual is intended for use by:

Operators of gen-sets
Gen-set control panel builders
For everybody who is concerned with installation, operation and maintenance of the gen-set

!! Warnings !!

The NT controller can be remotely controlled. In the event that maintenance needs to be done to the gen-set, check the following to ensure that the engine cannot be started.

To be sure:

Disconnect remote control via RS232 line
Disconnect input REMOTE START/STOP

or

Disconnect output STARTER and outputs GCB CLOSE/OPEN and MCB CLOSE/OPEN

The controller contains a large number of configurable setpoints, because of this it is impossible to describe all of its functions. These are subject to change from SW version to SW version. This manual only describes the product and is not guaranteed to be set for your application on arrival.

Text

ESC	(Capital letters in the frame) buttons on the front panel
Break Return	(Italic) set points
Generator protections	(Bold) Set point group
Cyan background	Valid for IS-NT only

Conformity declaration

CE

Following described machine complies with the appropriate basic safety and health requirement of the EC Low Voltage Directive No: 73/23 / EEC and EC Electromagnetic Compatibility Directive 89/336 / EEC based on its design and type, as brought into circulation by us.

Note:
ComAp believes that all information provided herein is correct and reliable and reserves the right to update at any time. ComAp does not assume any responsibility for its use unless otherwise expressly undertaken.

WARNING – VERY 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).

Every time you want to disconnect following NT controller terminals:

- Mains voltage measuring and / or
- Binary output for MCB control and / or
- MCB feedback

Be aware that the MCB can be switched off and gen-set can start !!!

Switch the controller to MAN mode and disconnect the Binary outputs Starter and Fuel to avoid unexpected automatic start of gen-set and GCB closing.

!!! CAUTION !!!

Dangerous voltage

The terminals for voltage and current measurement should never be touched.
Properly connect the grounding terminals.
Do not disconnect the CT terminals for any reason.

Adjust set points

All setpoints are preadjusted to their typical values. But the set points in the "**Basic settings**" settings group **!!must!!** be adjusted before the first startup of the gen-set.

!!! WRONG ADJUSTMENT OF BASIC PARAMETERS CAN DESTROY THE GEN-SET !!!

The following instructions are for qualified personnel only. To avoid personal injury do not perform any action not specified in this User guide !!!

Clarification of notation

HINT
This type of paragraph points out details to help user installation/configuration.

NOTE:
This type of paragraph calls readers' attention to a notice or related theme.

CAUTION!
This type of paragraph highlights a procedure, adjustment, etc. which may cause damage or improper functioning of the equipment if not carried out correctly and may not be clear at first sight.

WARNING!
This type of paragraph indicates things, procedures, adjustments, etc. which demand a high level of attention, otherwise personal injury or death may occur.

EXAMPLE:

This type of paragraph indicates examples of usage for illustrational purposes.

Available Firmware and Archive sets

For suitable firmware for your controller please consult this table:

Firmware (*.mhx)

InteliGen NT GC InteliGen NTC GC	InteliGen NT BaseBox InteliGen NTC BaseBox	InteliSys NT BaseBox InteliSys NTC BaseBox
IG-NT-GC-3.1.0	IG-NT-BB-3.1.0	IS-NT-3.1.0

Archives (*.ant)

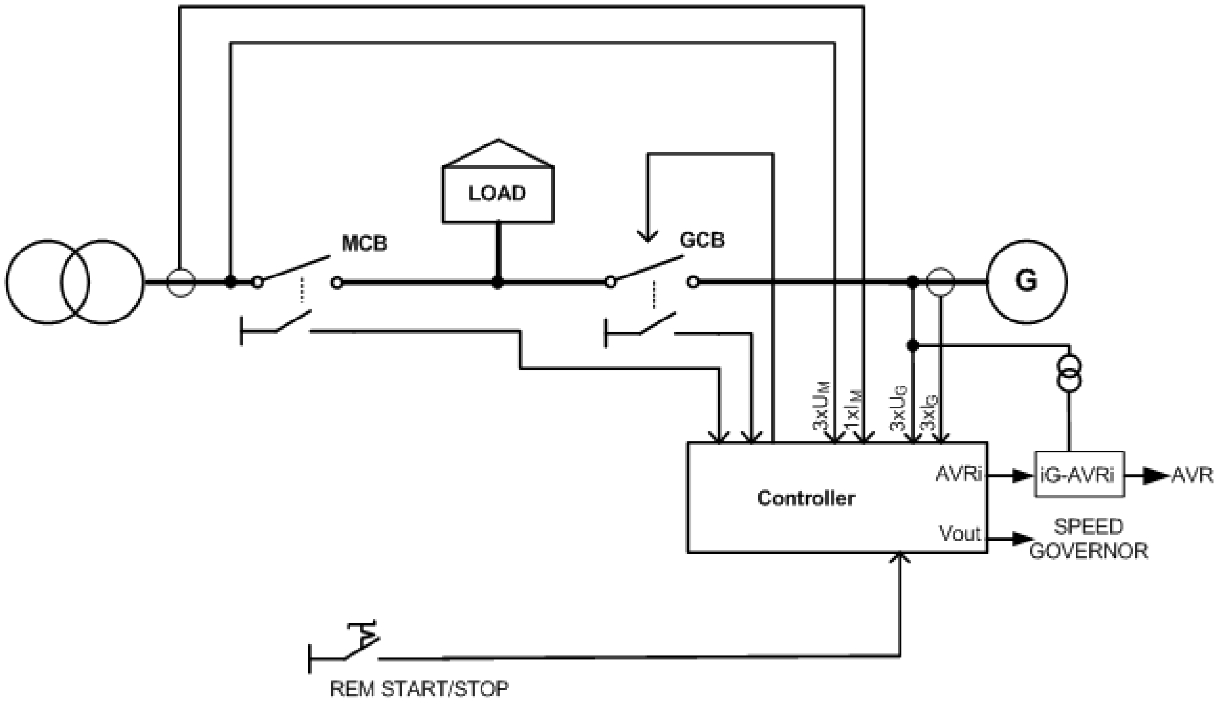
InteliGen NT GC InteliGen NTC GC	InteliGen NT BaseBox InteliGen NTC BaseBox	InteliSys NT BaseBox InteliSys NTC BaseBox
IG-GC-SPTM-3.1.0	IG-BB-SPTM-3.1.0	IS-SPTM-3.1.0
IG-GC-SPI-3.1.0	IG-BB-SPI-3.1.0	IS-SPI-3.1.0
IG-GC-MINT-3.1.0	IG-BB-MINT-3.1.0	IS-MINT-3.1.0
IG-GC-COMBI-3.1.0	IG-BB-COMBI-3.1.0	IS-COMBI-3.1.0
IG-GC-COX-3.1.0	IG-BB-COX-3.1.0	IS-COX-3.1.0
IG-GC-MINT-Marine-3.1.0		IS-MINT-Marine-3.1.0

Some features are available only in InteliGen NT Basebox, InteliGen NTC Basebox and InteliSys NT. These features are highlighted by green background.

General description

The SPI application is intended for single gen-sets and includes following main features:

- Automatic startup and stop sequences with adjustable timing
- Wide range of generator and engine protections, additional freely configurable protections
- **Parallel to the mains operation**, many different load control modes (baseload, import/export control and other)
- **Island operation**
- **Integrated mains protection** (mains decoupling relay) including vector shift
- **One breaker control** (GCB) including **synchronizing**
- MCB position sensing
- Soft loading and unloading



Functions

OFF-MAN-AUT mode

OFF mode

Outputs STARTER, GCB CLOSE/OPEN and FUEL SOLENOID are not energized.
Genset cannot be started. If START,STOP,GCB ON/OFF buttons are pressed the controller will not respond.
When the gen-set is running it is not possible to switch directly to OFF mode. First you have to stop the engine.

MAN mode

1) START - starts the gen-set.
2) GCB ON/OFF
   If generator voltage is out of the limits (adjusted in the set point group **Gener protect**) controller does not respond to the GCB ON/OFF
   a) controller closes GCB to dead bus (MCB feedback must be opened).
   b) controller starts GCB synchronizing when mains is OK and MCB is closed. Closes the GCB when synchronized and stays running in parallel. Operational mode in parallel depends on **ProcessControl** setting.
   c) Unloads gen-set and opens the GCB if gen-set was running in parallel to the mains.
3) STOP
   a) When gen-set is running in parallel: transfers load to the mains, opens GCB, goes into cooling state and stops the engine.
   b) When gen-set is running island (MCB is opened): opens GCB, goes into cooling state and stops the engine.
   c) When engine is running unloaded: activates cooling sequence and then stops the engine.
   d) During cooling state causes immediate engine stop.

HINT
The gen-set is permitted to run unloaded for unlimited time.
Controller does not automatically start the gen-set when power cut comes or REM START/STOP is closed.
Controller does not automatically change the MCB state depends on mains changes.
Load control in parallel depends on **ProcessControl**: *Load ctrl PtM* setpoint.

SEM

In SEM mode, pressing of START or STOP buttons performs a predefined sequence:
1) START – starts the engine, synchronizes and runs in parallel.
2) STOP – softly unloads the gen-set, opens GCB, provides cooldown and stops the engine.

AUT mode

Automatic mode is influenced by **ProcessControl**: *Island enable, ParallelEnable, Synchro enable* setpoints.

No.	*Island enable*	*Parallel enable*	*Synchro enable*	Function
1	YES	YES	FORWARD	Basic SPI application
2	YES	NO	NO	SPM application
3	NO	YES	FORWARD	SPI application, no island (stand-by) operation allowed
4	NO	NO	NO	

	NO	NO	FORWARD	Gen-set start is blocked. Binary output *StartBlocked* indicates those states.
	NO	YES	NO	

Following procedure corresponds to setting No.1 from table above.

1) After the input Rem start/stop is energized, controller starts the gen-set. If MCB feedack is active, the controller will synchronize the gen-set to mains and ramp up the load, depending on the ProcessControl set points adjustment.
2) If a mains failure is recognized, the controller will open the GCB to separate the failed mains from the generator. After the mains breaker has been open (MCB feedback is de-energized), the controller will close the GCB again to the island (stand-by) operation.
3) If mains recovers again, the GCB is open again to allow the MCB to be closed (manually or in general not with a command from the controller). After both mains is present and MCB closed, the controller will synchronize again with the healthy mains and close the GCB.
4) If input Rem start/stop is de-energized, controller will softly unload the gen-set back to the mains, then open the GCB, cool down and stop the gen-set.

Mains parameters out of limits during synchronising

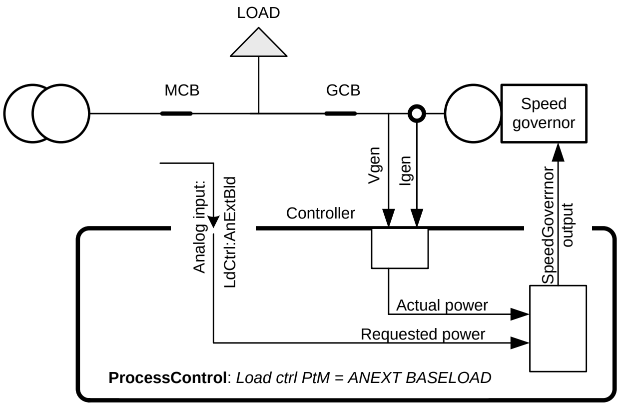
In case that mains parameters get out of permitted limits during synchronizing to mains (reverse or forward), the regulation of gen-set speed and voltage according to mains frequency and voltage is interrupted. During the state, when parameters reach out of limits, until “Mains fail” is issued, the engine speed and voltage regulation output is kept on the last value.

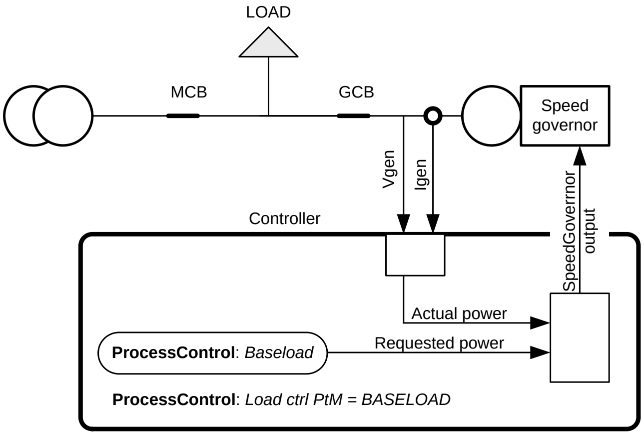
Active Power control modes in SPI

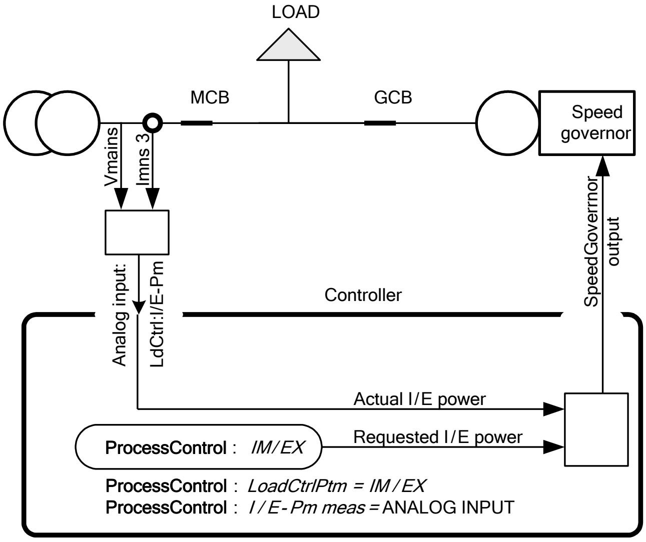
ProcessControl: *Load ctrl PtM*		
Mode	Function	Related Setpoints – LBI – LBO - LAI
BASELOAD	Gen-set power is regulated to value given by *Base load* setpoint.	**ProcessControl**: *Base load*
IM/EX	Gen-set load is controlled so, that the mains import is maintained constant at the level given by *Import load* setpoint – I/E power is measured by controller on auxiliary CT input or by analog input.	**ProcessControl**: *Import load, I/E Pm-meas*
ANEXT BASELOAD	Gen-set power is set by analog input.	**Analog input:** *LdCtrlAnextBld*
ANEXT IM/EX	Gen-set load is controlled so, that the mains import is maintained constant at the level given by the analog input *LdCtrl:AnExI/E* – I/E power is measured by controller on auxiliary CT input or by analog input.	**ProcessControl**: *I/E Pm-meas,* **Analog input:** *PFCtrl:AnExI/E*
T BY PWR	Gen-set power is controlled to keep the required temperature, that is measured via an analog input.	**ProcessControl**: *TempByPwr Treq, TempByPwr gain, TempByPwr int,* **Analog input:** *LdCtrl:TByPwr*

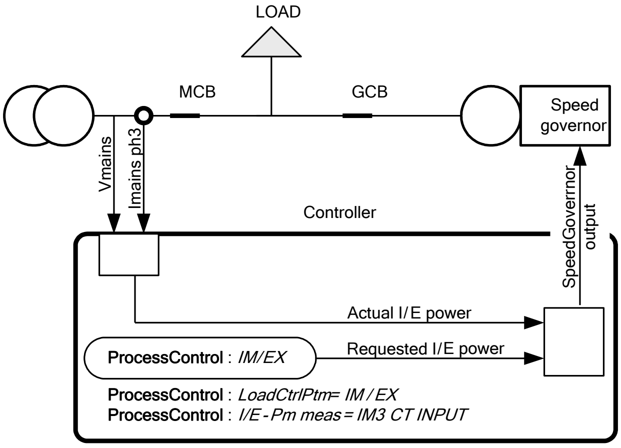
Another modes of active power control		
Mode	Function	Related Setpoints – LBI – LBO - LAI
Export limit	Limits export to the mains in the baseload mode. If the function is enabled, the gen-set power is limited so that mains import is always higher or equal to the setpoint *Import Load*.	**ProcessControl**: *Export limit = ENABLE, Import load*
Warming	The controller limits gen-set power for requested time or until the water temperature reach the requested value. After warming the gen-set goes to the	**ProcessControl**: *Warming load; Warming temp; Max warm time*

	requested (e.g. Baseload) power.	
Peak shaving	Automatic gen-set start/stop based on object (load) consumption. Can be based on measured kW or kVA.	**ProcessControl**: *PeakLevelStart; PeakLevelStop; PeakAutS/S del, Peak kVA Start, Peak kVA Stop, PeakKVAS/S del,* **LBO**: *PeakShaveAct*



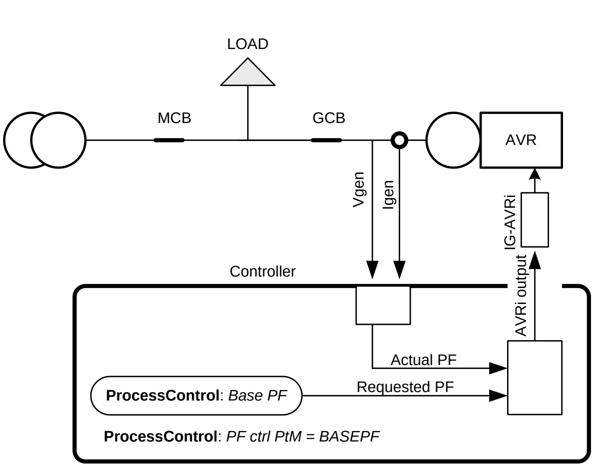


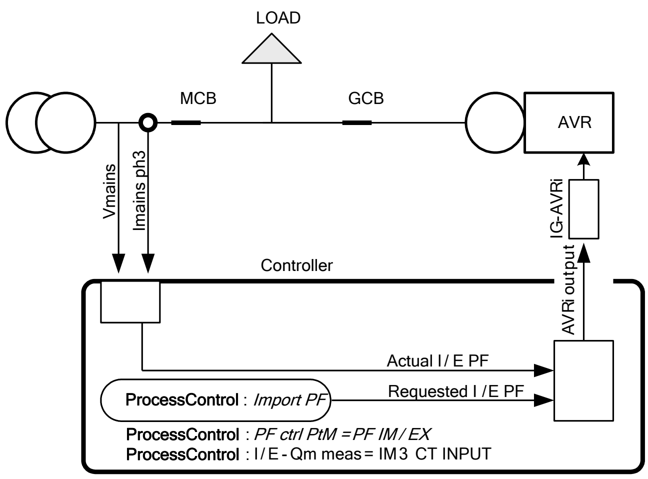


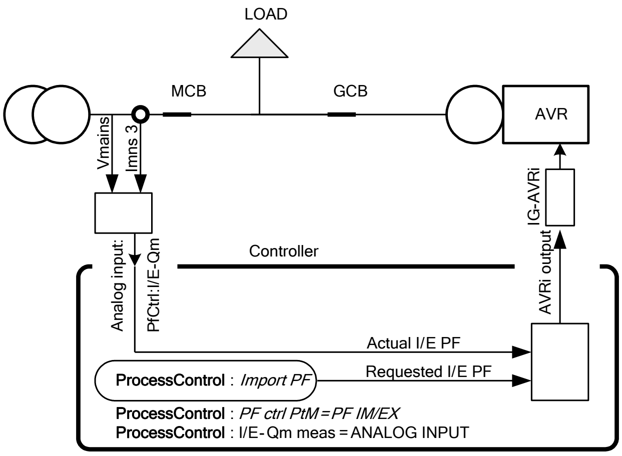


PF control modes

ProcCtrlSingle: *PF ctrl PtM*		
Mode	Function	Setpoints
BASEPF	Gen-set power factor is maintained at constant level adjusted by the setpoint *Base PF.*	**ProcCtrlSingle**: *PF ctrl PtM*
PF-IM/EX	Gen-set power factor is controlled so, that the mains power factor is maintained constant at the level adjusted by setpoint *Import PF*	**ProcCtrlSingle**: *Import PF, I/E Qm-meas*
ANEXT BASEPF	Gen-set power factor is maintained at constant level given by the analog input *PFCtrl:AnExBPF*	**Analog input:** *PFCtrl:AnExBPF*
ANEXT PF-IM/EX	Gen-set load is controlled so, that the mains power factor is maintained constant at the level given by the analog input *PFCtrl:AnExI/E* – I/E power factor is measured by controller on auxiliary CT input or by analog input.	**ProcCtrlSingle**: *I/E Qm-meas* **Analog input:** *PFCtrl:AnExI/E*





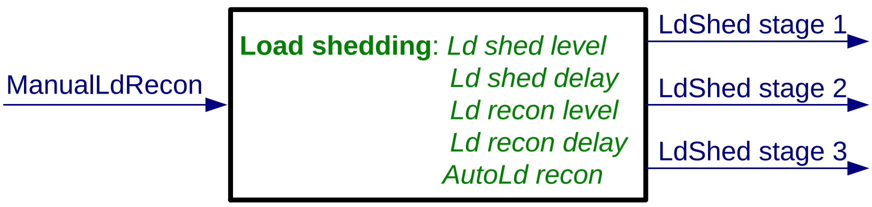


Load shedding

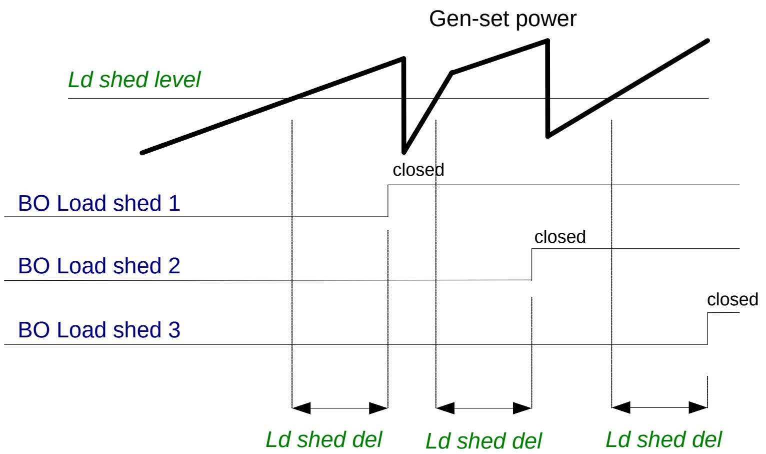
All LOAD SHED outputs are activated (closed) to trip the unessential load when gen-set goes to island:

a) When GCB is closed after mains fail and gen-set starts in SEM / AUT mode.
b) When MCB opens from parallel to mains operation in SEM / AUT mode.
c) Before MCB is opened in MAN mode by button.

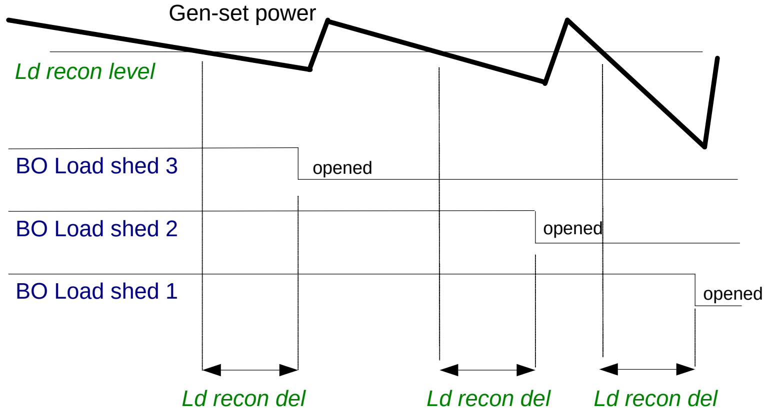
The load shedding function is active in all controller modes except OFF.
Load shedding has three steps and each step is linked with its own Load shed x binary output. There is only one load shed level and delay for all three steps as well as recon level and delay. Load shed can only move from one step to the next, e.g. No LoadShed to LdShed S1 to LdShed S2 to LdShed S3 and vice versa.
If manual reconnection of the load is desired, the AutoLd recon setpoint needs to be disabled (*AutoLd recon* = DISABLED) and the MAN load recon binary input needs to be configured.
Rising edge on this input resets the controller to a lower stage, but only if the load is under the *Ld recon level* at that moment.



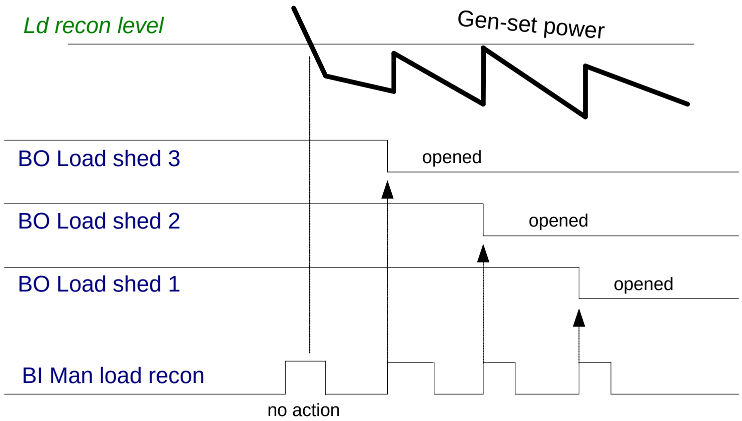
HINT
If no Load Shedding outputs are configured, there is no record to history and no scrren timer indication of the activity of this function.



Load reconnection – automatic -> *AutoLd recon* = ENABLED



Load reconnection – manual -> *AutoLd recon* = DISABLED



Power derating

This function linearly **decreases genset nominal power** according to analog input value.
Gen-set power starts decreasing when temperature measured by Analog input PowerDeratingX exceeds *DeratingX strt* value.
Gen-set power is at *DeratedX pwr* value when temperature measured by Analog input Power deratingX is equal or higher than *DeratingX end* value.

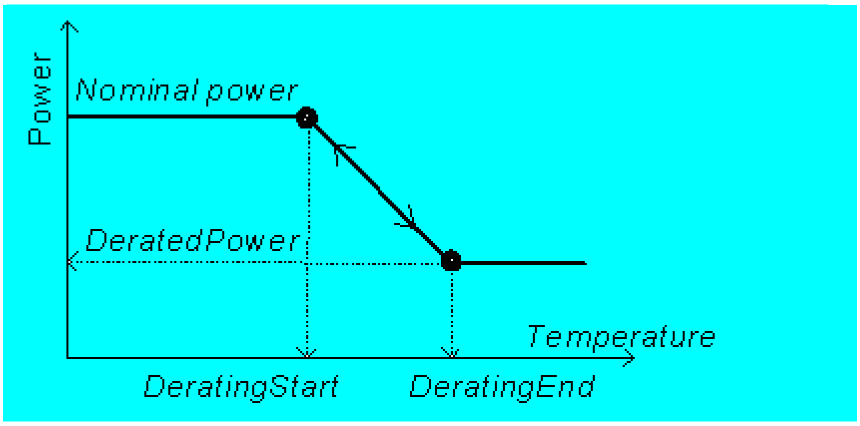
Hint:
To use Power derating function configure at first Analog input PowerDeratingX to any IGS-NT or IS-AIN analog input terminal by GenConfig.

When Power derating function is active the generator overload protection is based on the Derated power! ! !

Derated power value **Pg derated** is visible in the controller measure screen.

When derating function is not active the Derating power is equal to Nominal power.

Example :
Nomin power = 200 kW, *Derating1 strt* = 70 °C, *Derating1 end* = 100 °C, *Derated1 pwr* = 70 %.
Genset is running at Nominal power 200 kW. When temperature reached 70 °C the genset power starts decreasing. When temperature reached 100 °C genset runs at 70 % of Nominal power = 140 kW. When temperature increased above *DeratingX end* temperature level, gen-set power stays at *DeratedX pwr* level 140 kW.



Temperature derating function decreases genset power depend on setpoints *DeratingX strt*, *DeratingX end* and *DeratedX pwr*.

Temperature derating starts at *DeratingX strt* temperature.

At *DeratingX end* temperature runs genset at *DeratedX pwr* level.

Above *DeratingX end* temperature Genset runs at constant *DeratedX pwr*.

Start up synchro (SUS) sequence description

Soft magnetising of transformer

In cases where the load is huge transformer and standard application is used, there is usually situation where the gen-set is started and when voltage and frequency are in limits – the GCB is closed.
During first energizing of a transformer, a transient inrush current is up to 10 to 15 times larger than the rated transformer current (this inrush current can flow for several cycles.)
For elimination of this high current (inrush current) – SUS sequence can be used.
Princip of elimination inrush current is in energizing of transformer from lower voltage.
(gen-set is started with closed GCB, so with connected (non loaded) transformer.
In first step the gen-set is started without excitation (without voltage), when the RPM achieves some limits – and then the excitation is started.
AVR with possibility to set voltage ramp is recommended to use – for customization of voltage ramp.
Transformer is energized slowly from lower voltage – which causes lower inrush current.

Detailed description of process

For magnetising of transformer the SPtM or SPI application is usually used.
For configuration of SUS sequence refer the setpoints from group „SUS control“ setpoint group.

Setpoints

SUS start [ENABLED/DISABLED] for activation/deactivation of SUS sequence.

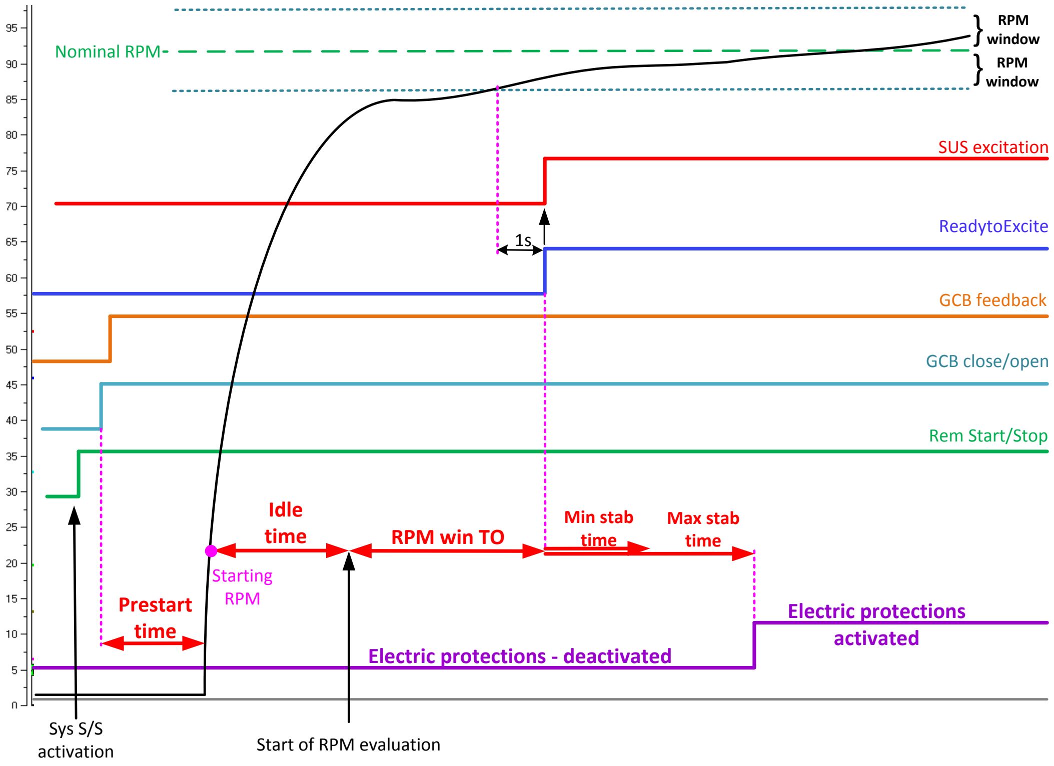
RPM window – it defines RPM window, where the gen-set can be excited.

RPM win TO – RPM window Time Out defines time for achieving RPM window and activation LBO:ReadyToExcite, if the gen-set doesn't activate LBO:ReadyToExcite in this time out, the GCB is opened and gen-set is started by standard way.

ExcitationCtrl – configuration of excitation control [INTERNAL/EXTERNAL] – it's used for configuration of source for excitation control. In case INTERNAL – when the RPM achieves RPM window for 1 second – the gen-set internaly activates excitation. In case of EXTERNAL control – when RPM achieves RPM window – the system waits for external signal for start of excitation.

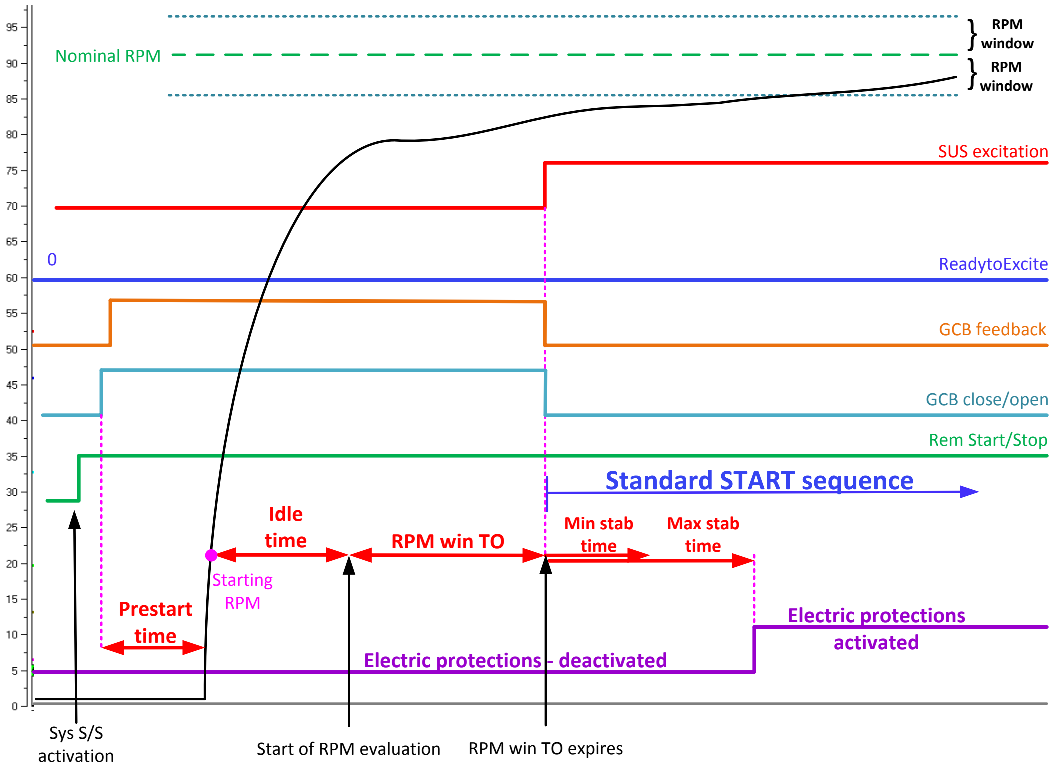
Diagram of process and delays:

SPI aplication, ExcitationCtrl=INTERNAL, RPM achives RPM window in RPM win TO.



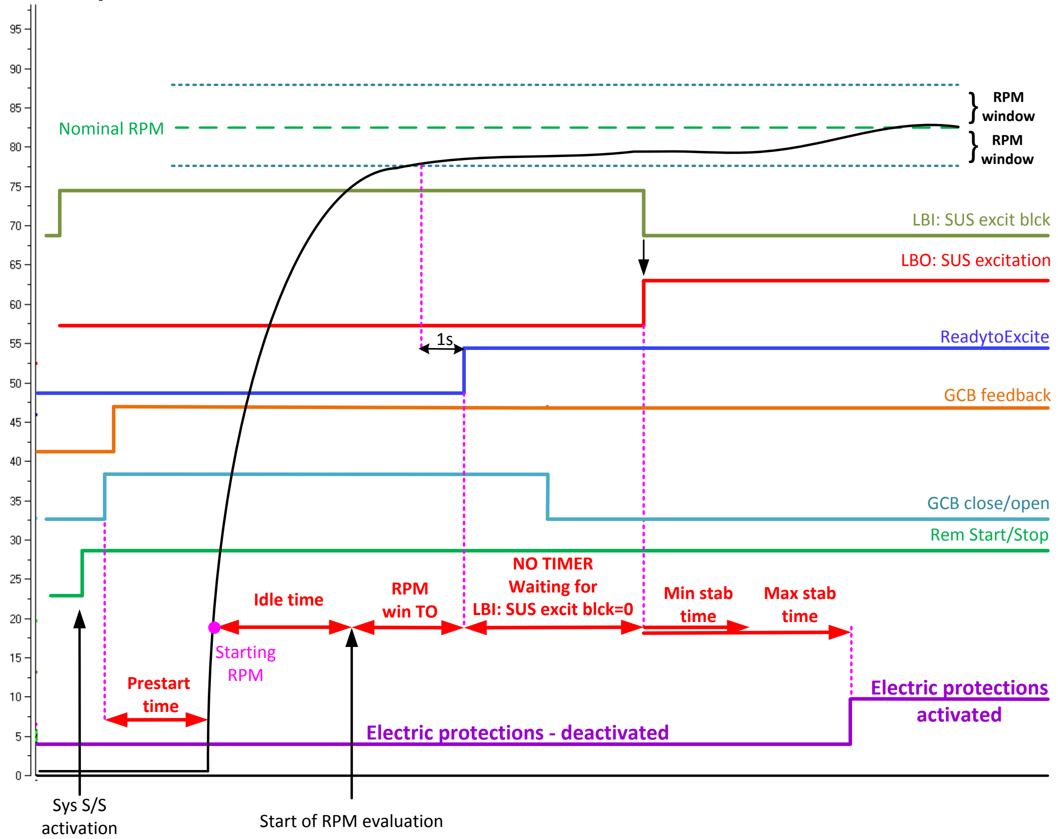
On the picture is depicted SUS sequence where RPM achieves RPM window in RPM win TO.
After Sys Start/Stop activation the delay: Prestart time is counted, then the gen-set is started.
If the start command comes in case of Mains fail, the delay: EmergStart del (AMF settings setpoint group) is counted before System start activation.
After achieving starting RPM (Engine params: Starting RPM) Idle time is counted. When the Idle time is up the evaluation of RPM in RPM window is activated. When the RPM are in RPM window for 1s – LBO:ReadyToExcite is activated. (for correct SUS sequence LBO:ReadyToExcite must come in time RPM win TO) LBO:ReadyToExcite causes activation of LBO:SUS excitation which activates AVR and excitation. After activation of LBO:SUS excitation delays:MinStabTime and MaxStabtime are activated.
Electric protections are activated when voltage and frequency are in limits (during MaxStabTime) or when MaxStabTime is up.

SPI aplication, ExcitationCtrl=INTERNAL, RPM don't achive RPM window in RPM win TO



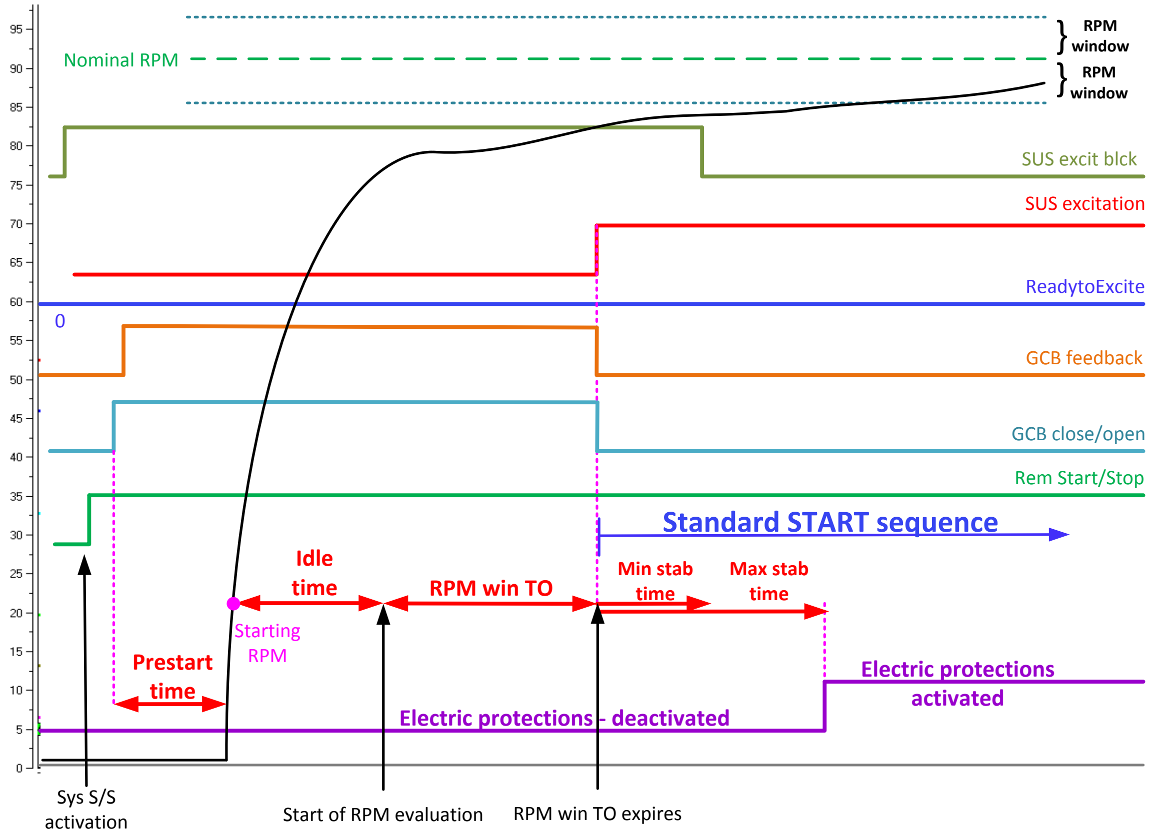
On the picture is depicted SUS sequence where RPM don't achieve RPM window in RPM win TO.
The picture shows that RPM don't achieve RPM window and LBO:ReadyToExcite is not activated in delay RPM win TO. This causes opening GCB and STANDARD start sequence when RPM win TO delay is up.

SPI aplication, ExcitationCtrl=EXTERNAL, RPM achive RPM window in RPM win TO



Picture shows process of starting the gen-set achieving the RPM window and activation LBO:ReadyToExcite in RPM win TO timer. After this is no timer and controller/system waits for activation of excitation (deactivation of LBI:SUS excit blck). After activation of excitation the MinStabtime and MaxStabTime follow.

SPI aplication, ExcitationCtrl=EXTERNAL, RPM dont achive RPM window in RPM win TO



The picture shows SUS sequence where RPM do not achieve RPM window in delay RPM win TO. When timer RPM win TO is up and LBO:ReadyToExcite is not activated – system is switched over to STANDARD start sequence – it means that it opens GCB and activates excitation (LBI:SUS excit blck is ignored from this moment and excitation is controlled INTERNALLY).

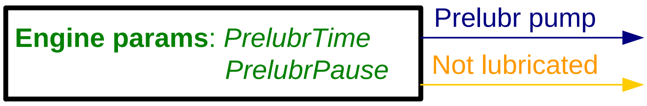
Conditions for performance of SUS sequence

- Setpoint "SUS Start (SUS control group) – ENABLED
- RPM pick-up is connected
- No voltage on the bus (actually voltage on the bus must be lower than 1/3 of *GenNomV.* MINT, Combi application only)
- MCB is opened (SPtM, SPI application only)
- LBI:GCB Disabled is not activated
- LBI: SUS excit blck – is activated before Start command (in case of configuration: setpoint ExcitationCtrl=EXTERNAL only (SUS control group)
- In case of enabled power management – the gen-sets are started based on actual Load reserves.
- GCB feedback must come during Prestart time (Engine params groups). If it doesn't come during Prestart time, then it is switched to STANDARD start sequence

CAUTION!
The residual magnetism of the armature can cause that there can apperar the voltage on the bus during the SUS start sequence. The value higher then 1/3 of the setpoint*GenNomV* is used as the limit of the protection during the SUS start sequence. If the voltage of the gen-set (actually the bus voltage) is higher than this limit, the SUS sequence is interrupted and GCB is opened. Gen-set continues in standard start sequence.

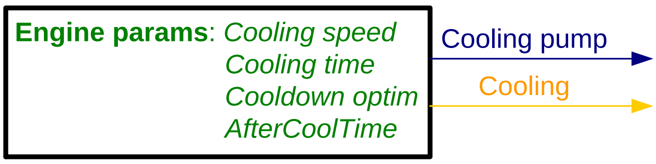
Engine states

Engine prelubrication



HINT
To use Prelubrication, configure Binary output PRELUBR PUMP first.
Prelubrication is disabled in controller OFF mode or if *Prelubr time* is set to zero.
Binary output PRELUBR PUMP is opened when engine is running.
Prelubrication cycle starts with *PrelubrPause* after engine stop.
Prelubrication cycle starts immediately when controller power supply is switched on or when mode changes from OFF to MAN or AUT or after Emergency stop was reset. An Alarmlist message “Not lubricated” is active until this first lubrication cycle has been completed.

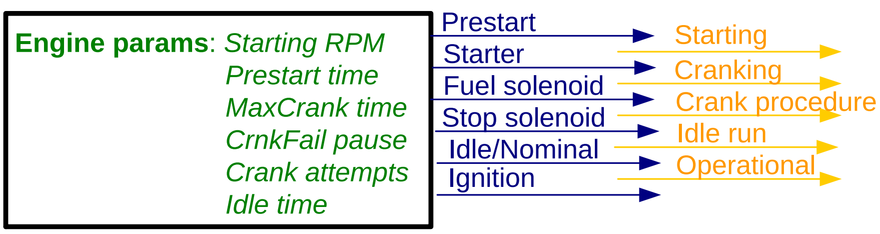
Engine cooling



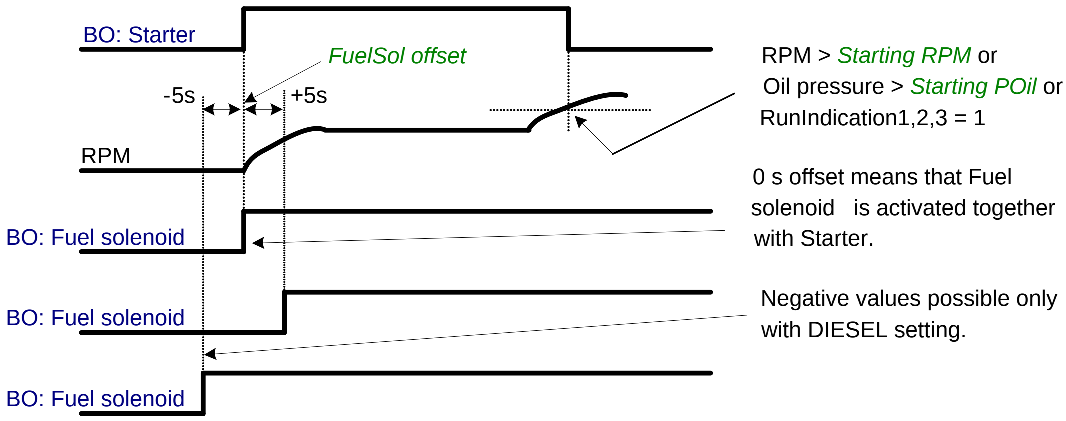
Engine warming

Service time alarm

Engine starting procedures

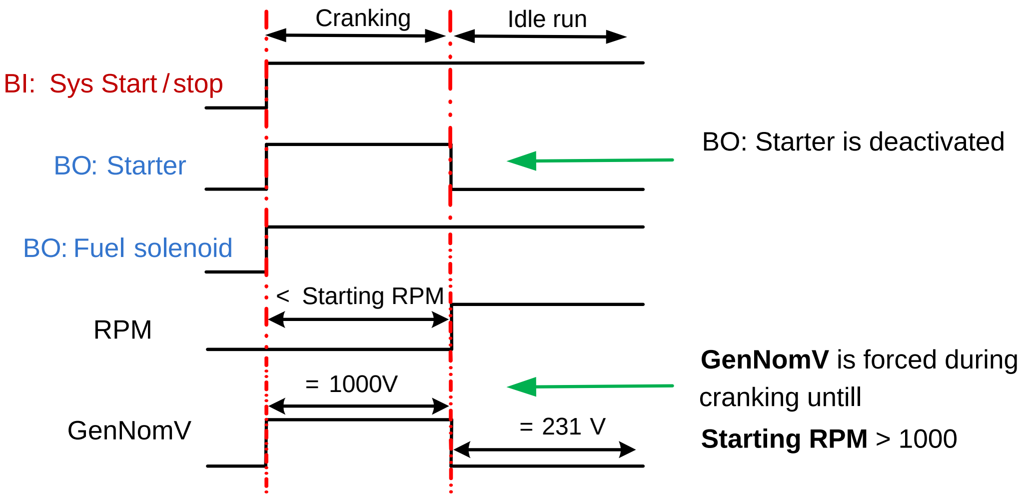


Engine starting procedure if **Engine params**: *Fuel solenoid* = DIESEL ENGINE with different setting of *FuelSol offset*.



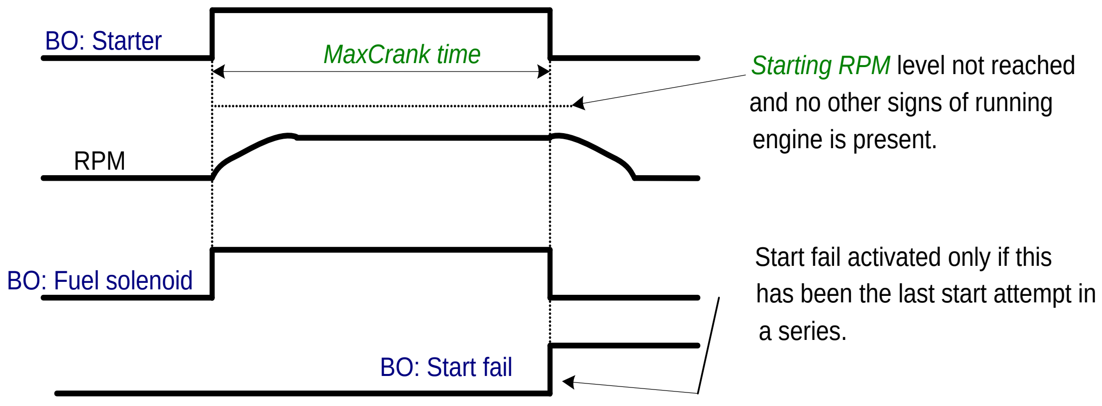
Engine starting procedure if **Engine params**: *Fuel solenoid* = GAS ENGINE

Engine starting procedure with ***own starting procedure***:
Engine is started after **Starting RPM** reach starting leve or other condition. BO: Starter is deactivated only if one of those condition is fulfilled.

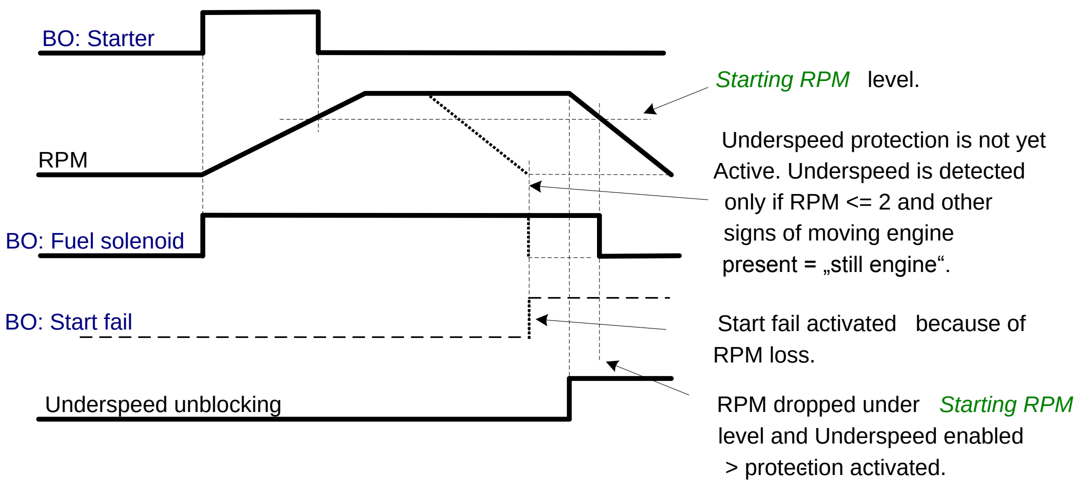


Generator nominal voltage is 231V but during *Cranking* is forced to 1000V until engine in *Idle state* (at least one of condition has to be fulfilled).

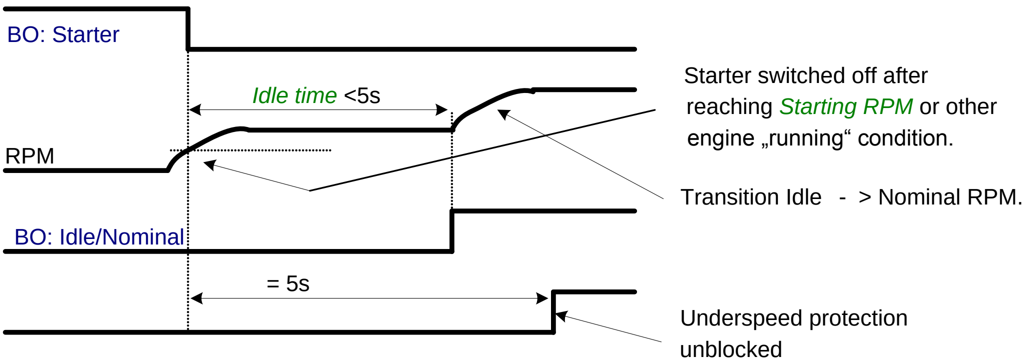
Unsuccessful start – no **Engine params**: *Starting RPM* reached



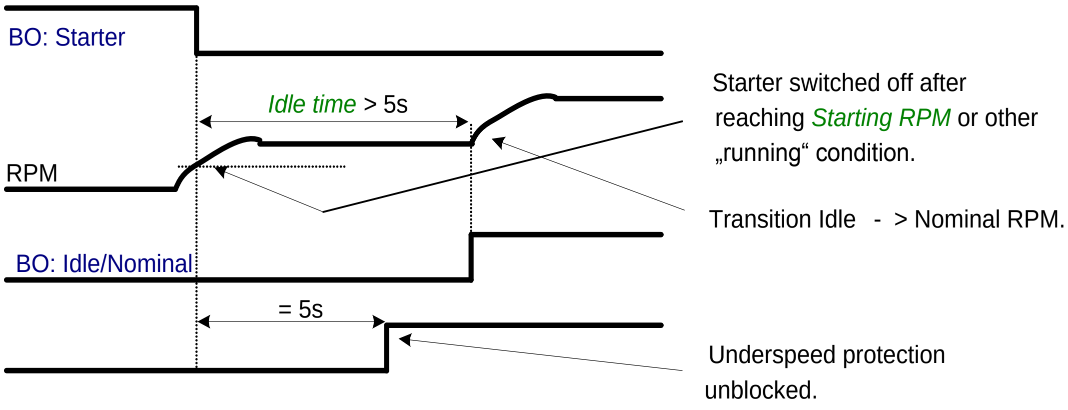
Unsuccessful start – RPM disappeared before/after Underspeed protection got active:



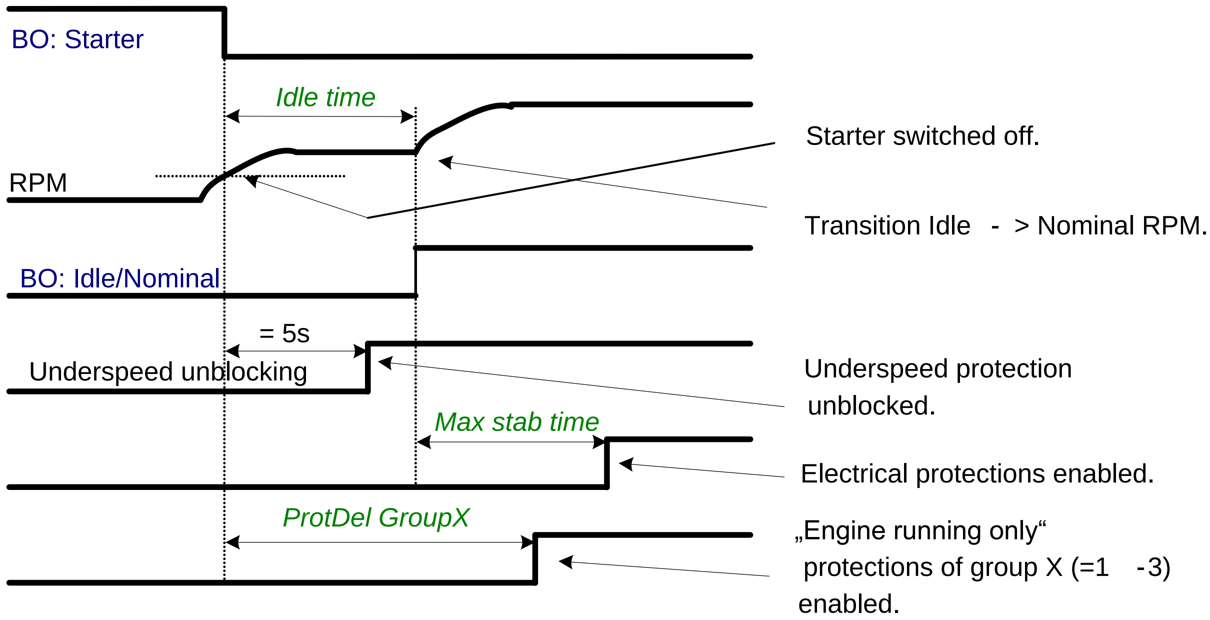
Underspeed protection unblocking if *Idle time* < 5s:



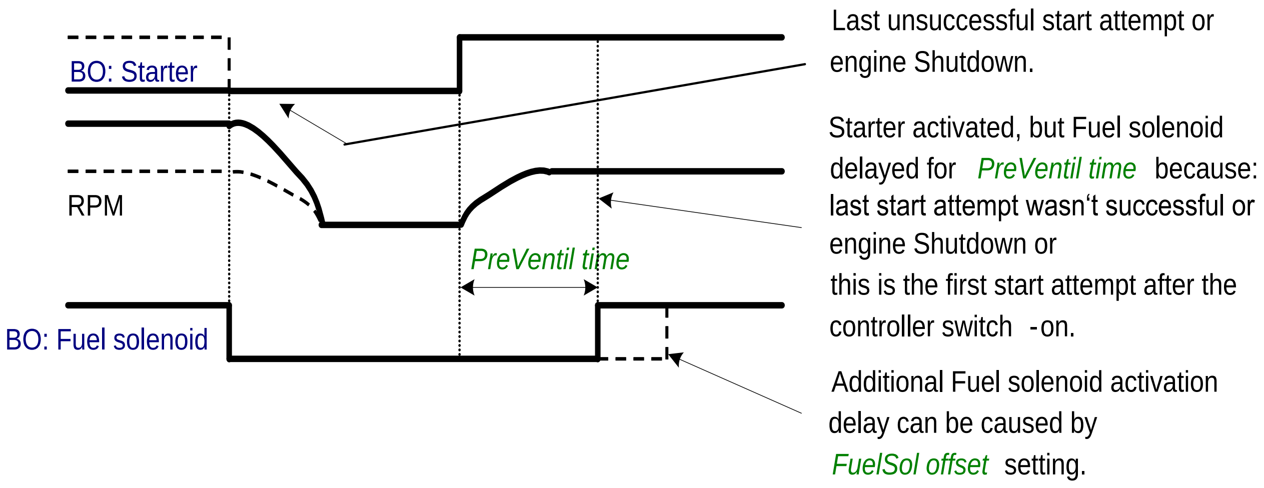
Underspeed protection unblocking if *Idle time* > 5s:



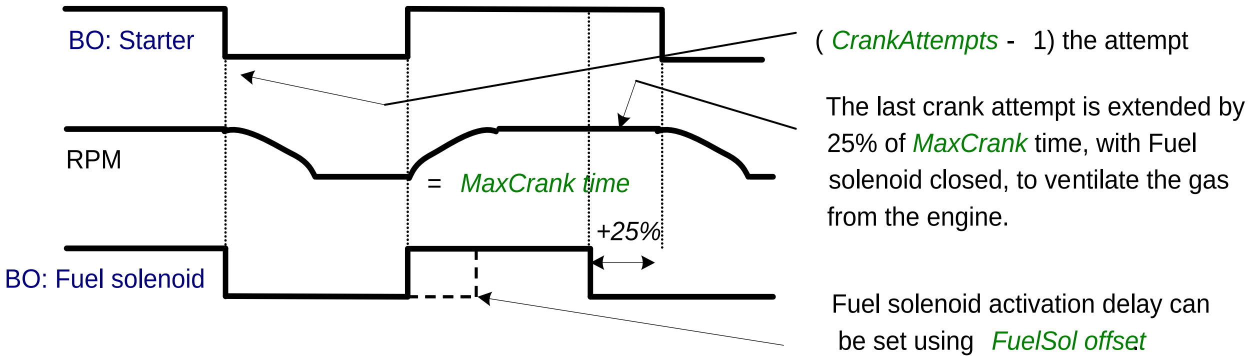
Transition Idle -> Nominal RPM, protections unblocking:



Preventilation (if *Fuel solenoid* = GAS):

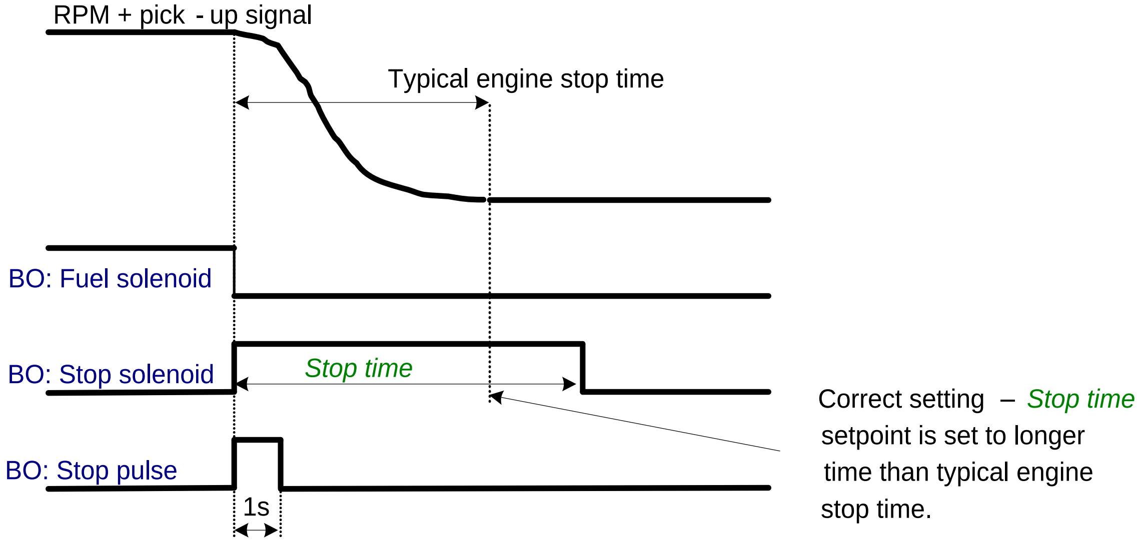


Ventilation (if *Fuel solenoid* = GAS ENGINE):

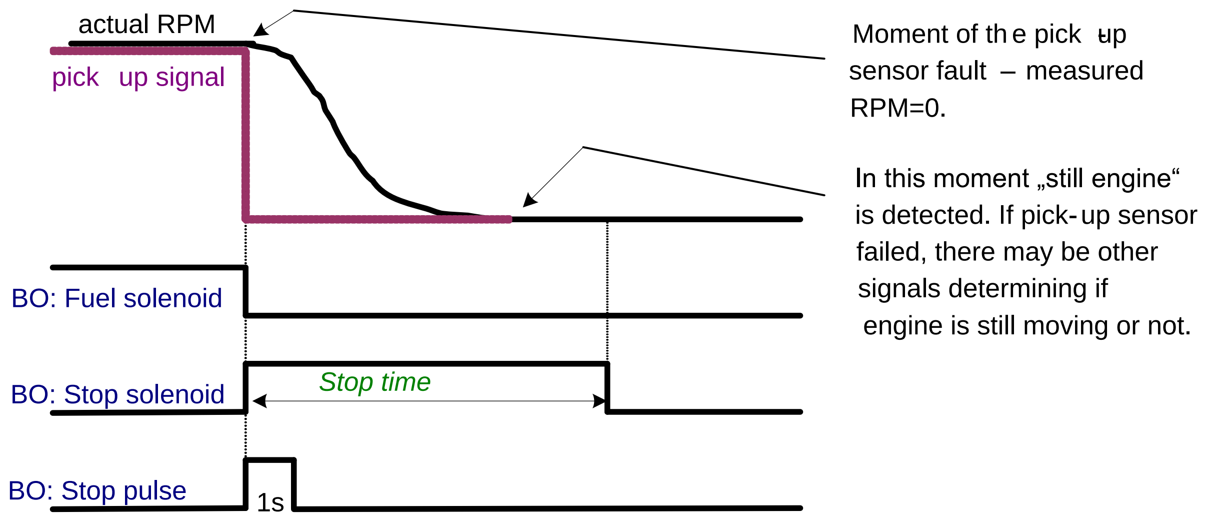


Engine stopping procedures

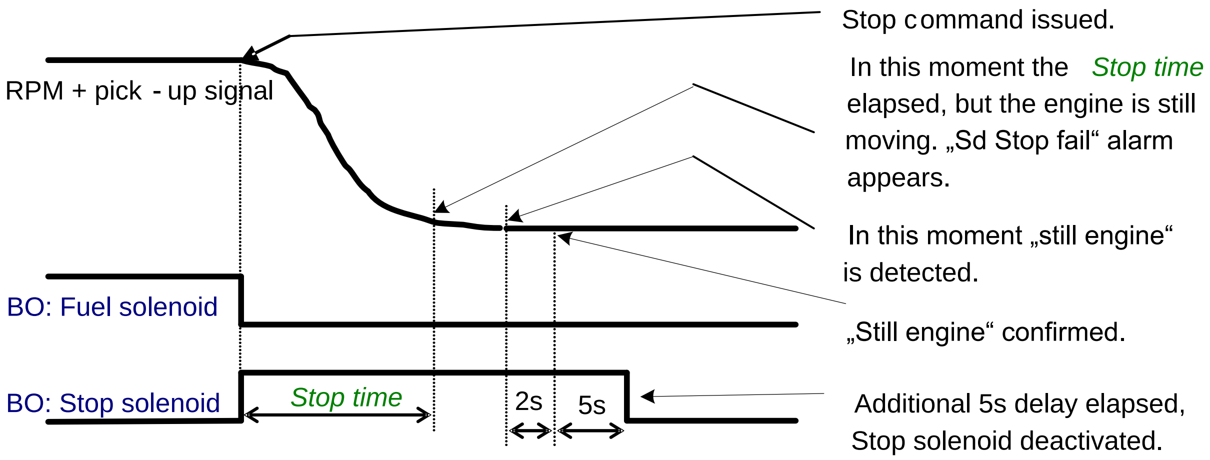
Normal engine stop:



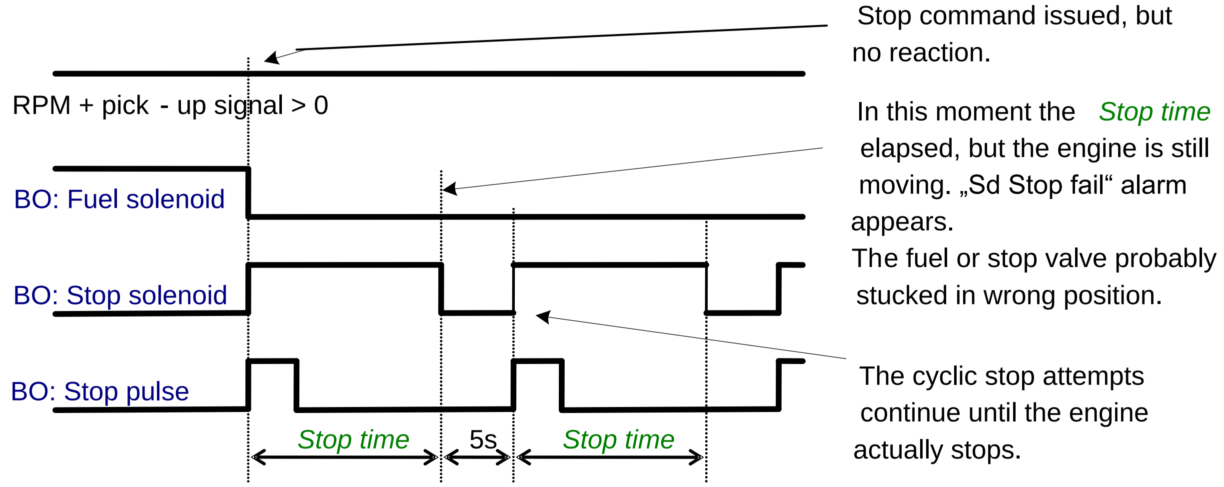
Pick-up sensor fault – forced engine stop:



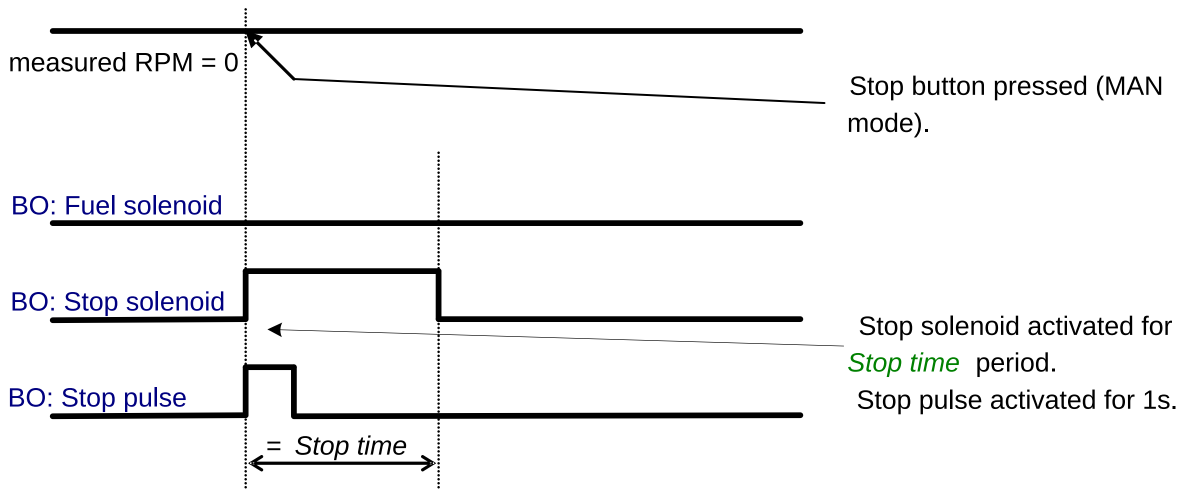
Normal engine stop, but *Stop time* is set too short:



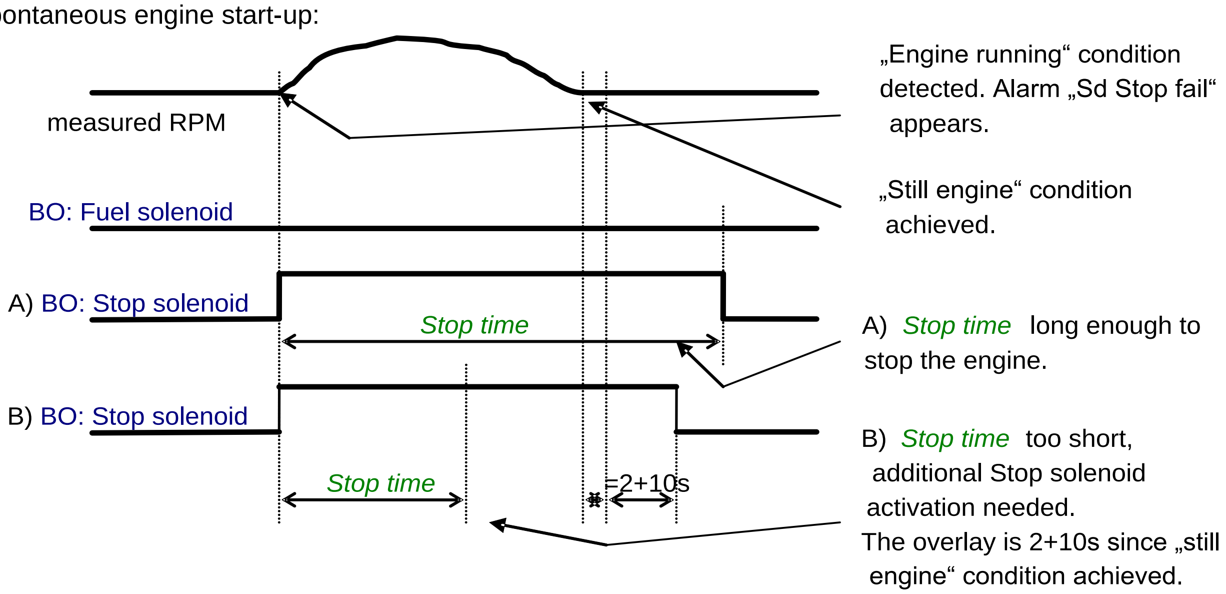
Unsuccessful engine stop:



“Forced” stop in still state:

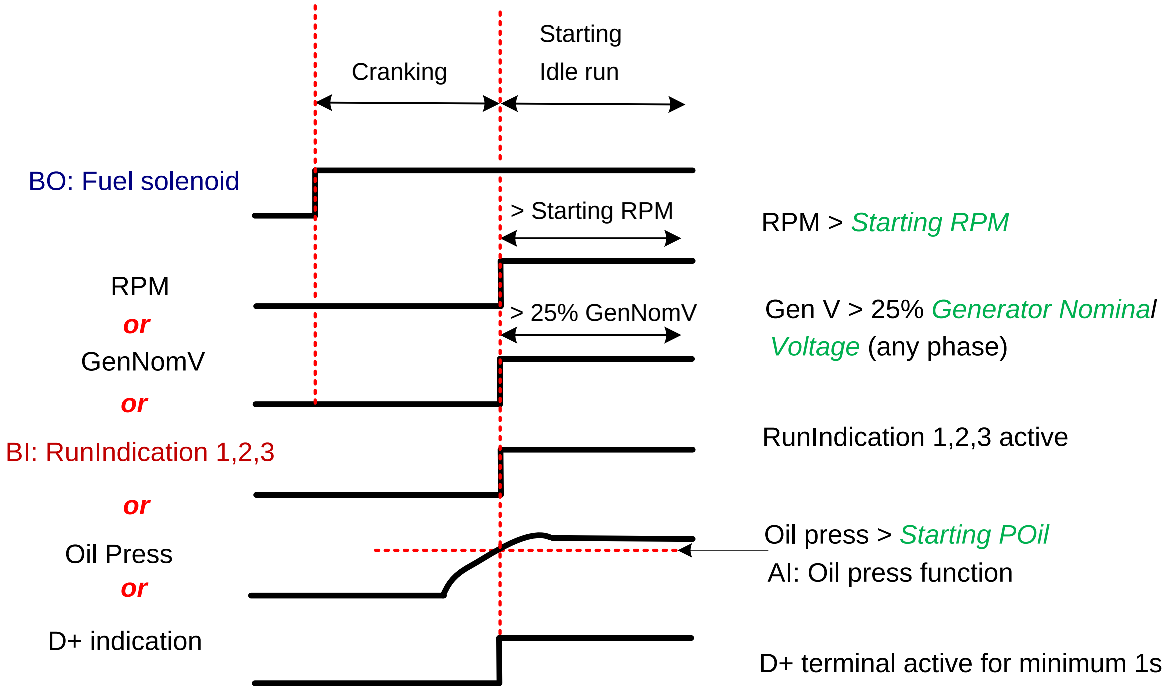


Spontaneous engine start-up:



“Engine started” conditions

- Engine speed (RPM) > *Starting RPM* or
- AI: Oil press > *Starting POil* or
- D+ terminal active for minimum 1s or
- BI: RunIndication 1 or 2 or 3 = active or
- Generator voltage > 25% of *GenNomV* (any phase)
-



“Engine running” conditions

- RPM > **Engine params**: *Starting RPM* or
- Analog input Oil pressure > **Engine params**: *Starting POil* or
- D+ terminal active and **Engine params**: *D+ function* = ENABLED or
- Active Binary input RunIndication1 or
- Active Binary input RunIndication2 or
- Active Binary input RunIndication3 or
- Vgen > 15 V (any phase).

“Still engine” conditions

- Engine speed (RPM) = 0 and
- AI: Oil press < *Starting POil* and
- D+ terminal not active and
- BI: RunIndication 1 and 2 and 3 = not active and
- Generator voltage < 15V (all phases) and
- Generator frequency = 0 Hz and
- if all above conditions are fulfilled, additional 2s delay is necessary to confirm “still engine”

NOTE:
If any of the functions not used (e.g. BI RunIndication3 not configured), it’s state is omitted in the evaluation. This is not valid for RPM comparisons, this condition is always active.

Circuit breakers operation sequence, GCB/MCB fail detection

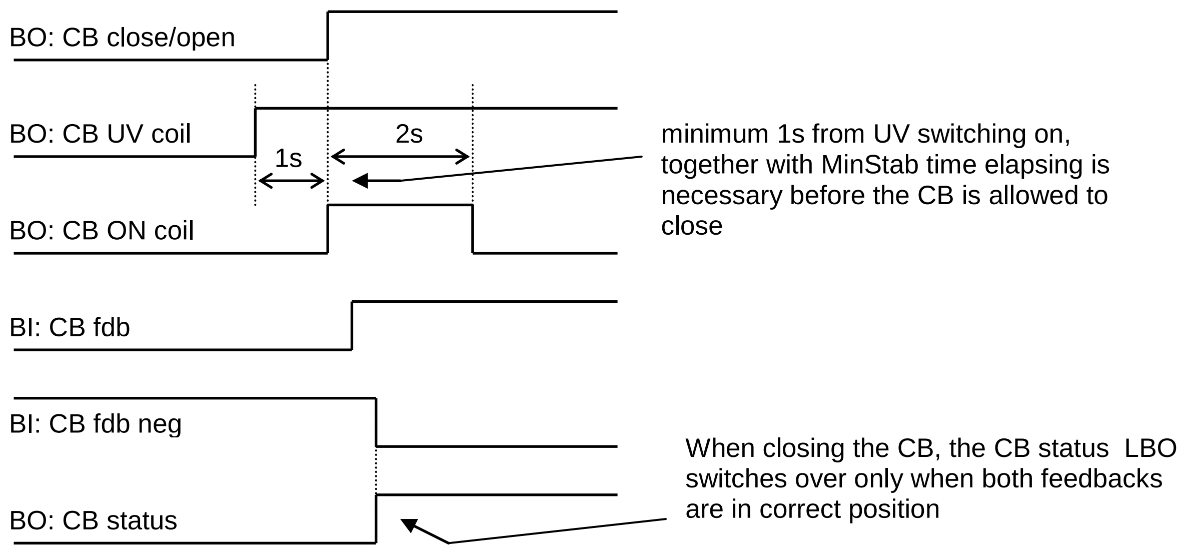
NOTE:
In the following text, “CB” abbreviation is used for MCB or GCB respectively.

Related binary inputs and outputs:

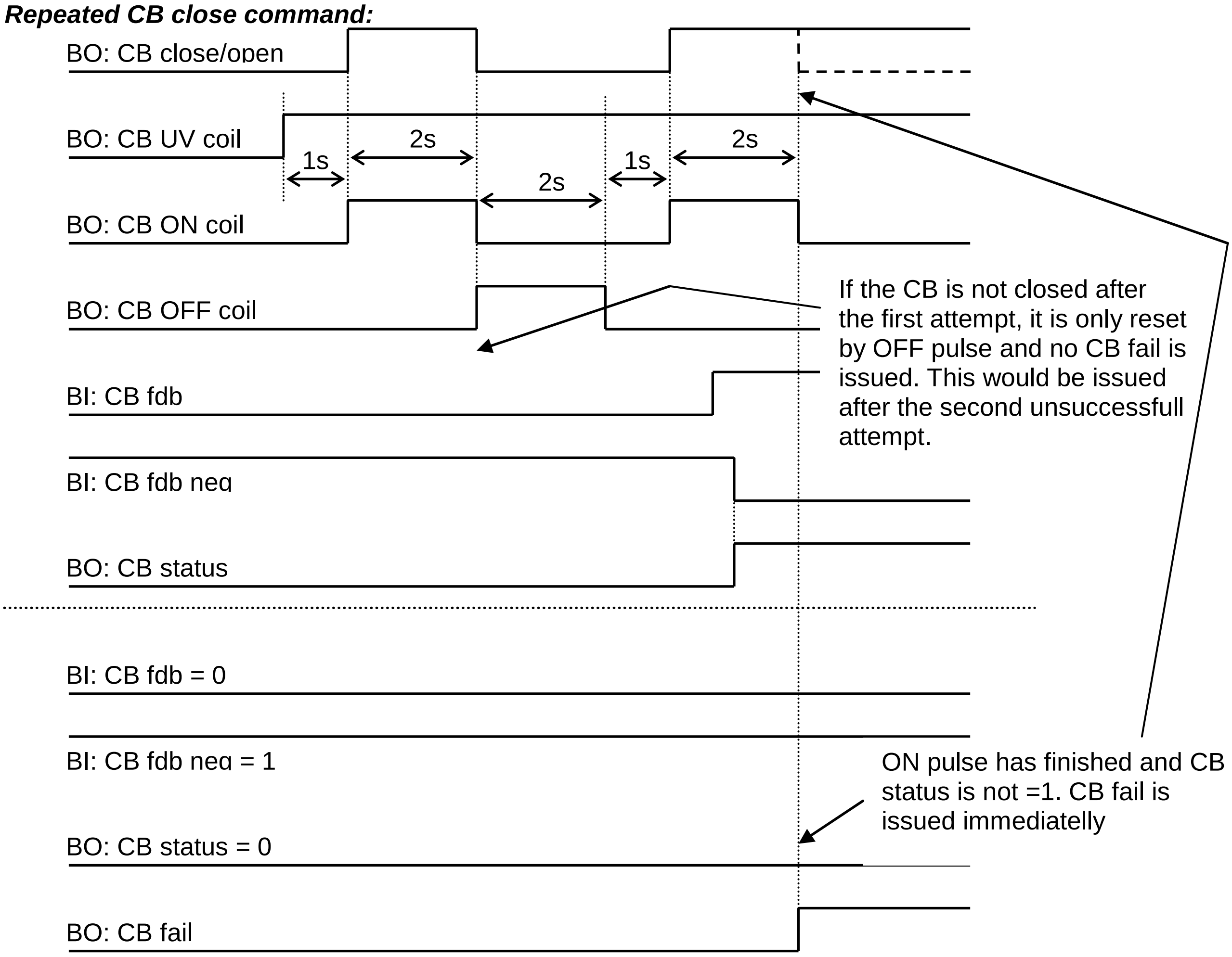
- CB fdb – CB feedback binary input
- CB fdb neg – negative CB feedback binary input. Used for increasing the reliability of CB status evaluated by the controller. In case that it is not configured, negative value of CB fdb is calculated internally within the controller.
- CB close/open – output for circuit breaker. Equals to 1 during the time when CB is requested o be closed.
- CB ON coil – output for closing coil of the CB. 2s pulse (5s if synchronising is not provided by the particuilar CB) is used for closing the CB.
- CB OFF coil – output for opening coil of the CB. 2s pulse (5s if synchronising is not provided by the particuilar CB) is used for opening the CB.
- CB UV coil – output for undervoltage coil of the CB. Permanently active, 2s negative pulse (5s if synchronising is not provided by the particuilar CB) is used for CB opening request
- CB status – output indicating CB status as evaluated by the controller. This signal is used for lighting LEDs on the panel, switching the regulations, CB fail evaluation, etc.

Possible CB sequences:

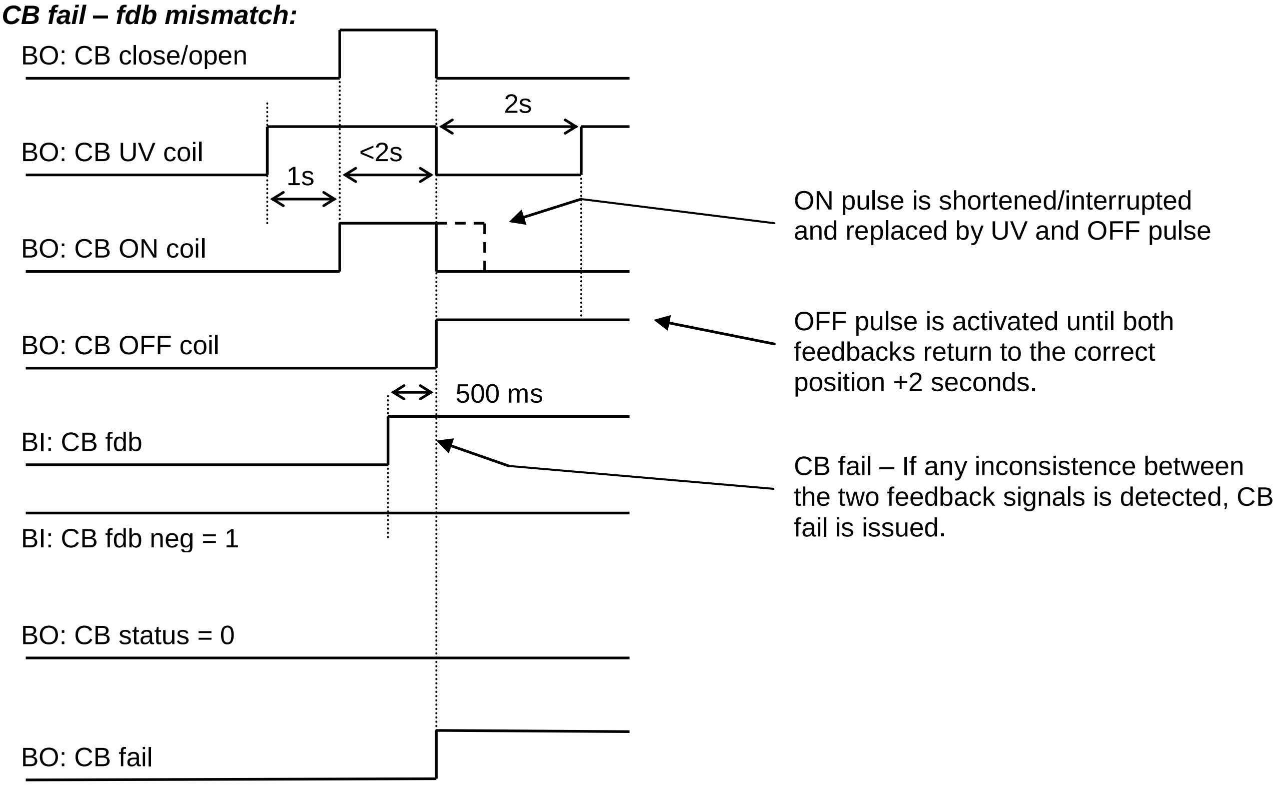
CB close command:



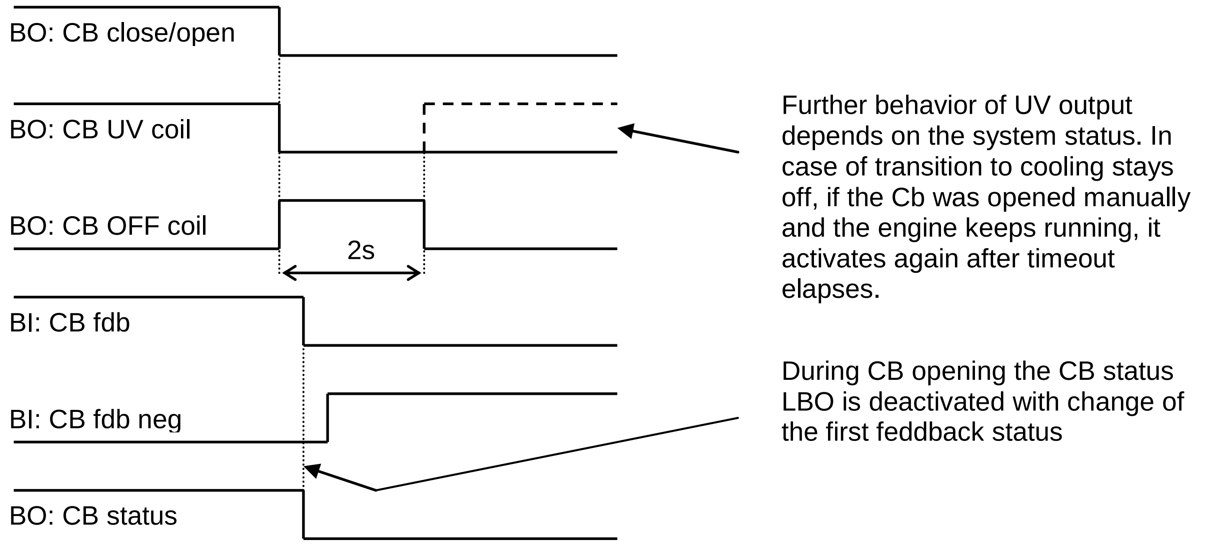
Repeated CB close command:



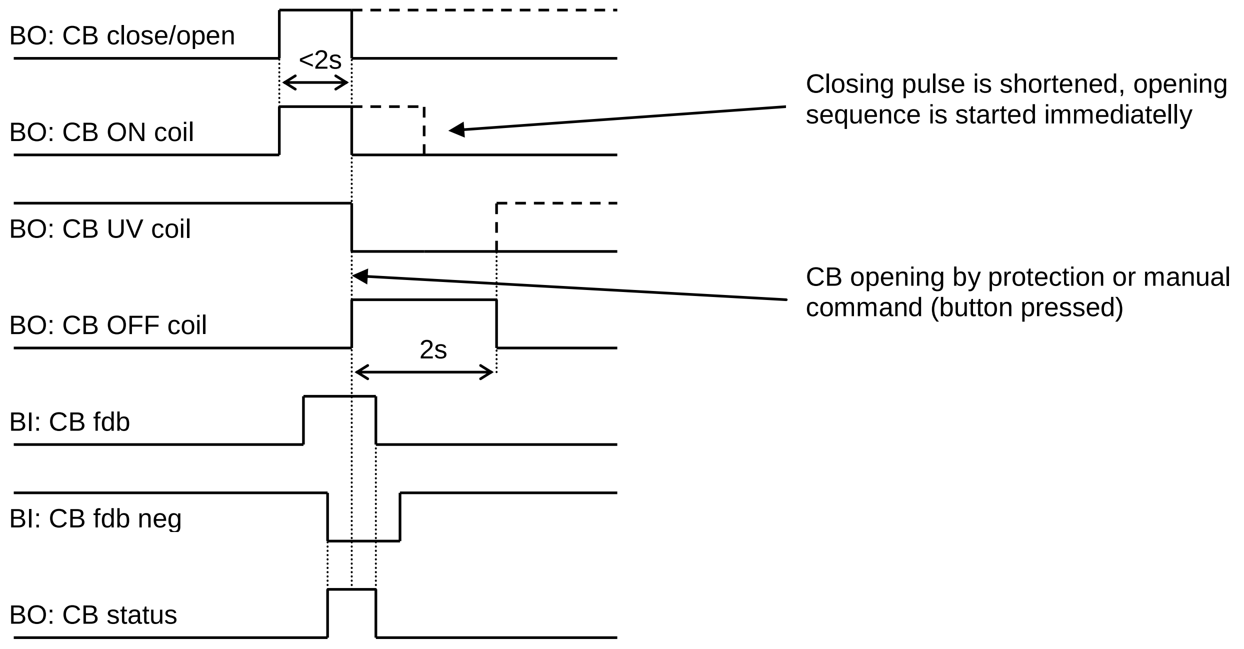
CB fail – fdb mismatch:



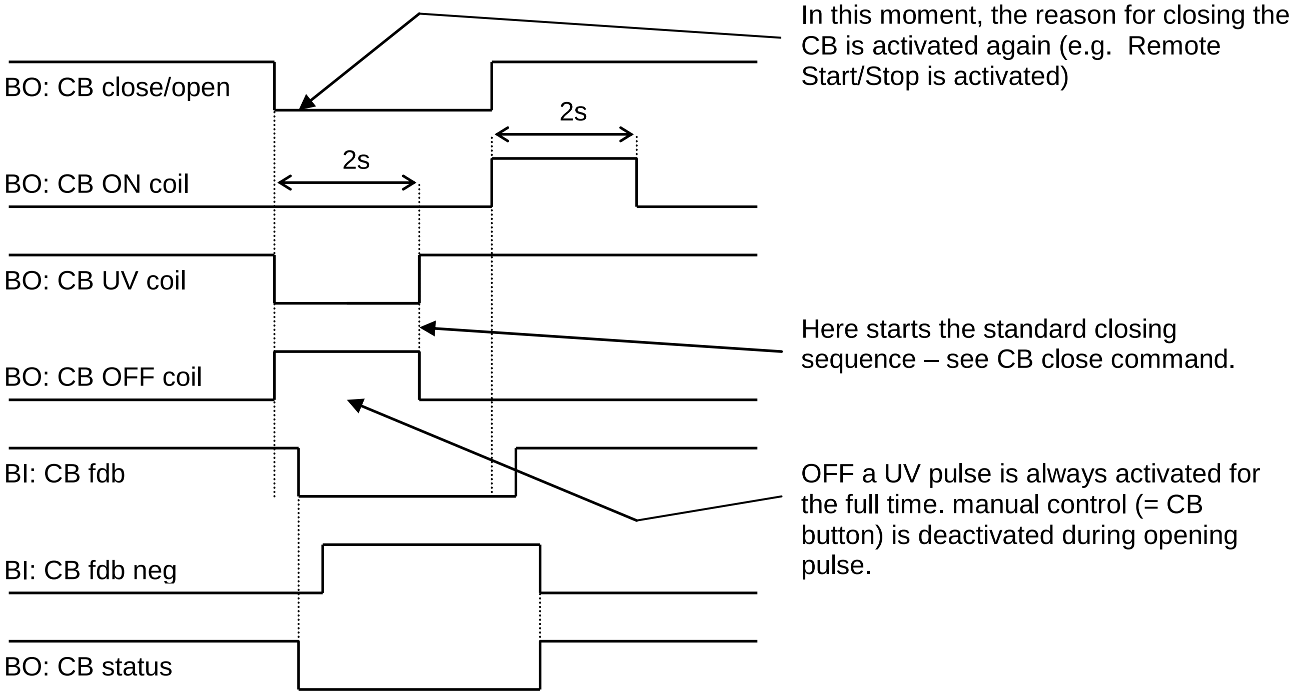
CB open command:



Transition closing -> opening (opening command is issued during closing pulse):

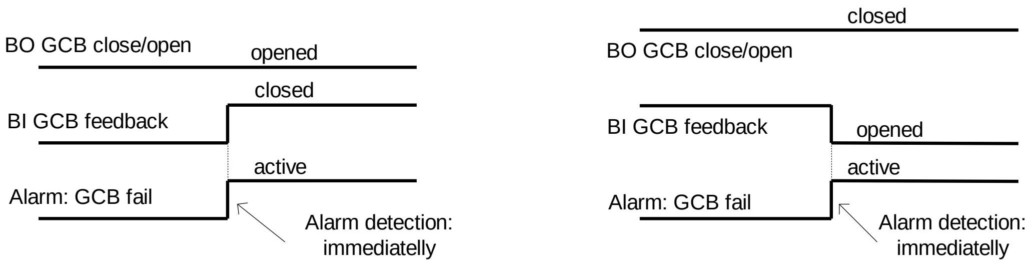


Transition opening -> closing (closing command is issued during opening pulse)



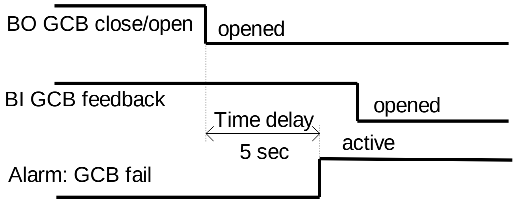
Other CB fail reasons:

– When the BO CB close/open is in steady state and CB feedback is changed, the CB fail is detected immediately (no delay).



– When the BO CB close/open opens, there is 5 resp. 2 sec delay for the breaker to respond before a CB fail is detected. In such case, if CB OFF coil is used for opening the CB and CB fail occurs during opening the CB, the signal CB OFF coil is automatically extended until the breaker opening is detected (evaluated as CB status).

- 2 sec when the CB is used for synchronizing
- 5 sec in other cases



– In case that CB fail is detected after switching the controller on (CB is closed), the CB OFF coil output is activated immediatelly.

Peak shaving based on Active and Apparent power

The Peak shaving function is active only in AUT mode in parallel to Mains operation. Peak shaving is based on Object P or Object Q (consumption of load). If load consumption increases over **ProcessControl:***PeakLevelStart* or **ProcessControl:***PeakKVAStart* for period longer than **ProcessControl:***PeakAutS/S* or **ProcessControl:***PeakKVAS/S del* the gen-set is started (BO Sys start/stop is activated). If load consumption decreases below **ProcessControl:***PeakLevelStop* or **ProcessControl:***PeakKVAStop* for period longer than **ProcessControl:***PeakAutS/S del* or **ProcessControl:***PeakKVAS/S del* the gen-set is stopped. Both Peak shaving based on kW and kVA can work simultaneously (SYS START/STOP is activated if at least one condition is fulfilled). Peak shaving based on Apparent power is available in InteliGen-NT Basebox, InteliGen-NTC Basebox and InteliSys-NT only.

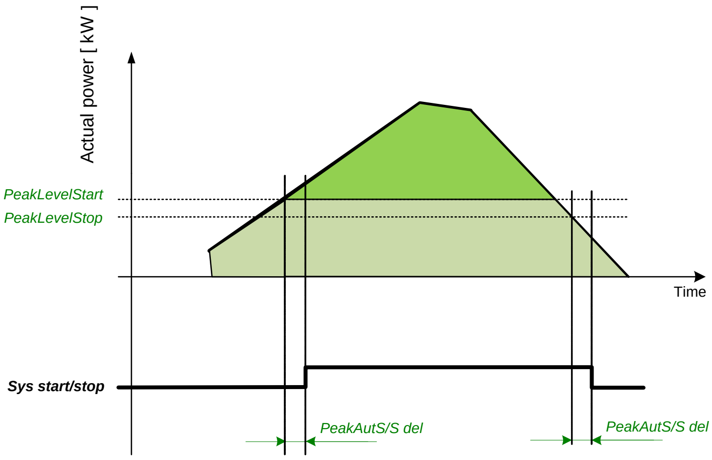


Figure: Example of peak shaving function based on Active power (the same function for Reactive power)

NOTE:
Function Peak Shaving based on Apparent power is not available for IG-NT-GC controller.

Remote Alarm Messaging

It is possible to use up to five channels for Active Call, Email and SMS upon defined type of Alarm. It is possible to define protection type for all ENABLED channels to react. All the possibilities in the controller are: History record, Alarm only, Warning, Mains protect and Mains protect with Reset. Find more information about alarm types in the chapter Protections and alarm management.

Communication Types for Remote Alarm Messaging

Below there all types of communication available for each Active Call channel.
DATA-ANA: This option sends a complete archive to the recipient's PC via analog modem. An analog modem must be connected either to one of controller COM ports or to one of I-LB modules connected to the controller via CAN2 bus. The channel address must contain complete telephone number of the recipient's PC where InteliMonitor is running in Active call receiving mode.
DATA-GSM: This option sends a complete archive to the recipient's PC via GSM modem. A GSM modem with activated CSD data transfers must be connected either to one of controller COM ports or to one of I-LB modules connected to the controller via CAN2 bus. The channel address must contain complete telephone number of the recipient's PC where InteliMonitor is running in Active call receiving mode.
DATA-ISDN: This option sends a complete archive to the recipient's PC via ISDN modem. An ISDN modem must be connected either to one of controller COM ports or to one of I-LB modules connected to the controller via CAN2 bus. The channel address must contain complete telephone number of the recipient's PC where InteliMonitor is running in Active call receiving mode.
DATA-CDMA: This option sends a complete archive to the recipient's PC via CDMA modem. A CDMA modem must be connected either to one of controller COM ports or to one of I-LB modules connected to the controller via CAN2 bus. The local CDMA network must allow point-to-point data transfers. The channel address must contain complete telephone number of the recipient's PC where InteliMonitor is running in Active call receiving mode.

SMS-GSM: This option sends a short text message (SMS) containing the actual Alarmlist contents to the recipient's mobile phone via the GSM modem. The channel address must contain complete telephone number of the recipient's mobile phone.
SMS-CDMA: This option sends a short text message (SMS) containing the actual Alarmlist contents to the recipient's mobile phone via the CDMA modem. The channel address must contain complete telephone number of the recipient's mobile phone.
IB-E-MAIL: This option sends an e-mail containing the actual Alarmlist contents and latest 20 history records (only date, time, reason) to the recipient's mailbox via the IB-COM module or IG-IB module. The channel address must contain valid e-mail address of the recipient.

NOTE:
The SMTP settings (SMTP authent,SMTP user name, SMTP password, SMTP address, Contr mailbox) must be properly adjusted for sending e-mails.

Example of setting

There is an example of setting of Remote Alarm Messaging. In this case active calls we be triggered on Mains protect and Mains protect with Reset alarms. Message is sent via email to emailAddress@domain.com (Channel 1 – available for NTC controller or with any controller with connected IB-NT or I-LB+), archive is sent via ISDN modem to the number +111222333444 (Channel 2) and SMS is sent to the number +999111333555 (Channel 3).

Name	Access Group	Value
History record	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	DISABLED
Alarm only	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	DISABLED
Warning	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	DISABLED
Mains protect	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	ENABLED
MainsP w/Reset	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	ENABLED
AcallCH1-Type	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	IB-E-MAIL
AcallCH1-Addr	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	emailAddress@domain.com
AcallCH2-Type	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	DATA-ISDN
AcallCH2-Addr	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	+111222333444
AcallCH3-Type	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	SMS-GSM
AcallCH3-Addr	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	+999111333555
NumberRings AA	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	3
ActCallAttempt	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	5
Acall+SMS lang	0ON 1OFF 2OFF 3OFF 4OFF 5OFF 6OFF 7OFF	1

It is also possible to adjust number of attempts that controller performs in case of not successful Active Call – **Comms settings:***ActCallAttempt*. The language of messages can be changed – **Comms settings:***Acall+SMS lang* (use Translator and Languages tabs in GenConfig to adjust languages).
Up to five channels can be used.

Controller Redundancy

Redundant system is a general term for applications where there are two controllers at each gen-set. One is the main controller, which controls the gen-set in normal conditions, the other is the redundant controller, which takes over the control when the main controller fails. Both controllers have identical firmware and most of the configuration and setpoints. Only several things need to be adjusted/configured differently because of the rendundancy function itself.

CAUTION!
If there are shared binary or analog outputs used on the controller (e.g. for system start/stop), it is necessary to prepare the configuration in the way so each controller uses binary or analog output set with different address. Configuration in gen-set controllers then needs to be altered so it can receive signals from both controllers (e.g. using built-in PLC functions).

Redundant systems using binary signals

It is not possible to use this redundancy system since correct function of the controller depends on CAN bus communication and thus CAN redundancy should be always used.

Redundant systems using CAN bus

This system uses the CAN bus for detection whether the main controller is operational or not. If the redundant controller has not received two consequent messages from the main one (~100ms) it will take over the system control - it activates the binary output CTRLHBEAT FD, which has to be wired in such a way, that it disconnects the dead main controller from the control, connects the redundancy controller instead and activates it by deactivation of the binary input EMERG. MANUAL.
As there can be up to 16 pairs of controllers at the CAN bus it is necessary to select which main controller (address) belongs to which redundant one. The setpoint **ProcessControl:***Watched Contr* is used for this purpose. It must be adjusted to address of the respective main controller in each redundant controller and it must be adjusted to 0 in each main controller.

CAUTION!
Correct wiring of all inputs and outputs that should be used both by the main and the redundant controller needs to be done. Please refer to the corresponding chapter for wiring of binary inputs and outputs.

Do not use Shared Binary Inputs/Outputs for CTRLHBEAT FD -> EMERG.MANUAL connection since the failed controller may not interpret it correctly!

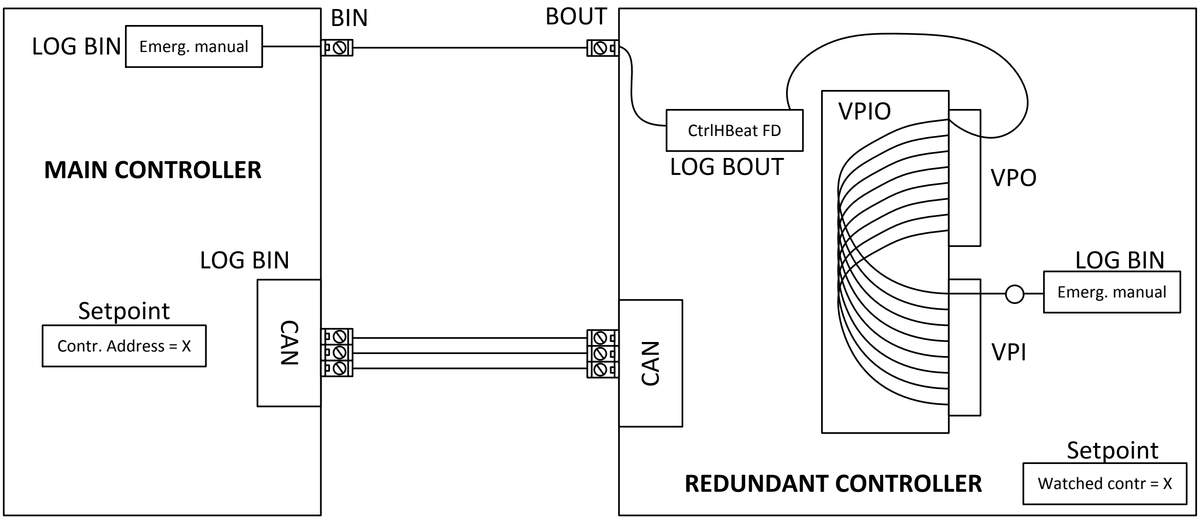


Figure: Example of redundancy function

In the figure above the signal of logical function CtrlHBeat FD is used to disable the main controller if it is lost from CAN bus or CAN bus communication from that controller becomes erratic. It is used also to disable the redundant controller when the communication on CAN bus is alright (it is negated). For more information on Virtual Binary Inputs and Outputs (VPIO) please refer to the chapter about Shared Binary Inputs and Outputs and Virtual Binary Inputs and Outputs.

NOTE:
Use pulse signals for control of circuit breakers. MCB ON COIL, MCB OFF COIL, MGCB ON COIL and MGCB OFF COIL should be used to prevent sudden opening for a short period of time when the controller fails and to ensure proper function of redundancy.

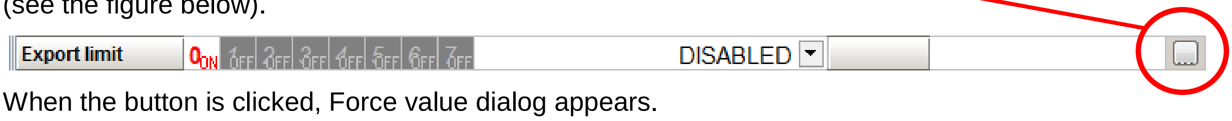
Force value – step by step guide

In this chapter there is complete step by step guide which shows how to use Force value function of the controller.

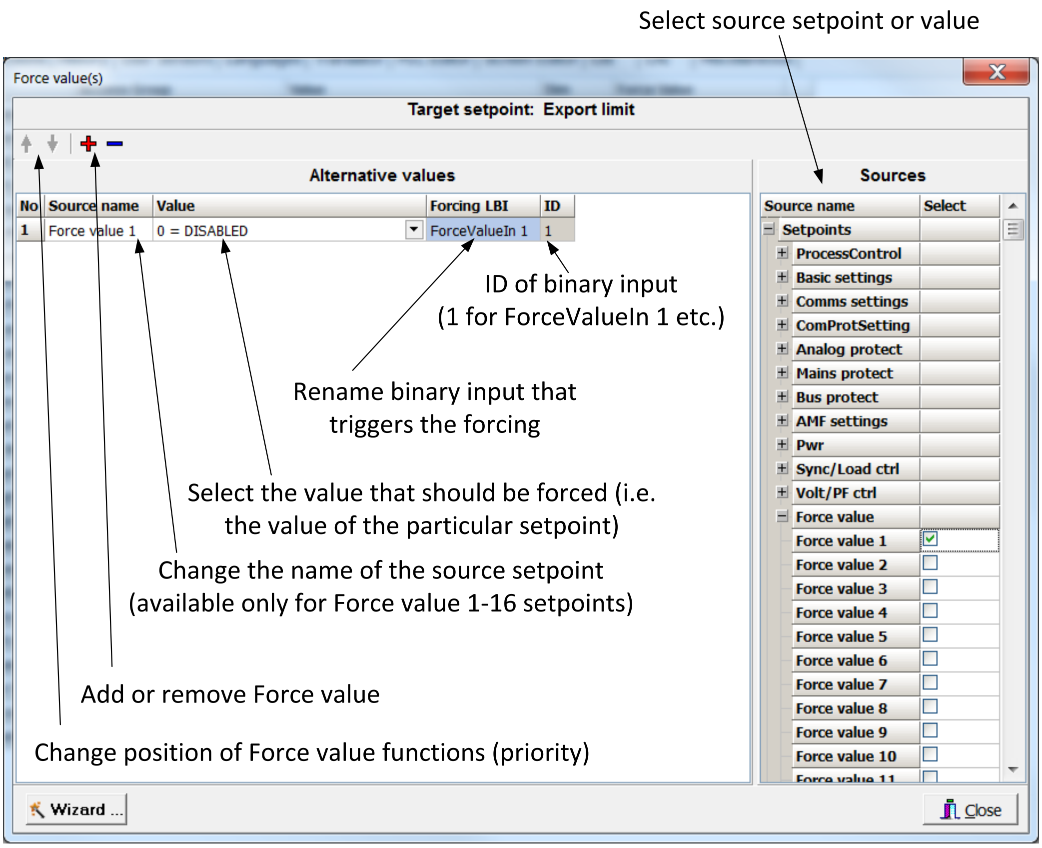
Forcing of values is used to change particular setpoint temporarily by activation of related Binary Input. This is used to change function of controller under given conditions (e.g. there are two different periods during the day when Export limit given by distribution network is required or not).

WARNING!
Setpoints must not be written **continuously** (e.g. via Modbus connection)! If continuous change of setpoints is required, combination of External values and Force value function needs to be used. The memory that holds setpoints is designed for up to 10^5 writings. Than memory may be damaged!

Setpoints that are available for forcing may be identified by Force value button on the right side in GenConfig (see the figure below).



When the button is clicked, Force value dialog appears.

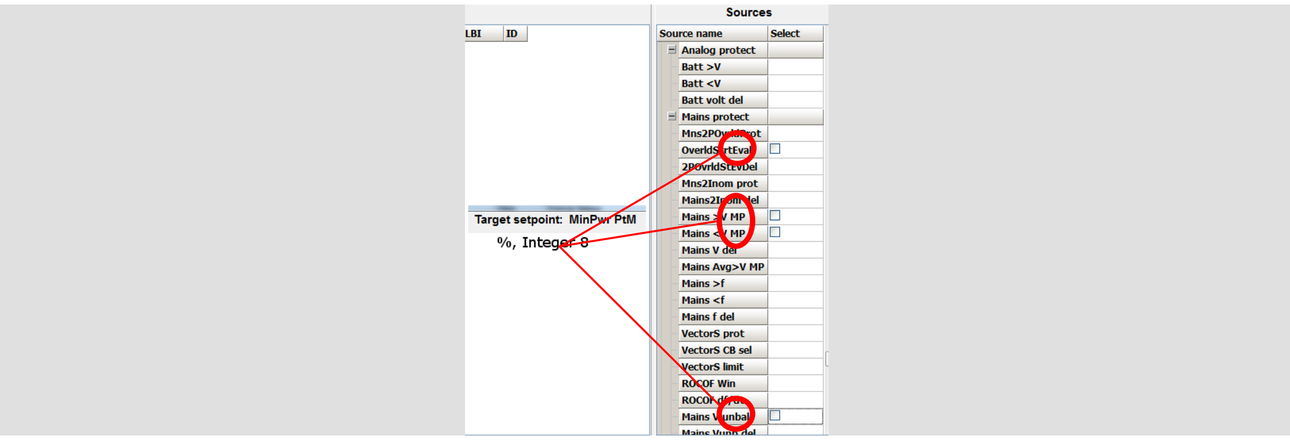


For example if we add **Force value:***Force value 1* to be forced to **ProcessControl:***Export limit* as value 0 (DISABLED) by Binary Input ForceValueIn 1 we can change the function of Export limit from ENABLED to DISABLED by activation of ForceValueIn 1. It is possible to rename the setpoint to e.g. **Force value:***ExportDisabled* and Binary Input as well to e.g. DisableExpLim. The function will not change (only the corresponding names).

It is possible to use several force value functions for one setpoint. If more than one forcing Binary Input is active, the one with the highest position (lowest number in the Force value dialog) is used.

It is possible as well to use one Binary Input to force multiple setpoints (e.g. in case of complex function change).

NOTE:
It is possible only to force value or setpoint in other setpoint if their dimension and range are the same (e.g. only value with dimension in hours and which is Integer 16 to a setpoint with dimension hours and which is as well Integer 16). You may use PLC block Convert to change the dimension and range if needed.



Values for continuous writing from external sources

This function is especially designed for continuous writing of setpoints from external sources (e.g. via Modbus connection).

WARNING!
Setpoints must not be written **continuously** (e.g. via Modbus connection)! If continuous change of setpoints is required, combination of External values and Force value function needs to be used. The memory that holds setpoints is designed for up to 10^5 writings. Than memory may be damaged!

It is possible to use up to four different External values for continuous writing from external sources. The values are adjusted by setpoints in **Force value** group. Default (also initial) value may be adjusted, rate of change of *ExtValueX* (by Binary Inputs EXTVALUEX UP and EXTVALUEX DOWN) can be adjusted as well as high and low limit of the value.
There are two way, how to adjust External values. One is using Binary Inputs mentioned above. Second one is to write the value directly using e.g. Modbus. External values then may be converted using PLC block convert and force into setpoint which is then continuously forced (**note: NOT WRITTEN**) by the value of ExtValueX. This way internal memory is safe and no damage may occur.
External values are reverted back to their default (initial) value (given by corresponding setpoint) when Binary Input for their reset is active (and they change to the previous value after Binary Input deactivates). When the Binary Input is active the External value cannot be changed by Modbus writing or by using Binary Inputs for up and down value.

NOTE:
External values are not available for external writing when any Binary Input (up, down or reset) related to them is active.
Note also that when the controller is reset (powered down and up again), all external values are reverted back to their default (initial) values.

HINT
For information on how to write (or read) objects from controller via Modbus, please refer to the latest Communication guide for InteliGen and InteliSys.

General Purpose Timers

There is 16 general-purpose timers in the controller, each 4 of them are joined together to one output. That means there are 4 fully independent timer blocks including 4 timer channels each. The combined outputs from the timer blocks are *TIMERACT 1-4*, *TIMERACT 5-8*, *TIMERACT 9-12* AND *TIMERACT 13-16*.
The timers are 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 disconection of the mains etc. Each timer channel can be activated only once within a single day. The activation time and duration of each channel is adjustable (both as hh:mm).

Timer modes

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 preriod.

The mode of each timer channel is adjusted by an assigned setpoint. The setpoints are located int the **Timer settings** group and can be adjusted via InteliMonitor and GenConfig.

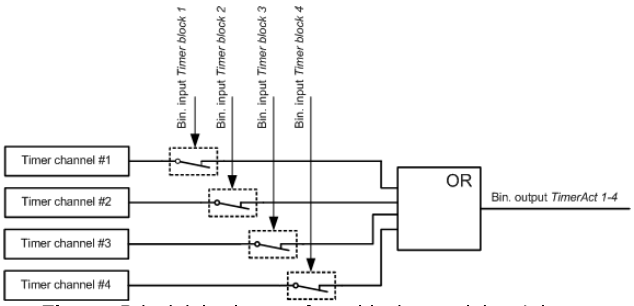
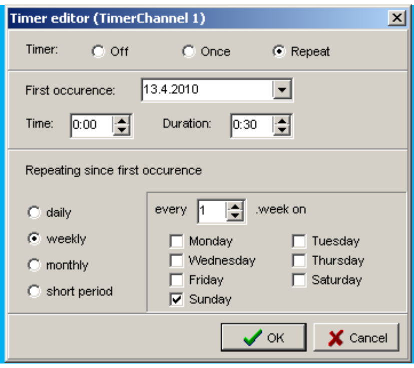


Figure: Principial scheme of one block containing 4 timers

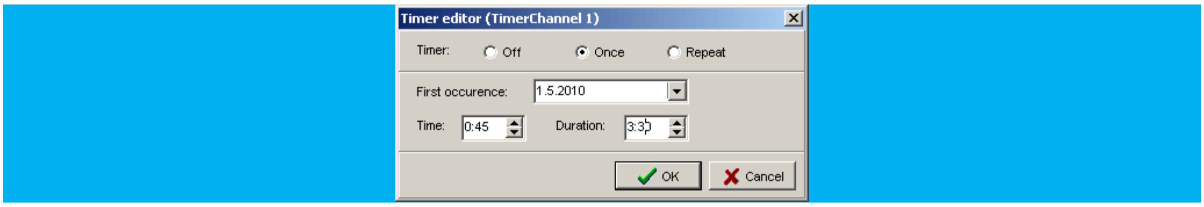
EXAMPLE:

Below is an example how to use the timers for periodic tests of the gen-set performed every sunday with duration of 30 minutes and also for scheduled transfer of the load before expected mains failure announced by the local electricity distribution company to 1.5.2010 from 01:00 to 04:00.

1. The output *TIMERACT 1-4* is configured internally in GenConfig (LBI tab) to the logical binary inputs *REMOTE TEST* and *TEST ON LOAD*.
2. The setpoint **Timer settings:***TimerChannel 1* is adjusted to "repeated" mode, "weekly" period, only sundays, starting date/time next sunday at 0:00, timer duration 0:30 min.



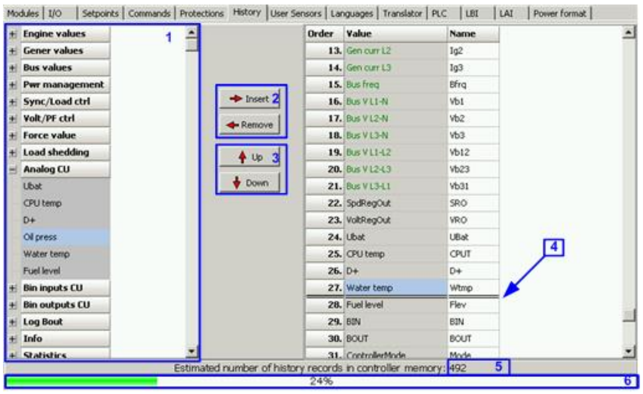
3. The setpoint **Timer settings:***TimerChannel 2* is adjusted to "once" mode, starting date/time 1.5.2010 at 01:00, timer duration 3:00 hrs.



History Related functions

History Records Adjustment

It is possible to change History records content. Each record contains date, time and cause of the record as obligatory columns. The rest of columns are configurable.
The history record structure has two parts. The upper part is so-called fast and is written into the history memory immediately in the moment when the written event occurs. The rest of the record may be written with a delay max. 100ms. The fast part is intended for fast changing values as e.g. currents, voltages or power. The parts are separated by a line in the record content list.



1. Values selection tree
2. Buttons for adding/removing values into/from the record structure
3. Buttons for ordering of the values in the record structure
4. Fast history separator. The fast part is located above the separator
5. Estimated number of records depending on record size
6. Record capacity usage indicator

<u>NOTE:</u>
Values that are displayed in green color are recomended to be placed in the fast part.
If the checkbox Add modules to history automatically.. in the Modules tab is checked then all values of a module are automatically added into the history record when the module is inserted into the configuration.

Time Stamp function

The controller allows user to define when the history records are written even though there is no other reason for history record (so called Time Stamp).
It is possible to disable time stamping function (for example when time stamping is not needed and just floods the history). It may be conditioned by activation of logical Binary Input function (TIME STAMP ACT) or it may be enabled always.
Period of time stamping may be adjusted from 1 to 240 minutes.

<u>NOTE:</u>
Beware of History flooding by to many Time Stamps (vital information may be overwritten).

Time and Date Intercontroller Sharing

Time and Date are used mainly for History records. These values are shared between controllers that are connected to CAN. When the value is changed in one controller, it sends its new value to all other controllers that are connected to the same CAN bus and they update their time and date values and setpoints accordingly.

Summer Time Mode

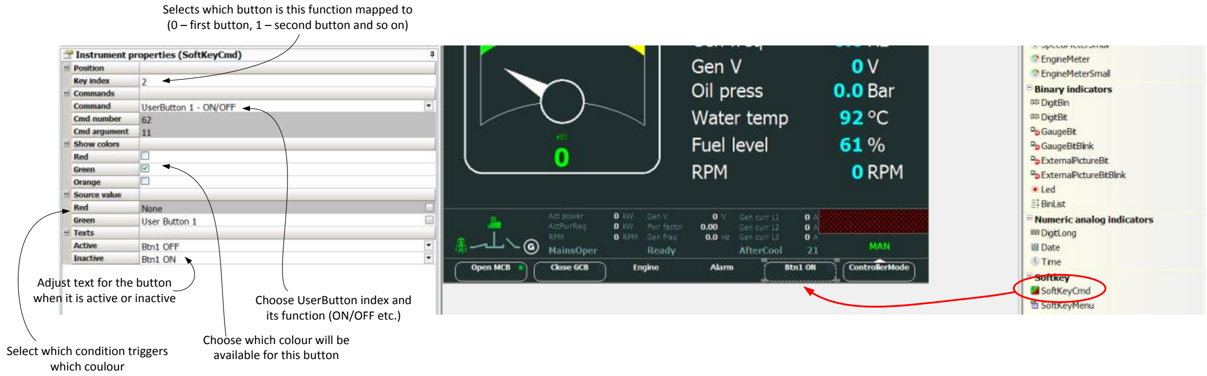
Summer Time Mode function may be enabled and disabled by user. It is possible to set if the controller is located in the northern or southern hemisphere as well.
SummerTimeMode implemented in ComAp controllers is based on CET summer time which means:

- Clock goes forward 1 hour at 2:00 a.m. on the last Sunday in March
- Clock goes backwards 1 hour at 3:00 a.m. on the last Sunday in Octorber

NOTE:
Please be aware that in other regions summer time adjustments may be done in different time.

User Buttons

There are several User Buttons available in the controller. It is possible to set them on Soft Buttons in InteliVision 5 or 8.



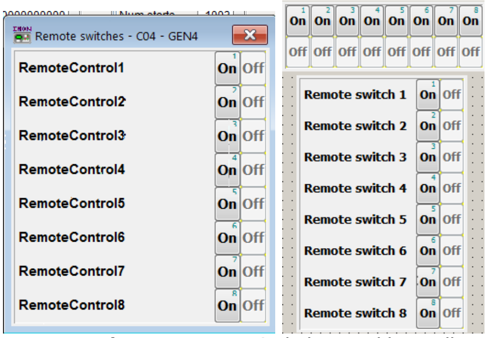
Available functions for soft buttons are listed in the following table.

ON	Pressing the button changes the state of log. Binary Output USER BUTTON X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of log. Binary Output USER BUTTON X to opened. When the output is opened and the button is pressed state is not changed.
ON/OFF	Pressing the button changes the state of log. Binary Output USER BUTTON X to opened or closed depending on previous state (it is changed to the opposite state).
PULSE ON	Pressing the button issues log. Binary Output USER BUTTON X to close for one second. **NOTE:** Repeated pressing of button during the closed period (one second) causes issuing other puls of length of one second to be generated from the moment of button pushing.

HINT
It is possible to lock User Button with password (go to tab Commands in GenConfig). User Buttons 1-5, 6-8 and 9-16 can be locked separately. It is also possible to use User Buttons in SCADA diagrams.

Remote Control Function

It is possible to remotely control several Binary Outputs in the controller. You can either use Remote Switches tool in InteliMonitor (select Remote switches in menu for corresponding controller), import Remote Switches tool to a SCADA diagram in Line Diagram Editor or use external device via Modbus (register #46361 and command #26 (1A hex), for more information on Modbus please refer to the InteliGen/InteliSys Communication guide).
Remote Switch will activate or deactivate depending on remote control so it can be used to manually control devices, simulate malfunctions while commissioning etc.



1A	Set binary output RemoteSwitch1-8 (RemoteControl1-8)	00200000
	Reset binary output RemoteSwitch1-8 (RemoteControl1-8)	00100000

Figure: Remote Switches tool in InteliMonitor, Remote Switches tools in Line Diagram Editor and Mobus commands

Remote Switches may be easily used to trigger logical Binary Input function and all other related functions as normal switch on Binary Input. Module VPIO (Virtual Peripheral Inputs- Outputs) can be added to configuration and it will copy the state of Remote Switch on virtual output to its counterpart virtual input. Refer to the figure below for example.

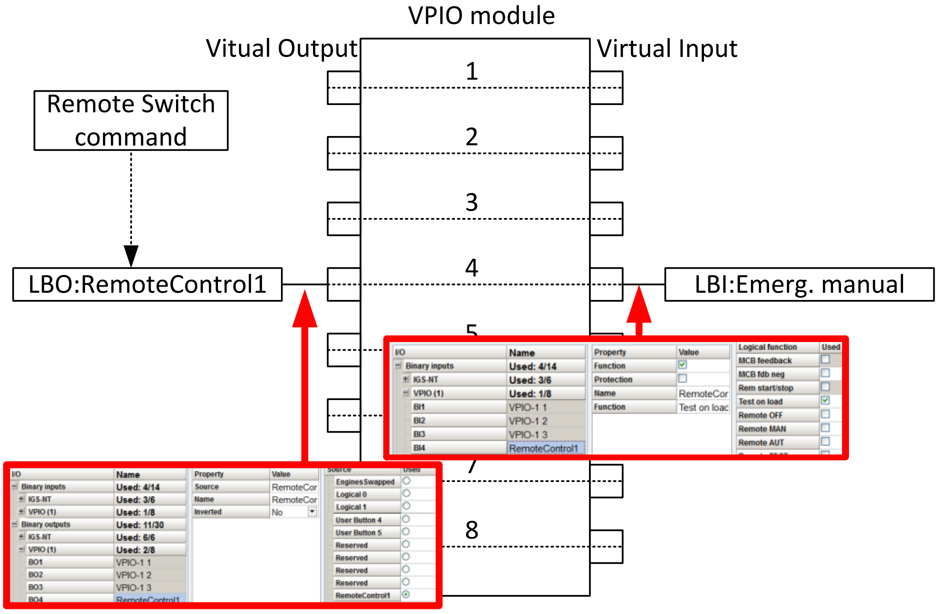


Figure: Using of Remote Switches to trigger logical binary inputs

Virtual Peripheral Inputs-Outputs (VPIO) module

For the controller there are several modules available. One of them is Virtual Peripheral Inputs-Outputs module which is particularly usefull for connection of logical Binary Output functions to logical Binary Input functions. This way internal controller function may easily trigger other internal controller functions without unnecessary wiring or usage of PLC functions.
Module is functioning the same way as normal module with 8 outputs and 8 inputs, but the difference is, that each input copies its counterpart output. It is possible to select any logical Binary Output function for one of the outputs of VPIO module. Inputs on VPIO module work the same way as standard input of the controller (i.e. it can be assigned function and protection).
For example of this function please refer to the chapter Remote Control function.

Shared Inputs and Outputs

It is possible to share Binary and Analog values between all the controllers via CAN bus, thus saving physical Inputs and Outputs and excess wiring.

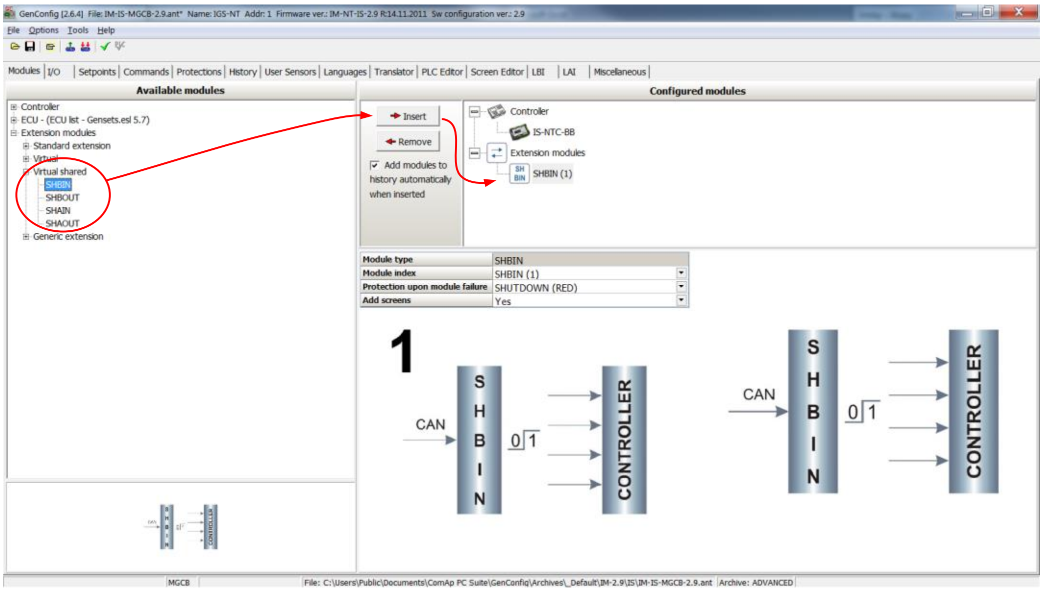


Figure: Adding of various modules

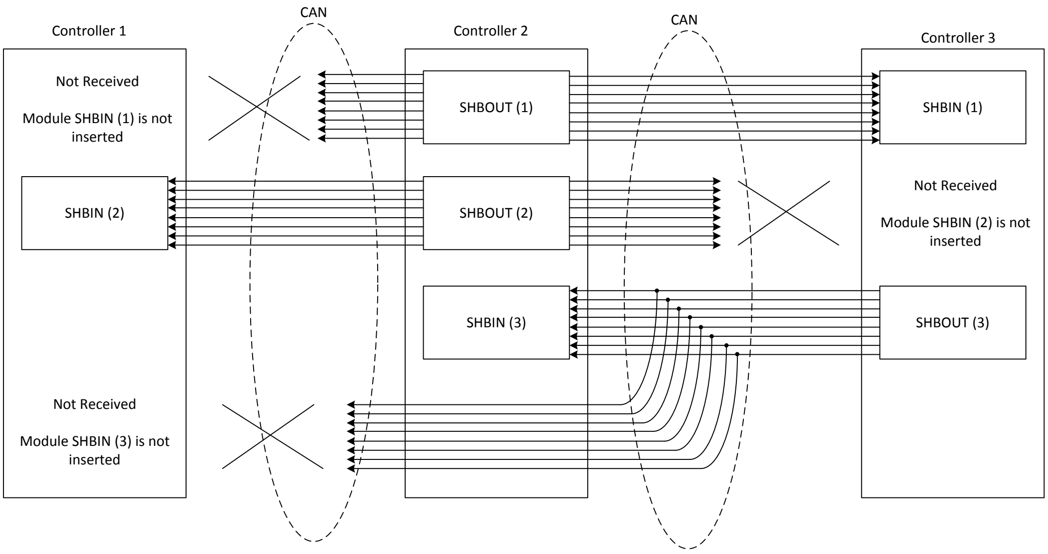
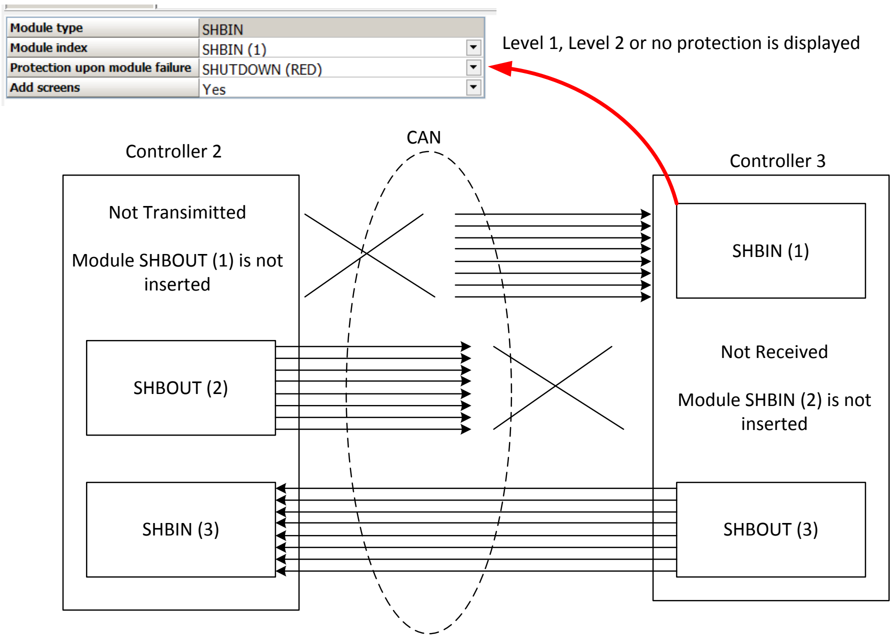


Figure: Principal Scheme (same for shared Binary I/O and shared Analogue I/O

Shared Binary Inputs and Outputs may be used exactly in the same way as standard physical Inputs and Outputs. If SHBIN or SHAIN modules are configured, at least one corresponding module of SHBOUT or SHAOUT (respectively) is needed. If it is not configured, corresponding protection appears because SHBIN or SHAIN will be missing. See the figure below for more information.

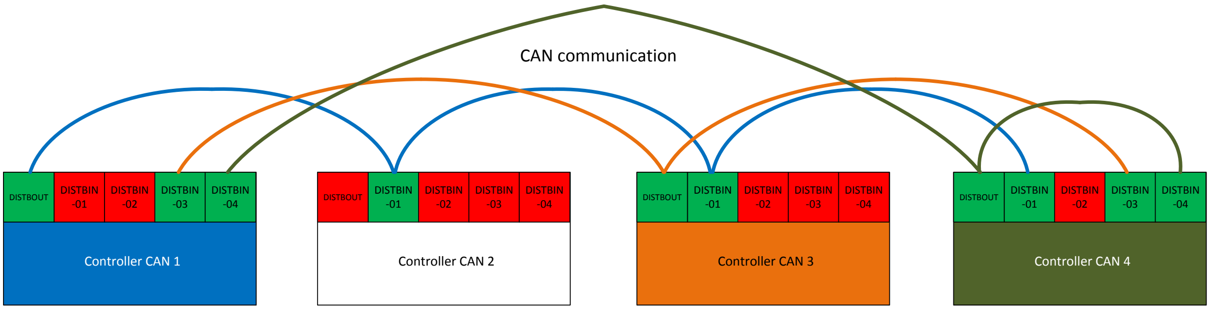
CAUTION!
For proper function of Shared Binary and Analog Inputs and Outputs, only one source of Shared Binary or Analog Outputs must be configured (i.e. it is not possible to configure in one controller SHBOUT1 and to another one as well SHBOUT1).

HINT
Controller sends Shared Binary Outputs each 100ms if there are any changes in any bit position. If there are no changes, controller sends the information with period 1s.



Distributed Binary Inputs and Outputs

It is possible to share Binary and Analog values between all the controllers via CAN bus, thus saving physical Inputs and Outputs and excess wiring.
DISTBIN and DISTBOUT work in a different way than SHBIN and SHBOUT. Each controller has one pack of eight DISTBOUT available (if not configured or no function is assigned to any output, it does not broadcast them). The number of DISTBOUT module is not shown in the configuration and it is always corresponding to the CAN address of the controller (e.g. the controller with address 5 will be broadcasting DISTBOUT-05 which can be received if module DISTBIN-05 is configured in another controller. Up to 32 DISTBIN modules can be configured (meaning that the controller will be receiving all DISTBOUT from all the controller, even his own).
It is not possible to change the name of DISTBIN inputs or add protections.
In the example below you can see 4 controllers with various DISTBIN and DISTBOUT configuration.



HINT
Controller sends Distributed Binary Outputs each 100ms if there are any changes in any bit position. If there are no changes, controller sends the information with period 1s.

NOTE:
DISTBIN and DISTBOUT function is not available for IM-NT-GC controller.

NOTE:
DISTBIN and DISTBOUT function is conditioned by IGS-NT-LSM+PMS dongle.

Modbus Reading and Writing

Controller supports Modbus Slave functions (an external device may write or read from a controller). Modbus registers corresponding to objects in the controller can be exported to text form in GenConfig.

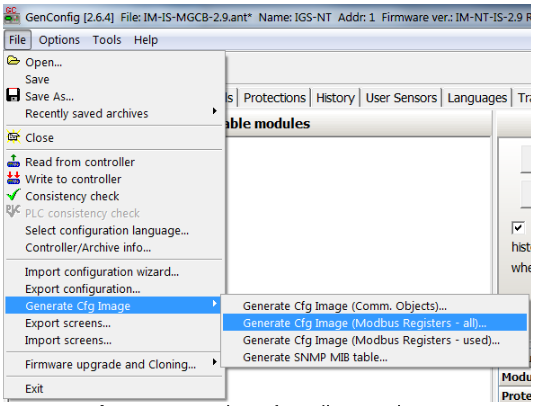
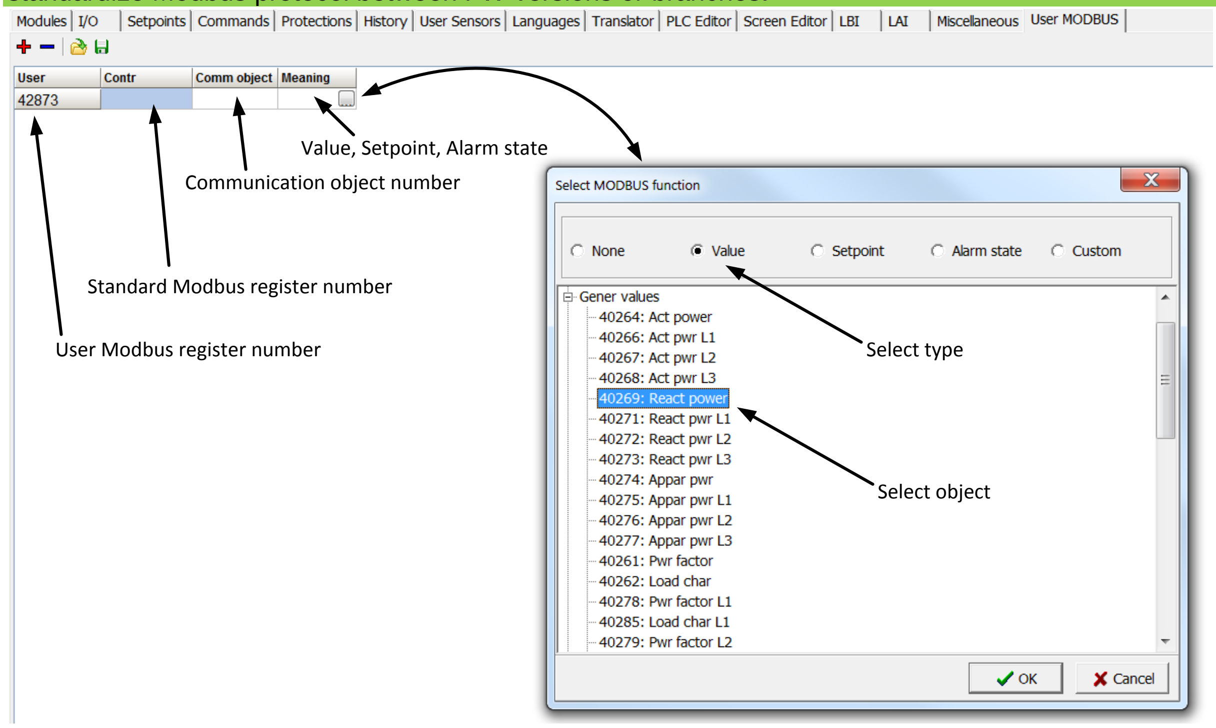


Figure: Exporting of Modbus registers

If Modbus Master function is required extension module I-CB/Modbus connected via CAN1 can be used. For more information on how to use this module please refer to InteliGen/InteliSys Communication Guide and to I-CBEdit manual.

User MODBUS

Users can define Modbus registers from 42873 to 43000. Values, setpoints and Alarm states can be specified for these new Modbus registers to prepare the Modbus protocol for batch reading and writing or to standardize Modbus protocol between FW versions or branches.



NOTE:
User MODBUS function is not available for IM-NT-GC controller.

Modbus Switches

The “Modbus Switches” are two Modbus registers dedicated for continuous writing of binary information via Modbus. Both registers are available on Modbus for simple writing (using command 6 or 16). The particular bits of these registers are available as binary status for universal use in logical binary outputs of the controller as “MODBUSSW1..MODBUSSW32”. No password is required for writing of those registers (if there is no general password for Modbus writing). There are two Values “ModbusSw1” and “ModbusSw2” in group “Log Bout” available for back-reading.

Register for writing	Modbus register number	Value for back-reading	Modbus register number
ModbusSw1	46337	ModbusSw1	40547
ModbusSw2	46338	ModbusSw2	40548

NOTE:
The LSB of ModbusSw1 (46337) corresponds with LBO “ModbusSw1”
The LSB of ModbusSw2 (46338) corresponds with LBO “ModbusSw17”

Examples:

Register port for writing	Input value	LBO ModbusSw16 ………………….ModbusSw1
ModbusSw1 (46337)	000F HEX	0000 0000 0000 1111

Register port for writing	Input value	LBO ModbusSw32 ………………….ModbusSw17
ModbusSw2 (46338)	F000 HEX	1111 0000 0000 0000

Analog Input Sensors and User Sensors

Controller and/or some extension modules allow connection of sensor outputs to Analog Inputs. There is whole variety of common sensor output characteristics prepared in configuration by default. Although if there is sensor that is not in the list, it is possible to prepare custom characteristics (up to 16) with up to 31 definition points.

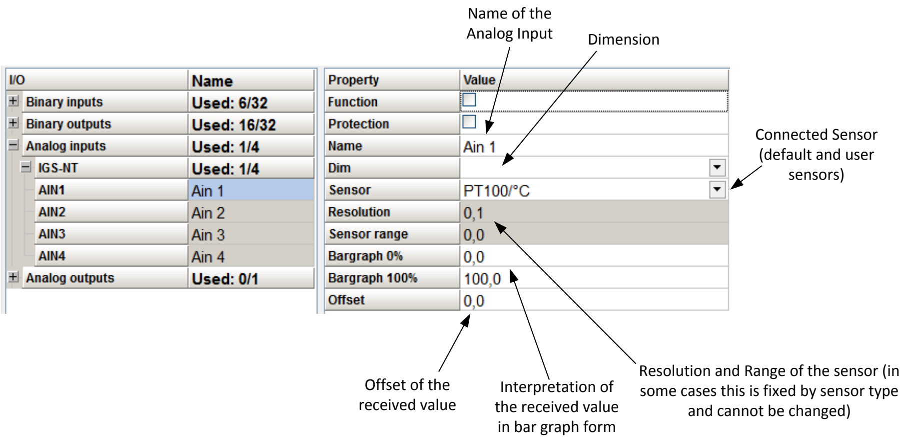


Figure: Sensor adjustment in GenConfig

Default sensors: PT100/°C, PT1000/°C, NI1000/°C, PT100/°F, PT1000/°F, NI1000/°F, 4-20mA active, 0-2400ohm, 0-2.4V, Tristate

HINT
There is “electronic” type of sensor available for Shared Analog Inputs which can be used to interpret shared data over CAN bus.

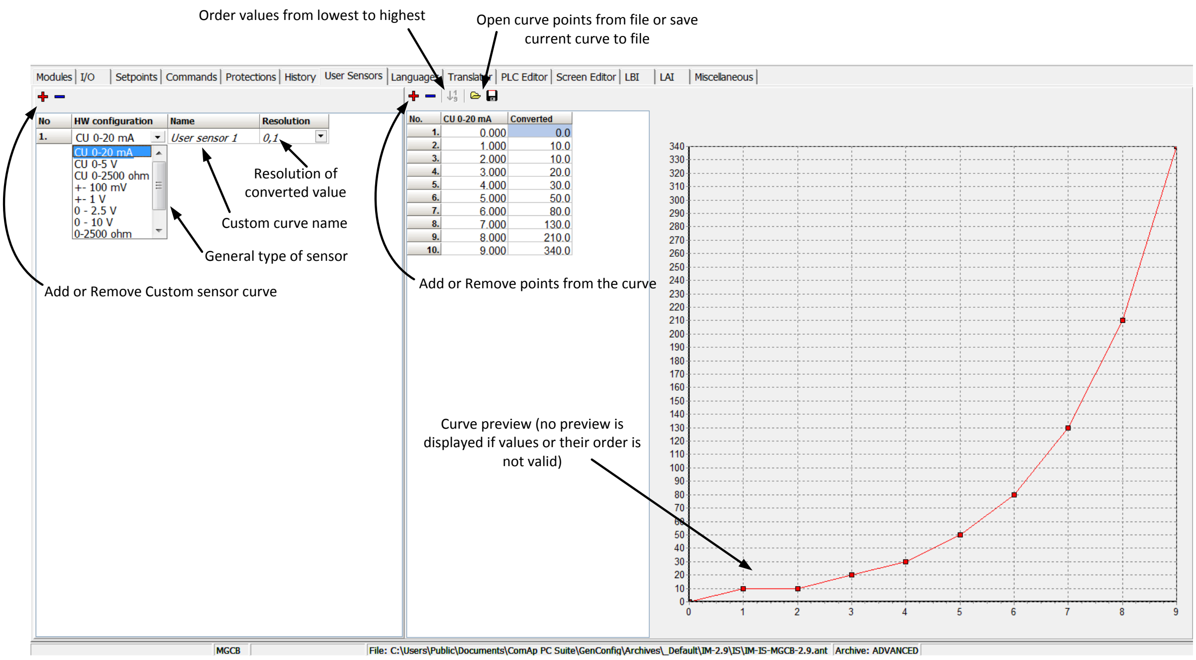


Figure: User Sensor definition

Languages and Translator tool in GenConfig

For detailed description of Languages and Translator tool please refer to GenConfig interactive help (press F1 when in corresponding tab or open Help -> GenConfig Help).

Power Formats

IGS-NT family allows user to choose from several Power Formats that affect dimensions in which values and some setpoints are interpreted or adjusted. Power formats may be changed in Miscellaneous tab in GenConfig. There are following Power Formats available:

- 1 kW kVAr kVA kX V
- 0,1 kW kVAr kVA kX V
- 0,01 MW MVAr MVA MX kV
- 0,01 MW MVAr MVA MX V

NOTE:
Range of some setpoints and values is changed significantly when different Power Formats are selected.

Last Power Format is designed to be used in combined Power/High Voltage and Low Voltage instalations. High voltage is then interpreted in Volts (e.g. 33256V instead of 33kV).
Last two Power Formats can be used in combination on one CAN bus.

System Start/Stop

For proper function of the system, System start and stop signal needs to be used properly. Below there is scheme that shows how to use the Binary Output SYS START/STOP in the system using just CAN wiring (no physical wiring is needed to share the starting and stoping signal into all controllers in the system).

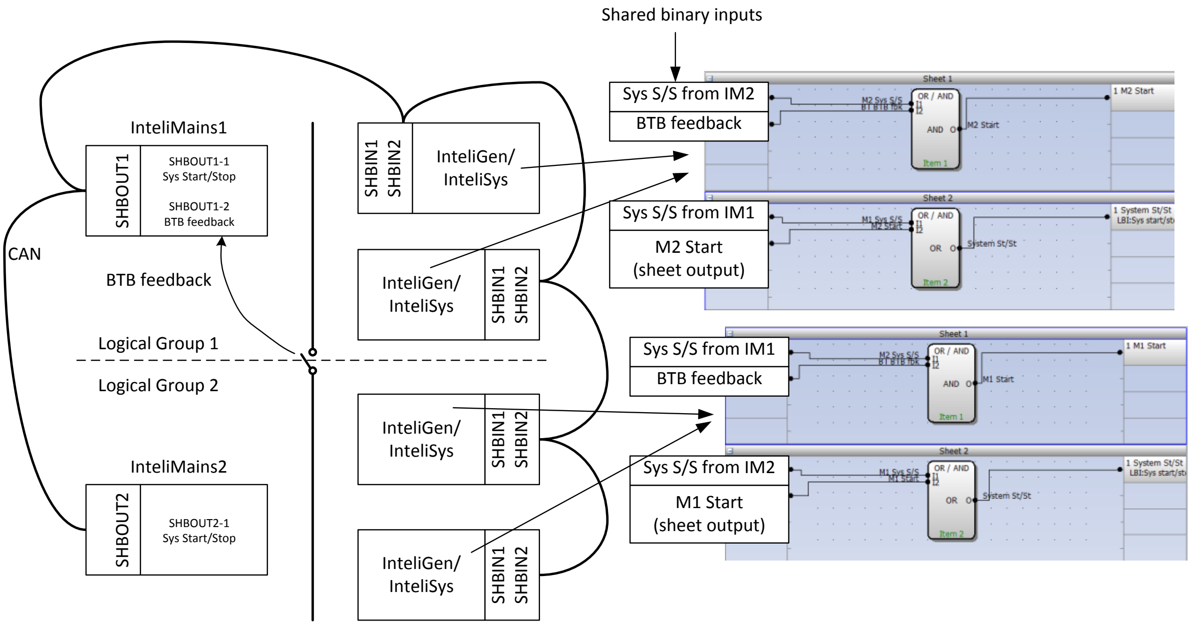
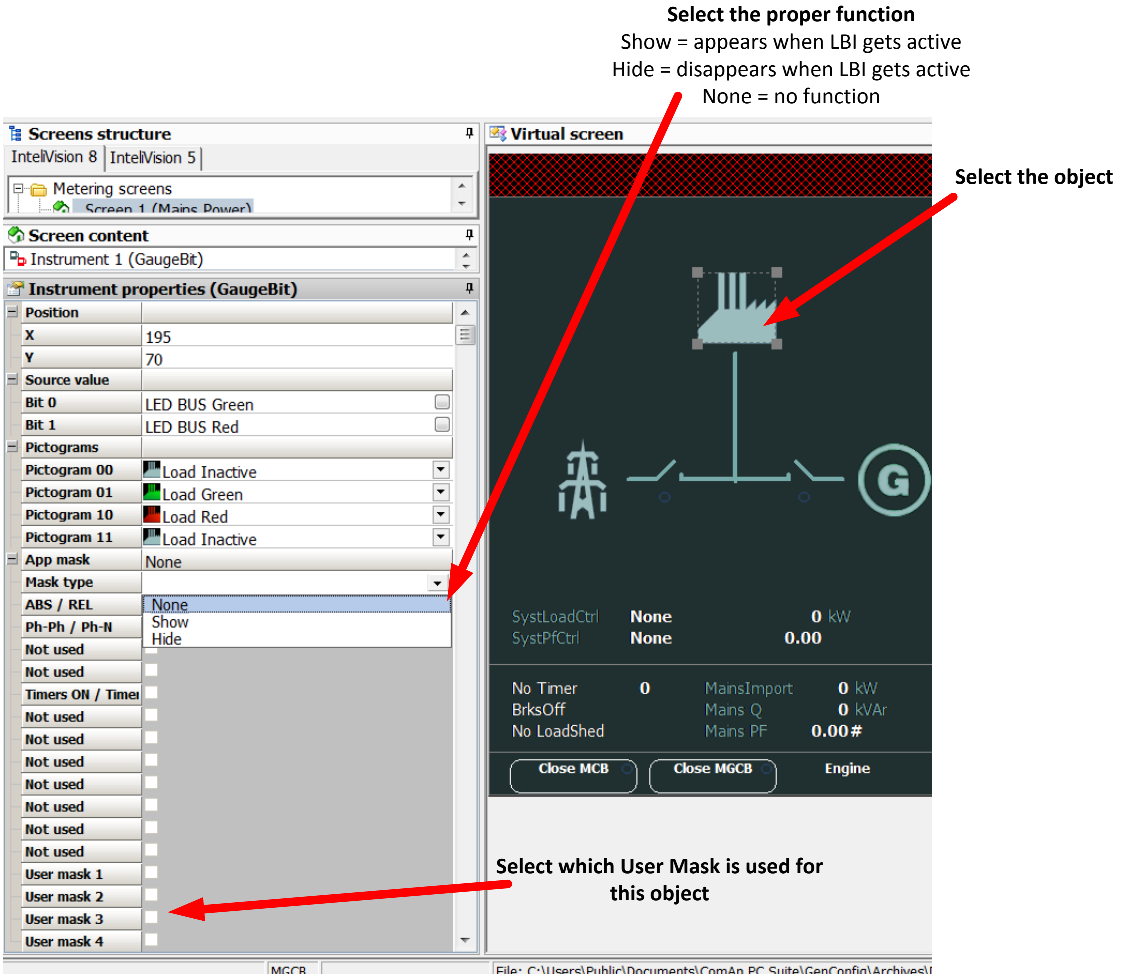


Figure: Preparation of correct system start/stop function for two logical groups

User Mask function

In GenConfig you can easily set any object in Screen Editor to show or hide based on activation of particular Logical Binary Input available for users. Below, there is diagram showing the setup of User Mask function in Screen Editor.



NOTE:
Masking of screens in InteliVision 5 supports only Show function
Use also other masking functions (masking can react on several internal states, e.g. activation of Timers).

PLC functions

See description in IGS-NT-Application guide 05-2013.pdf.

Multi language support

NT family controllers support up to five Languages that is possible to switch during controller duty. Every terminal (i.e. Remote display or PC-InteliMonitor) can be switched to different language. Use PC-GenConfig - Translator tool to translate texts to another language.
Default application archives contain all texts in English only.

ECU interface customizing

The list of available ECU interfaces can be found in GenConfig / Modules / ECU list.

Binary selector

This function enables to change the following CAN values transmitted to ECU via J1939 or binary output only. The change can be provided by setpoint or via Binary input. There are four Bin selector channels available.

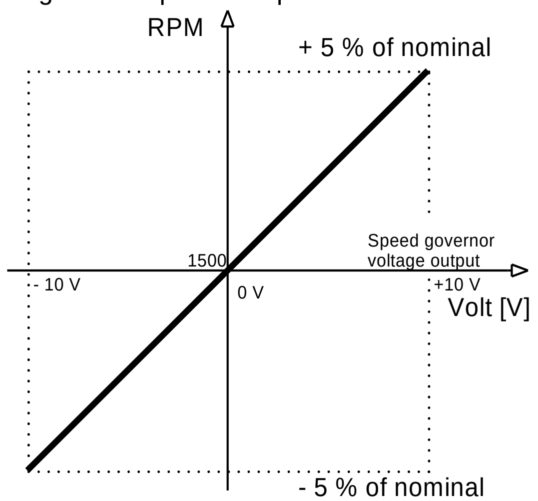
J1939 value	ECU command

Governor mode	Isochronous - Droop
Idle Speed select	Idle – Nominal
Frequency select	1500 – 1800
Preheat request	Yes – No
Protection override	Yes – No

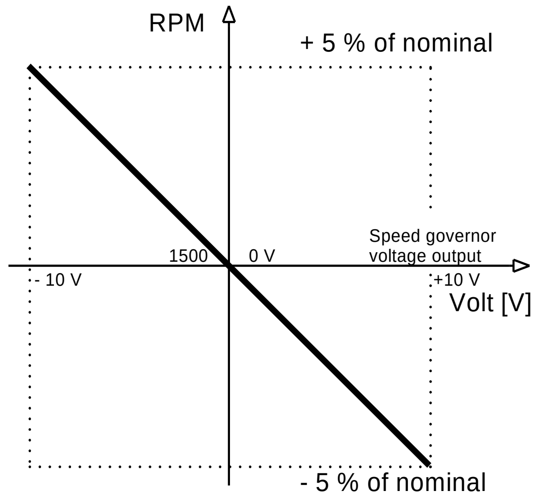
Sync/load control adjustment

HINT:
Use isochronous speed governor.
Two wire shielded connection from IGS-NT SPEED GOVERNOR output (SG OUT, SG COM) to Speed governor auxiliary input is recommended.
A full range change of the IGS-NT speed governor output (from SpeedGovLowLim to SpeedGovHiLim) should cause 5-10% change of the engine speed (SpeedGovLowLim ~ 95% RPMnom, Speed gov bias ~ 100% RPMnom, SpeedGovHiLim ~ 105% RPMnom.

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



SpeedRegChar = POSITIVE



SpeedRegChar = NEGATIVE

Before optimal Sync/load setpoints adjusting disconnect GCB OPEN/CLOSE output or set *Phase window* = 0 to avoid paralleling.

Synchronizer adjustment

1) Start the engine in MAN Mode.
2) Set the engine RPM by speed trim on speed governor or by *Speed gov bias* and *SpeedGovLowLim* and *SpeedGovHiLim* to Nominal frequency.
3) To start synchronizing press GCB ON/OFF button. GCB LED starts to flash to indicate synchronization. To stop synchronization press again GCB ON/OFF .

Slip control adjusting:

4) Adjust *Freq gain* to unstable speed control and decrease value by 30 % to insure stable performance.
5) Adjust *Freq int* to stable (fast and smooth) slip control. Synchroscope movement on the controller measure screen should slow down and stop (in any position, because Angle control is off).

Angle control adjusting:

6) Set *Angle gain*. Synchroscope on the controller measure screen should move slowly and stop in “up“ position. Set *Angle gain* to unstable value (synchroscope swings) and decrease value by 30 % to insure stable performance.

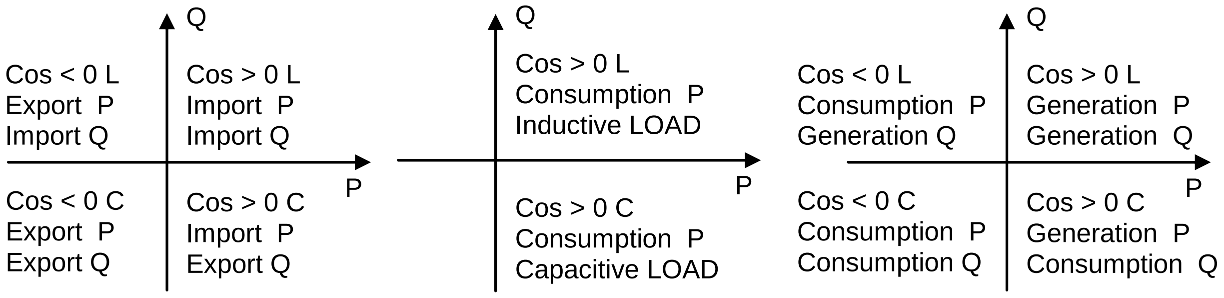
Load control adjustment

Prior to Sync/Load control adjustment, the Volt/PF control has to be adjusted! Load control loop is active in parallel to mains mode only (MCB feedback closed). Switch off other engines while adjusting.

1) Set *#SysLdCtrl PtM* = Baseload, set *Baseload* value to 30 % of Nominal power of one gen-set.
2) Set *Load gain* to the same value as *Slip freq gain*. Set *Load int* to zero.
3) Start the gen-set in MAN Mode, press GCB ON/OFF button to synchronize and close gen-set to mains.
4) When GCB is closed, gen-set load slowly increases to *Base load* value. Check that gen-set power is positive (CT polarity!).
5) Increase *Load gain* to unstable load control and decrease value by 30 % to insure stable performance. When *Load int* factor is set to zero gen-set load can differ from required Baseload.
6) To adjust and optimize *Load int* change several times *Base load* between 30 and 70 % of Nominal power. Usually setting *Load int* to 100% gives optimal performance.
7) When gen-set is running full load check if
   a. Speed governor output voltage value is not limited (not reached *SpeedGovLowLim* or *SpeedGovHiLim*)
   b. Speed governor actuator isn’t mechanically limited or operates in small section of throttle range.

Active and reactive power terminology

MAINS	LOAD	GEN
P > 0 Import	P > 0 Consumption	P> 0 Generation
Q> 0 Import	Q> 0 Consumption	Q> 0 Generation



Mains

Exported active power is supplied to the mains. It is displayed in negative numbers e.g. –20kW.
Imported active power is consumed from the mains. It is displayed in positive numbers e.g. +20kW.
When reactive power is imported (>0) InteliMains-NT displays L (inductive) character of the load.
When reactive power is exported (<0) InteliMains-NT displays C (capacitive) character of the load.

Load

Active power consumed by Load is displayed in positive numbers e.g. 20kW.
When reactive power is positive (>0) InteliMains-NT displays L (inductive) character of the load.
When reactive power is negative (<0) InteliMains-NT displays C (capacitive) character of the load.

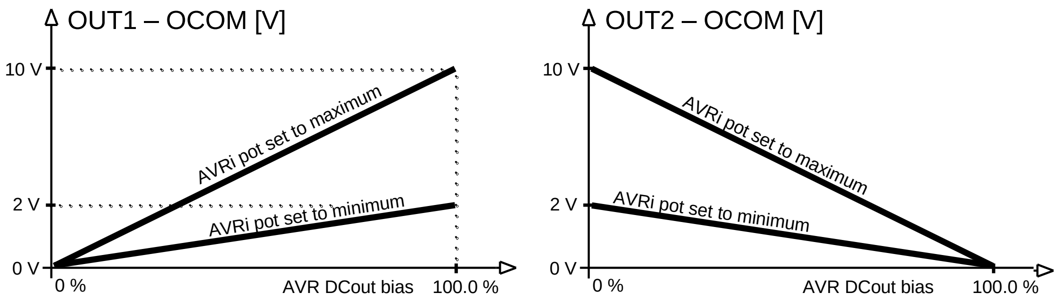
Genset

Generated active power is displayed in positive numbers e.g. 20kW.
When reactive power is positive (>0) IGS-NT displays L (inductive) character of the load.
When reactive power is negative (<0) IGS-NT displays C (capacitive) character of the load.

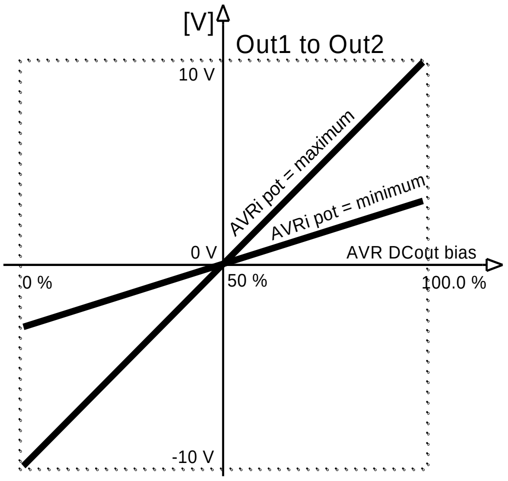
IG-AVRi output connection

Every time refer to corresponding AVR manual before interface connecting. Use no droop AVR.
IG-AVRi-TRANS (AC power supply for AVRi) has to be supplied from gen-set voltage.
AVRi outputs can be connected as symmetrical: OUT1-OUT2 or unsymmetrical OUT1-OCOM or OUT2-OCOM.

- Potentiometer on the AVRi defines maximal OUT1, OUT2 voltage range.
- Use symmetrical (OUT1,OUT2) AVRi output to connect the AVRi to AVR auxiliary voltage input.
- Use unsymmetrical output if an external AVR potentiometer has to be replaced with AVRi.
- AVRi output voltage should change generator voltage typically in range ± 10 % of Nominal voltage.
- For more details please refer to Installation guide – chapter AVR interface examples.



AVRi Out1 or Out 2 to GND output voltage depends on AVRi trim setting



AVRi Out1 to Out 2 output voltage

AVRi output voltage

	Out1 - OCOM		**Out2 - OCOM**		**Out1 – Out2**	
Bias \ Pot	Min	Max	Min	Max	Min	Max
0 %	0	0	2	10	- 2 V	-10 V
50 %	1	5	1	5	0 V	0 V
100 %	2	10	0	0	+ 2 V	10 V

Voltage control adjustment

1) Set *Voltage gain*, *Voltage int* to zero and *AVR DCout bias* to 50%.
2) Start always with AVRi pot min adjustment (fully counterclockwise).
3) Start the gen-set in MAN Mode to nominal speed, without load.
4) Adjust generator voltage to nominal value by the potentiometer present on the AVR. If there is no potentiometer on the AVR, use *AVR DCout bias* to adjust the nominal voltage.
5) Change *AVR DCout bias* to 0% and 100% to check generator voltage control range (typically ± 10 % of nominal voltage). Adjust voltage control range by AVRi trim.
6) Set *AVR DCout bias* to be Nominal voltage on generator (50%).
7) When gen-set is running unloaded increase carefully *Voltage gain* to unstable point and then decrease value by 30 % to insure stable performance.
8) Adjust *Voltage int* (usually setting to 100% gives optimal performance).

HINT:
To judge optimal adjusting induce generator voltage jumps by AVR DCout bias change or by Nominal voltage change .
AVRi output OCOM is common output. GND was used instead of OCOM

PF control adjustment

The genset should be cca 30 % loaded in parallel to mains and baseload mode.

1) Set the same values *PF gain, PF int* as in voltage control loop.

2) Set **Process control**: *#SysLdCtrl PtM* = BASELOAD, #Sys*BaseLoad* = 30 % of Nominal load, *#SysPFCtrl PtM* = BASEPF, *#SysPwrFactor* = 1.0.

3) Start and synchronize the gen-set in MAN Mode by pressing GCB ON/OFF

4) When running in parallel 30% loaded increase slowly *PF gain* to unstable point and then decrease value by 30 % to insure stable performance.

5) Adjust *PF int* (usually setting to 100% gives optimal performance).

Hint:

To judge optimal adjusting induce generator power jumps by *SysBaseLoad* change or by soft changes of *AVR DCout bias*.

Protections and Alarm management

ComAp gen-set controllers provide following range of generator protections.

For each protection adjustable limit and time delay are available.

ANSI CODE	PROTECTION	IG-NT, IG-NTC, IG-NT-BB, IG-NTC-BB	IS-NT-BB, IS-NTC-BB
59	Overvoltage	•	•
27	Undervoltage	•	•
47	Voltage Assymetry	•	•
81H	Overfrequency	•	•
81L	Underfrequency	•	•
78	Vectorshift	•	•
81R	Rate of Change of Frequency	•	•
50+51	Overcurrent	•	•
46	Current Unbalance	•	•
32	Overload	•	•
50N+64	Earth Fault Current	•	•
51N+64	Earth Fault Current, IDMT	•	•
32R	Reverse Power	•	•
25	Synchronism Check	•	•
47	Phase Rotation	•	•
37	Undercurrent	•@	•@
55	Power Factor	•@	•@
71	Gas (Fuel) Level	•	•
40	Excitation Loss	•	•

Note: – - excluded; • - included
@ - can be created using universal protections

Protection groups

There are two groups of protections in the controller: fix and universal (configurable)

PROTECTION GROUP	CONFIGURABILITY	SETTINGS
Analogu protection	Configurable	Analog protect
Generator protection	Configurable	Gener protect
Mains protections	Configurable	Mains protect

Fix protections	Fix	Engine params, Gener protect, Mains protect, Analog protect

Alarm types

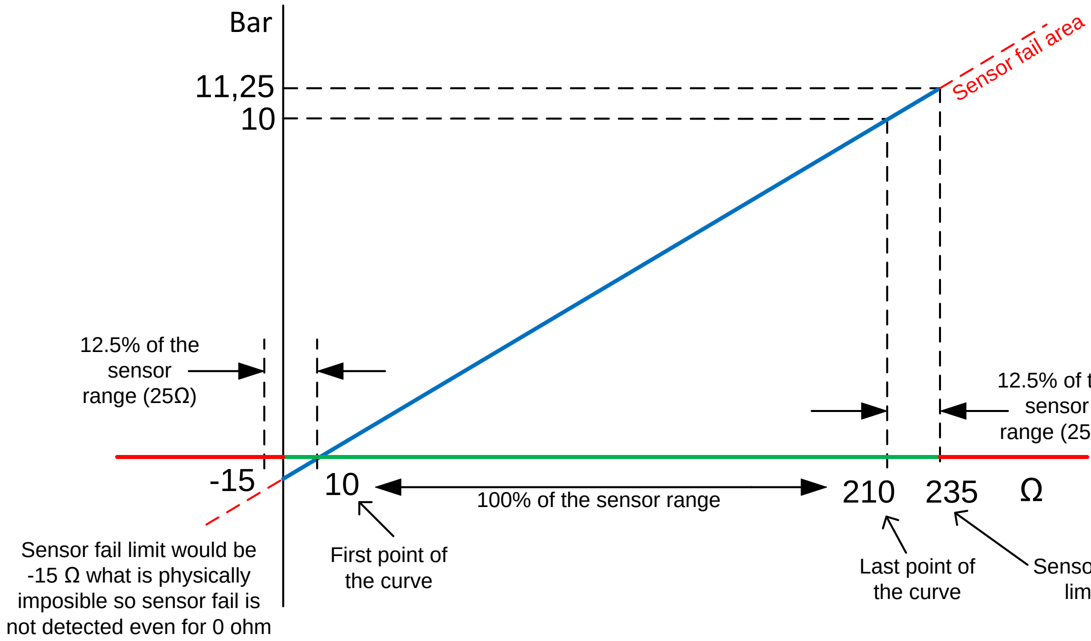
ALARM/EVENT KIND	LEVEL	DESCRIPTION
Warning	1	The alarm appears in the Alarmlist and is recorded into the history log. Activates the output Common Wrn as well as the standard alarm outputs.
Alarm Only	1	The alarm appears only in the Alarmlist. Activates the output Common Al as well as the standard alarm outputs.
HistRecOnly	1	The event is recorded into the history. Activates the output Common Hst for one second. Standard alarm outputs are not activated.
AL indication	1	The event is only indicated in the Alarmlist. It disappear for the alarmist automatically as soon as the cause disappears. Standard alarm outputs are not activated.
A+H indication	1	The event is only indicated in the Alarmlist and recorded into the history log. It disappear for the alarmist automatically as soon as the cause disappears. Standard alarm outputs are not activated.
Shutdown	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes immediate stop of the gen-set without unloading and cooling phase. The gen-set can't be started again while there is a Shutdown alarm in the Alarmlist. Activates the output Common Sd as well as the standard alarm outputs.
Slow Stop	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes stop of the gen-set by the standard stop sequence, i.e. including unloading and cooling phase. The gen-set can't be started again while there is a Slow stop alarm in the Alarmlist. Activates the output Common Stp as well as the standard alarm outputs.
Off Load	2	The event appears in the Alarmlist and is recorded into the history log. It does not require confirmation, diappears by itself. It causes immediate opening of the GCB. In AUT and SEM modes the gen-set remains running for 60 seconds and then it is stopped by the standard stop sequence. In MAN mode the gen-set remains running until the operator changes it's operational state manually. If the controller is in AUT or SEM mode and all previously active Off load alarms disappeared the gen-set is automatically started back and connected to the load if the condition for the gen-set to be running persists (e.g. Rem start/stop is active ..). This event is used to put the gen-set temporarily off the load for any reason. Activates the output Common OfL.

Low Power	2	The event appears in the Alarmlist and is recorded into the history log. It does not require confirmation, diappears by itself. It causes reduction of the required gen-set load to the Min Power PtM during parallel-to-mains operation or local baseload operation. If all previously active Low power alarms disappeared the gen-set is automatically ramped back to the original required load, which is given according to the currently active load control mode (Load ctrl PtM) in PtM operation. Activates the output Common LoP. This alarm type is not overriden by the input Sd Override. **Note:** Available in IS-NT only.
BrkOpen&CoolDn	2	The event appears in the Alarmlist and is recorded into the history log. It causes immediate opening of the GCB (without unloading) and then the standard stop sequence with cooling follows. The gen-set can't be started again while there is a BOC alarm in the Alarmlist. Activates the output Common BOC as well as the standard alarm outputs.
Mains Protect	2	The protection is only recorded into the history log. In applications which control the MCB this protection causes opening of the MCB. The gen-set can continue operation in island mode if required. The MCB can be closed back as soon as there isn't any mains protection active (including the built-in mains protections). In applications which do not control the MCB this protection causes opening of the GCB. The controller waits then for the MCB to open. After that the gen-set can continue operation in island mode if required. As soon as there isn't any mains protection active (including the built-in mains protections) the GCB is opened again and the controller waits for the MCB to close. After that the gen-set can continue operation in parallel-to-mains mode if required. Activates the output Common MP. This alarm type is not overriden by the input Sd Override.
Sd Override	2	The alarm appears in the Alarmlist and is recorded into the history log. It causes immediate stop of the gen-set without unloading and cooling phase. The gen-set can't be started again while there is a Sd override alarm in the Alarmlist. Activates the standard alarm outputs. This alarm type is not overriden by the input Sd Override.

HINT
The Standard alarm outputs are Alarm and Horn.

Sensor fail detection (FLS)

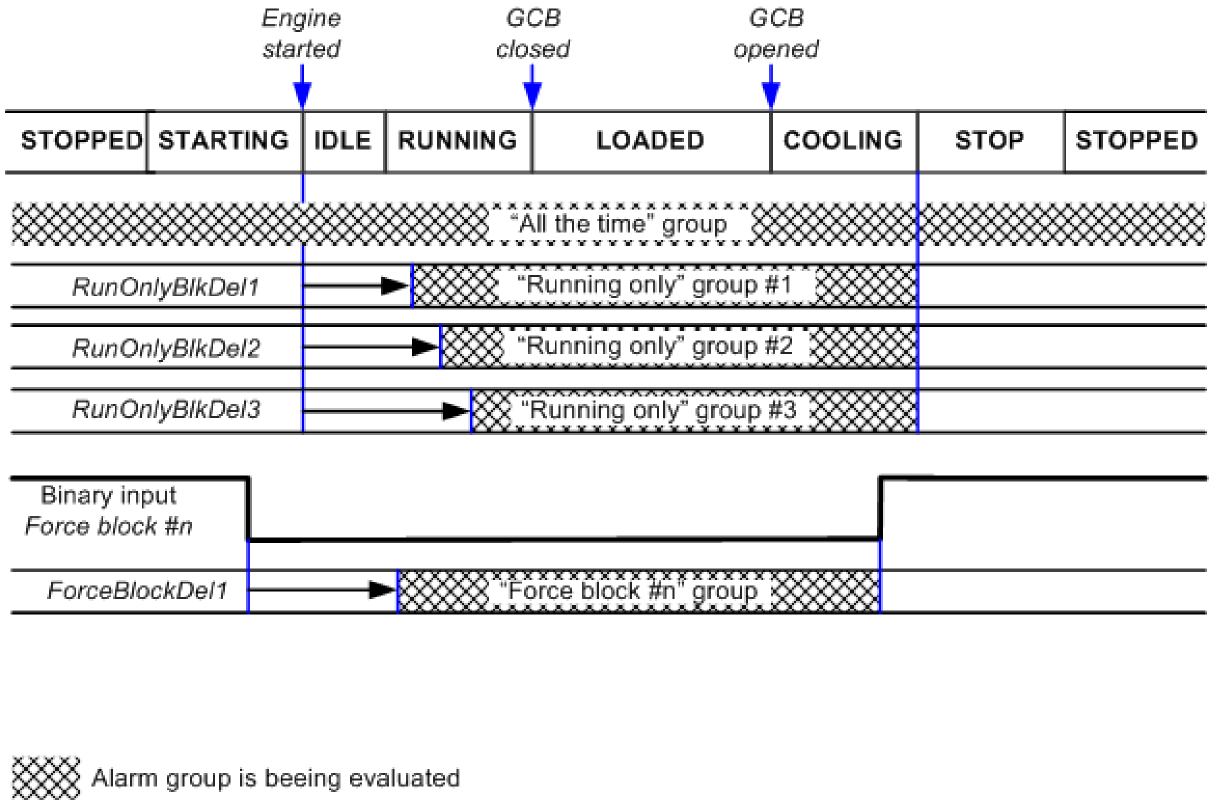
If the measured resistance, voltage or current on an analog input gets out of valid range, the sensor fail will be detected and a sensor fail message will appear in the alarmlist. The valid range is defined by the most-left (R_L) and most-right (R_H) points of the sensor characteristic ±12.5% from R_H-R_L.



HINT
The sensor fail alarm does not influence the gen-set operation

Blocking types

BLOCKING TYPE	DESCRIPTION
All the time	The alarms are beeing evaluated all the time the controller is switched on.
RunOnlyBlkDel1	The alarms are beeing evaluated only while the gen-set is running. The evaluation begins *RunOnlyBlkDel1* seconds after the engine has been started.
RunOnlyBlkDel2	The alarms are beeing evaluated only while the gen-set is running. The evaluation begins *RunOnlyBlkDel2* seconds after the engine has been started.
RunOnlyBlkDel3	The alarms are beeing evaluated only while the gen-set is running. The evaluation begins *RunOnlyBlkDel3* seconds after the engine has been started.
Force block 1	The alarms are beeing evaluated while the input *Force block 1* is not active. The evaluation begins *ForceBlockDel1* seconds after the input has been deactivated.
Force block 2	The alarms are beeing evaluated while the input *Force block 2* is not active. The evaluation begins *ForceBlockDel2* seconds after the input has been deactivated.
Force block 3	The alarms are beeing evaluated while the input *Force block 3* is not active. The evaluation begins *ForceBlockDel3* seconds after the input has been deactivated.
El. prot	The alarms are beeing evaluated while the generator is expected to provide correct voltage and frequency. That means the alarms start to be evaluated after transition form *Idle* to *Running* phase when the period of *Max stab time* has already elapsed, remain beeing evaluated while the gen-set is running at nominal speed (regardless of GCB position) and stop to be evaluated by transition to the *Cooling* phase.



Default protections in SPI

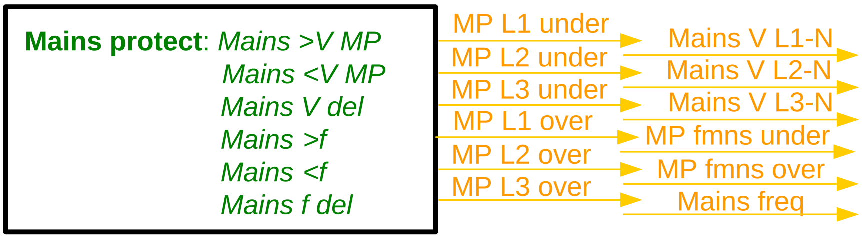
Fix – firmware based protections

ENGINE	PROTECTION TYPE	CORESPONDING SETPOINTS
Overspeed		**Engine protections:** *Overspeed*
Underspeed		**Engine params**: *Starting RPM*
GENERATOR	**PROTECTION TYPE**	**CORESPONDING SETPOINTS**
IDMT overcurrent	BOC	**Basic settings**: *Nomin current*; **Gener protect**: *2Inom del*
IDMT Active power	BOC	**Gener protect**: *OverldStrtEval; 2POvrldStrtEvDel*
IDMT EarthFault Current	BOC	**Gener protect:** *NomEthFltCurr, 2EthFltCurr del*
Shortcurrent	BOC	**Gener protect**: *Ishort; Ishort del*
Generator voltage: Ug1>, Ug1<, Ug2>, Ug2<, Ug3>, Ug3<	BOC	**Gener protect**: *Gen >V BOC; Gen <V BOC; Gen V del.*
Generator voltage: Ug1>>, Ug2>>, Ug3>>	Sd	**Gener protect**: *Gen >V Sd; Gen V del.*
Generator frequency: fg<, fg>	BOC	**Gener protect**: *Gen >f; Gen <f; Gen V del*
Excitation Loss	BOC	**Gener protect:** *ExcitationLoss, ExctLoss del*
MAINS	**PROTECTION TYPE**	**CORESPONDING SETPOINTS**

Vector shift	MP	**Mains protect**: *VectorS prot; VectorS CB sel; Vector S limit*
Mains voltage	MP	**Mains protect**: *Mains >V MP; Mains <V MP; Mains V del*
10 min moving average of mains voltage	MP	**Mains protect:** *Mains Avg >V MP*
Mains frequency	MP	**Mains protect**: *Mains >f; Mains <f; Mains f del*
Rate of Change of Frequency	MP	**Mains protect**: *ROCOF df/dt, ROCOF Win*
DEFAULT CONFIGURABLE	**PROTECTION TYPE**	**CORESPONDING SETPOINTS**
Reverse power (UnivState 1)	BOC	**Gener protect**: *Reverse power; ReversePwr del*
Batt <V, Batt >V (UnivState 2)	Wrn	**Analog protect**: *Batt >V; Batt <V; Batt V del*
Gen Current unbalance	BOC	**Gener protect**: *Gen I unbal; Gen I unb del*
Gen Voltage unbalance	BOC	**Gener protect**: *Gen V unbal;Gen V unb del*
Mains Voltage unbalance	BOC	**Mains protect:** *Mains V unbal; Mains Vunb del*

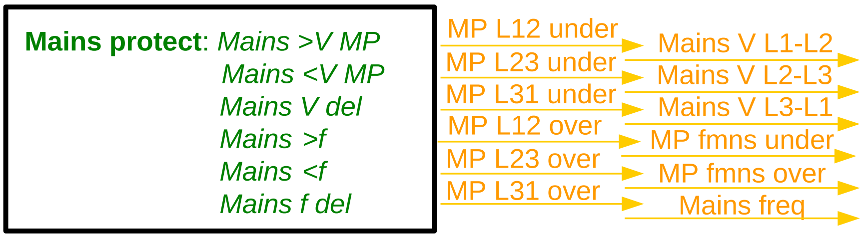
Mains voltage and frequency protections - limits and indications

Basic settings:
VoltProtselect = PHASE-NEUTRAL

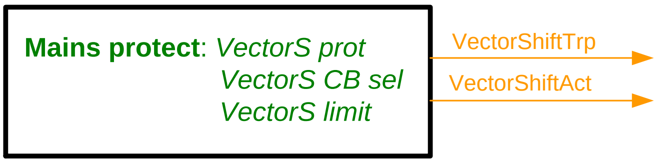


HINT
Mains protect is a setpoints group that contain setpoints related to mains protection evaluation. MP L1 under, Mains L1-N and etc are alarms that occurs when mains protection is evaluated.
For more information about Mains protection see chapter *Setpoints / Mains protect* of this manual.

Basic settings:
VoltProtselect = PHASE-PHASE



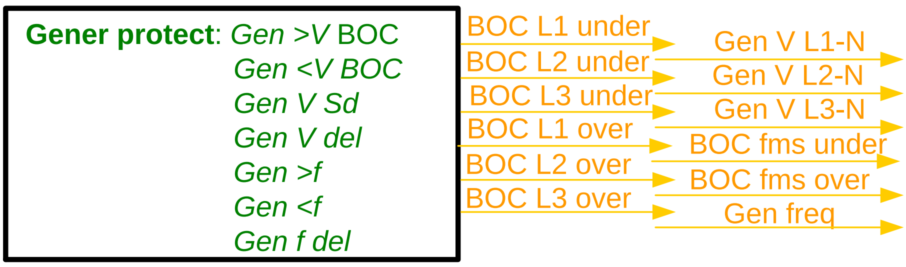
Vector shift protection - limits and indications



HINT
For more information about Vector Shift Protection see chapter Setpoints / Mains protect of this manual or chapter Vector Shift Protection of NPU User Guide 1.9.

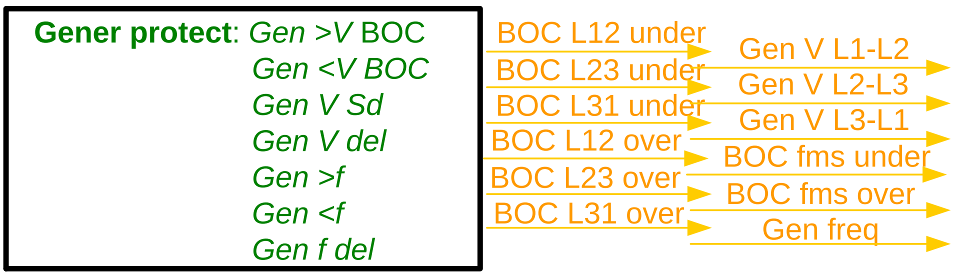
Generator voltage and frequency protections - limits and indications

Basic settings:
VoltProtSelect = PHASE-NEUTRAL



HINT
Gener protect is a setpoints group that contain setpoints related to mains protection evaluation. BOC L1 under, Gen V L1-N and etc are alarms that occurs when genset protection is evaluated.
For more information about Genset protection see chapter *Setpoints / Gener protect* of this manual.

Basic settings:
VoltProtSelect = PHASE-PHASE

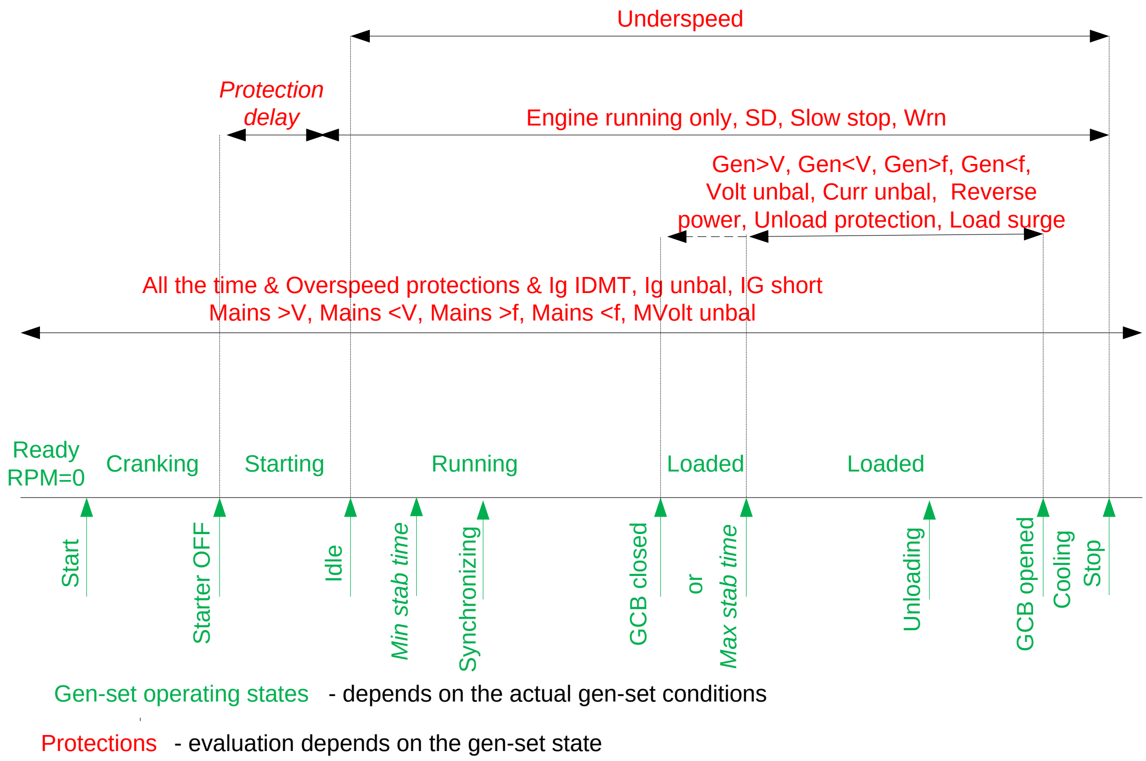


Shutdown override

If the Binary input shutdown override (Sd override) is closed, all 2nd level protections are disabled to allow engine run in an emergency situation, e.g. sprinkler devices power supply.
All protections are shown in Alarmlist and recorded into History, but the controller doesn't stop the engine because of them. If the input is deactivated and some protections are still active or not yet reset, the controller starts to take these protections into account and consequently stops the engine.

HINT
All 2nd level protections are locked out, except of these:
- Emergency stop
- Overspeed
- Underspeed (only if *Fuel solenoid* = GAS ENGINE)
- Binary and analog protections configured as *Sd override* type. In fact this protection type means "Unoverridable shutdown", i.e. it works the same way as standard shutdown protection, however it can not be overriden (blocked) by the *Sd override* input.

Alarm time chart

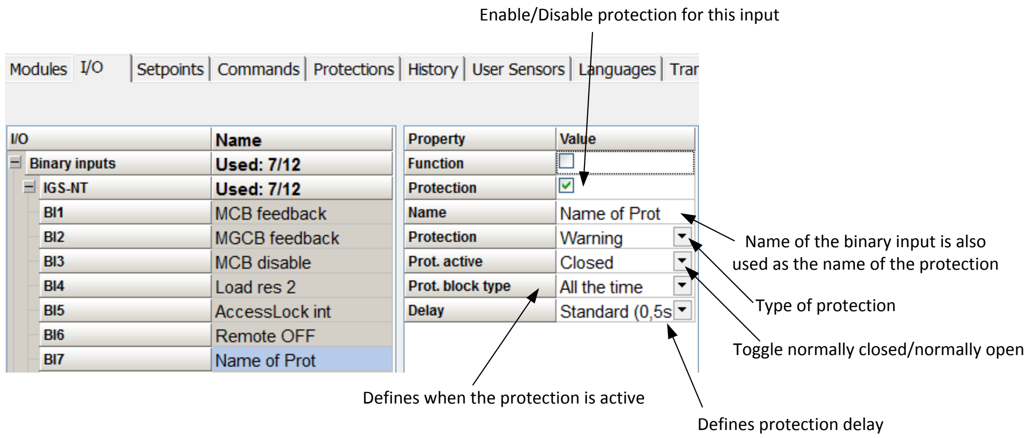


Configuration of User configurable protections in GenConfig

It is possible to configure protections on Binary Input, Analog Input or any value that is available in the controller.

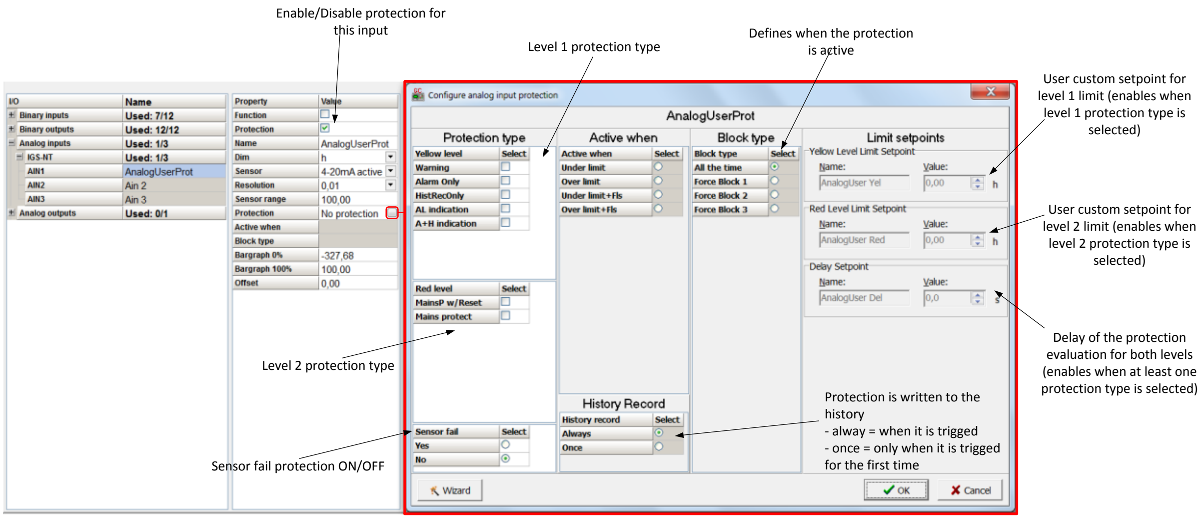
Binary Input protection configuration

Open I/O tab in GenCofig and adjust parameters that are described below.



Analog Input protection configuration

Open I/O tab in GenCofig and adjust parameters that are described below.

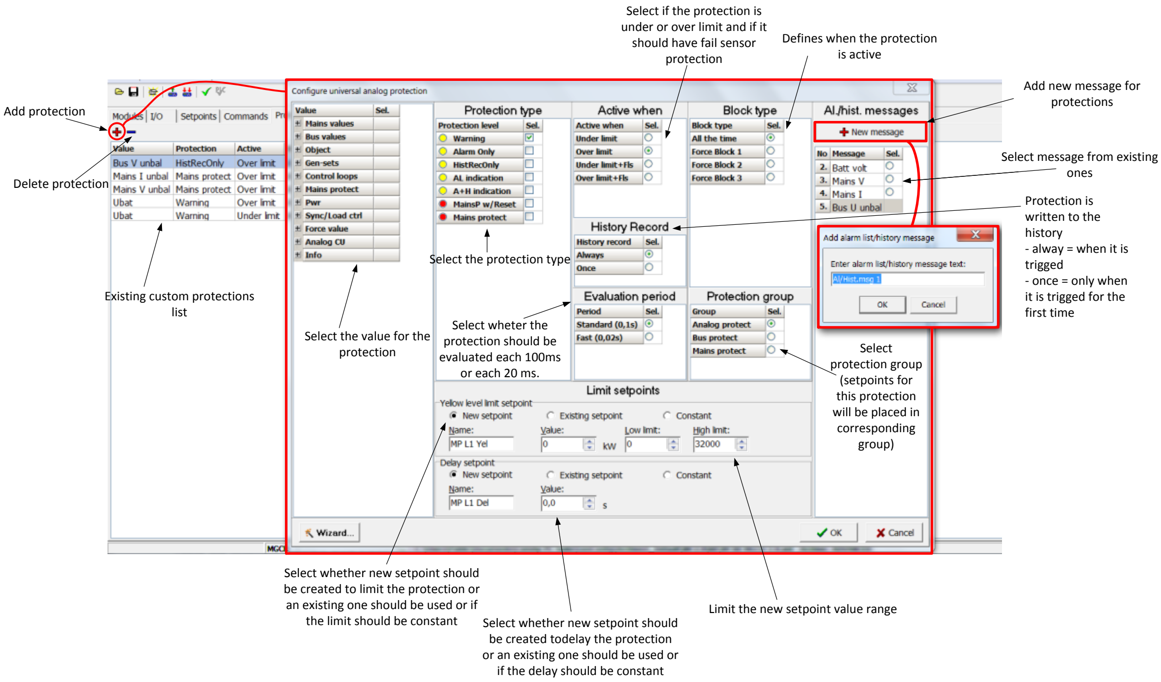


HINT

Fail Sensor protection (when activated) does not affect the function of the system itself. If you adjust “Active when” to Under limit + Fls or Over limit + Fls the protection will considered the value that is out of range (failed sensor) to be under or over limit (depending on the setting) and it will issue corresponding alarm after the delay of the protection. This can be used for example when the function of the particular sensor connected to an analog input is crucial for the operation of the system and its failure requires the system to be affected (open breakers etc.).

Custom configurable protection

Open Protections tab in GenCofig and adjust parameters that are described below.



HINT

You need to prepare two separate protections for level 1 and level 2.

Select the value for protection first and then use Wizard – it will take you through all the steps and help you adjust them correctly.

Reset Actual Alarms selection

It is possible to determine the behavior of alarms that are in alarm list when Fault Reset button is pressed. Select behavior with ComProtSetting:ResetActAlarms.

DISABLED	Pressing of the fault reset button (at any terminal or external button) resets only **inactive** alarms. Active alarms remain in the alarmlist unchanged and must be reset again when they become inactive.
ENABLED	Pressing of the fault reset button (at any terminal or external button) resets **all** alarms that are currently present in the alarm list. Inactive alarms disappear from the alarm list immediately, active alarms are changed to "confirmed" state and disappear when the alarm condition disappear or the alarm starts to be blocked.

NOTE:
ENABLED position corresponds to the method how the IG-classic and IS-classic controllers handled the alarms.

Gen-set operation states

Gen-set can operate in following states

GEN-SET STATE	DESCRIPTION
Init	Controller is powerd up and configuration setting is initialized
Not ready	Gen-set is not ready to start or is not allowed to start
Ready	Gen-set is ready to run, all condition for start are fulfilled
Prestart	Prestart sequence in process. From closing of *Prestart* output to closing of *Starter* output
Cranking	Engine is cranking and the *starter* output is closed
Pause	Pause between start attempts is counting down
Starting	Starting RPM is reached
Running	Gen-set is running and waiting for GCB connection
Warming	Gen-set is running in parallel operation and gen-set load is reduced to *Warming load*
Soft load	Gen-set power is ramping up
Loaded	Gen-set is loaded
Soft unld	Gen-set power is ramping down
Cooling	State after GCB was opened and engine is not stopped
Stop	Engine is stopped
Shutdown	Shutdown alarm activated
Ventil	Gas engine – ventilation of unburned fuel when stop command comes during cranking with gas
SDVentil	Gas engine – ventilation of unburned fuel after unsuccessful start attempt
Off load	GCB is opened, gen-set keeps running on nominal RPM
Emerg man	Emergency manual state

GEN-SET OPERATION STATES

Gen-set conditions	Description
IslOper	Island operation (MCB is opened, GCB is closed)
Brks Off	GCB, MCB opened
MainsOper	Mains is present (MCB is closed, GCB is opened)
Synchro	Gen-set is synchronizing (MCb is closed, GCB is opened)
ParalOper	Gen-set is in parallel with mains (MCB is closed, GCB is closed)
MainsOper/Brk Off	Engine is running idle

Gen-set external conditions

Inputs and Outputs

Virtual and physical modules

Number of I/O can be extended and project wiring can be reduced using the following extension and virtual modules.

Module name	BIN	BOUT	AIN	AOUT	IMPULSE	Note
IGS-NT controller	x	x	x	x		Number of I/O depends on type.
IGS-PTM	8	8	4	1	-	Standard I/O extension module.
IS-AIN8	-	-	8	-	-	Standard I/O extension module.
IS-AIN8TC	-	-	8	-	-	8 thermocouple inputs
IS-BIN16/8	16	8	-	-	-	Standard I/O extension module.
InteliAIN8	-	-	8	-	2	
InteliAIN8TC	-	-	8	-	-	
InteliIO8/8	8	8	-	2	-	
InteliIO16/0	16	0	-	2	-	
I-CB	x	x	x	x	-	Configurable communication bridge.
IGL-RA15	-	15	-	-	-	15 Green, Red, Yellow LED panel.
I-AOUT8	-	-	-	8	-	8 Analog outputs
VPIO	8	8	-	-	-	Virtual periphery I/O module.
SHBIN	8	-	-	-	-	SHared (virtual) Binary INput module
SHBOUT	-	8	-	-	-	SHared (virtual) Binary OUTput module
SHAIN	-	-	8	-	-	Shared (virtual) Analog INput module
SHAOUT	-	-	-	8	-	Shared (virtual) Analog OUTput module
PLC	x	x	x	x	-	Programmable (internal) logic module.

HINT
For more details about Virtual peripherals (Shared and Internal virtual I/O periphery and PLC) see IGS-NT-Application guide-2.4.pdf.

CAUTION!
Usage of any 3rd-party peripheral modules in cooperation with ComAp controller is not recommended. ComAp can’t guarantee the proper function of controller with none-ComAp peripheral modules.

Setpoints

Setpoints are analog, binary or special data objects, that are used for adjusting the controller to the specific environment. Setpoints are collected to groups according to their meaning. Setpoints can be adjusted from the controller front panel, PC, MODBUS etc.

Password protection

Any setpoint can be password protected - 7 levels of protection are available. There can be up to 8 users defined, each one with different access rights (levels of protection). Every user has it's own password. The password is a four-digit number. Only setpoints protected by the protection level that is covered by currently logged-in user's access rights can be modified.
If a user logs in from a particular terminal (e.g. the controller front panel), this does not unlock the other terminals for him, e.g. InteliMonitor connected directly or via modem.
Setpoints opened from front panel are automatically closed 15 minutes (return to measurement screens) after the last setpoint change or when wrong value of password is set.
System administrator (User 0 – always present in the system) can reset the password for any other user.
The controller programming (configuration) requires the highest - password 7 level, so only User 0 is able to modify the controller configuration or firmware.

Continuous internal evaluation of setpoints validity

In case of detection of Setpoints checksum (validity) evaluation error, the Shutdown alarm "Setpoint CS error" is issued to prevent the controller to run the engine with incorrect setting. The evaluation is provided at controller startup and continuously during the standard operation. I.e. in case of detection of such error, the engine is shut down immediatelly.

Setpoint synchronization

Setpoints, that are marked with "#" sign at the begin of their names, are synchronized with other controllers present on the CAN bus line, i.e. the system will ensure that the respective setpoint will have identical value in each connected controller. If the setpoint is changed in one controller, the same change will occur in all other controllers. This function is necessary especially for MINT application, where the system of Power management is based on fact that the respective setpoints are identical in all controllers.

CAUTION!
Do not perform repeated writing of setpoints (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, however it may become damaged, when allowed number of writing cycles is exceeded!

List of possible events

The complete list is available in Troubleshooting guide.

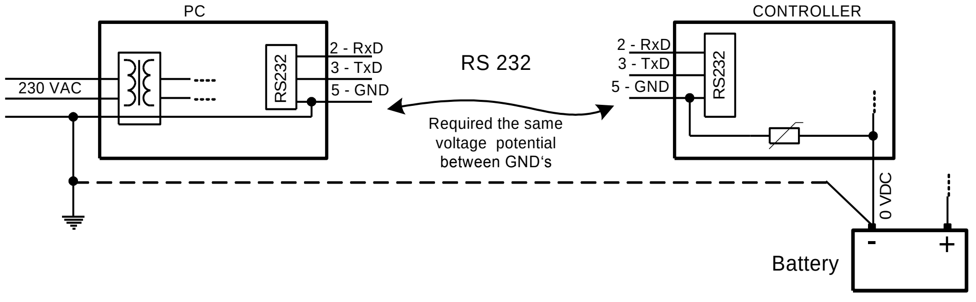
Controller configuration and monitoring

IGS-NT istallation pack contains separate PC software tools: GenConfig (GC) and InteliMonitor (IM).
GC and IM are based on Windows 95/98/NT/ME/2000/XP or higher platform and require approximately 30 Mbyte of hard disc free space.

Direct connection to the PC

IGS-NT controller can be connected directly with PC via RS232 or USB interface. Use the crossed RS232 or USB cable to connect PC with controller.

HINT
Make sure the grounding system on controller and PC – COM port (negative of the PC DC supply) are identical – before the first direct connection. There must not be any voltage between these two points otherwise the internal PTC protection activates and interrupts RS232 communication. In such case disconnect RS232 line wait a minute for PTC recovery and try again. The simple solution is to assure, that the PC supply 240/20V is ground free (GND terminal is not connected).



GenConfig functions

- Extension modules addressing
- All I/O function or protection configuration
- Setpoints adjusting
- Sensor characteristics modification
- History record modification
- Password level protection modification (password value must be changed in DriveMonitor)
- Controller firmware (mhx file) upgrade
- Controller application file Up/Down load
- Language translator enables
    - Create Dictionary between two languages (Dictionary can be used repeatedly)
    - Translate current text in Controller (in any language)
    - Add new language (up to five)

Configuration steps

Following configuration steps are available in GenConfig software:
- Select Extension modules when more inputs and outputs are required
- Configure J1939 interface when Electronic engine is connected
- Configure Binary inputs as Protection or Function
- Configure Binary outputs
- Configure Analog inputs as Protection or Function
- Define user sensors
- Configure History record
- Configure password protection
- Add/Translate the language

InteliMonitor

Functions

- On-line direct, Modem or Internet single or multiple engine monitoring
- Active Modem or Internet call from the controller to PC (activated by selected Alarm)
- On-line or Off-line History record listing
- Setpoints listing and adjusting (password protected)
- Statistics value (e.g. Running hours) Set/Reset
- Password and Access code change

Modbus protocol

Standard protocol enables receive/transmit any data or command from a Master system:

- Direct connection: RS232, RS422, RS485
- Modem connection
- 9600, 19200, 38400 or 57600 bps, 8 data bits, 1 stop bit, no parity
- Transfer mode RTU
- Function 3 (Read Multiply Registers)
- Function 6 (Write Single Register)
- Function 16 (Write Multiply Registers)
- The response to an incoming message depends on the communication speed. The delay is not shorter than the time needed to send/receive 3 and ½ characters.

The complete description of Modbus communication protocol can be found in *Modbus Protocol Reference Guide PI-MBUS-300* and *Open Modbus Specification Release 1.0*. Both documents are available from web site at http://www.modicon.com/openmbus/ .

HINT
Detail Modbus command description see in ComAp InteliCommunication guide.

Value and setpoint codes

HINT
It is possible to export actual values, setpoints and history file on-line from the controller or off-line from the archive using InteliMonitor – Monitor – Export data… function.

Technical data

HINT
Technical data of the controller and extension modules find in the IGS-NT-Installation guide-x.y.pdf.

Language support

IG-NT from display firmware version 1.4 supports following language code pages:

Code page	Language	Windows code
0	West European languages	Windows 1252
134	Chinese	GB 2312
162	Turkish	Windows 1254
129	Korean	Windows 1258
204	Russian	Windows 1251
238	East European languages	Windows 1250

IS-NT display from firmware version 1.5 supports following language code pages:

Code page	Language	Windows code
0	West European languages	Windows 1252
134	Chinese	GB 2312
162	Turkish	Windows 1254
129	Korean	Windows 1258
136	Thailand	GB 2312
204	Russian	Windows 1251
238	East European languages	Windows 1250

APPENDIX

Setpoint groups

CAUTION!
Do not perform repeated writing of setpoints (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, however it may become damaged, when allowed number of writing cycles is exceeded!

Setpoints - SMS/E-Mail

Setpoints - AMF Settings

1. EmergStart Del
2. MCB close del
3. MCB opens on
4. ReturnWithIntr
5. BreakerOverlap
6. RetFromIsland
7. ReturnTo mains
8. FwRet break
9. Mains ret del

Setpoints - Analog protect

1. Batt >V
2. Batt <V>
3. Batt volt del

Setpoints - Basic Settings

1. Nomin power
2. Nomin current
3. CT ratio prim
4. CT ratio sec
5. Im3/ErFlCurCTp
6. Im3/ErFlCurCTs
7. VT ratio
8. Vg InpRangeSel
9. Vm VT ratio
10. Vm InpRangeSel
11. GenNomV
12. GenNomVph-ph
13. MainsNomV
14. MainsNomVph-ph
15. FixVoltProtSel
16. Nominal freq
17. Nom frq offset
18. Gear teeth
19. Nominal RPM
20. Controller mode
21. FltRes GoToMAN
22. Local buttons
23. DispBaklightTO
24. DispBklStrtOff
25. UserBtn pulse
26. ConvCoefPulse1
27. ConvCoefPulse2 (for IS-NT only)
28. ConvCoefPulse3 (for IS-NT only)
29. ConvCoefPulse4 (for IS-NT only)

Setpoints - Comms settings

1. Gen-set name
2. Contr. adress
3. RS232(1) mode
4. RS232(2) mode

Setpoints - Date/Time

Setpoints - Engine Params

19. AfterCool time
20. Stop time
21. SDVentil time
22. Fuel solenoid
23. FuelSol offset
24. D+ Function
25. Bin selector 1
26. Bin selector 2
27. Bin selector 3
28. Bin selector 4
29. MaxFuelDrop

Setpoints - Engine Protect

1. Horn timeout
2. RunOnlyBlkDel1
3. RunOnlyBlkDel2
4. RunOnlyBlkDel3
5. BinInp delay 1
6. BinInp delay 2
7. BinInp delay 3
8. ForceBlockDel1
9. ForceBlockDel2
10. ForceBlockDel3
11. ResetActAlarms
12. Overspeed
13. Service time 1
14. Service time 2
15. Service time 3
16. Service time 4
17. Max+CylDifPmin(for IS-NT only)
18. Max-CylDifPmin(for IS-NT only)
19. Max+CylDifPnom(for IS-NT only)
20. Max-CylDifPnom(for IS-NT only)
21. PminCylDifEval(for IS-NT only)
22. CylDifEvalDel(for IS-NT only)

Setpoints - Force value

1. Force value 1
2. Force value 2
3. Force value 3
4. Force value 4
5. Force value 5
6. Force value 6
7. Force value 7
8. Force value 8
9. Force value 9
10. Force value 10
11. Force value 11
12. Force value 12
13. Force value 13
14. Force value 14
15. Force value 15
16. Force value 16
17. ExtValue1LoLim
18. ExtValue2LoLim
19. ExtValue3LoLim

20. ExtValue4LoLim
21. ExtValue1HiLim
22. ExtValue2HiLim
23. ExtValue3HiLim
24. ExtValue4HiLim
25. ExtValue1 rate
26. ExtValue2 rate
27. ExtValue3 rate
28. ExtValue4 rate
29. ExtValue1deflt
30. ExtValue2deflt
31. ExtValue3deflt
32. ExtValue4deflt

Setpoints - Gener Protect

1. OverldStrtEval
2. 2PovrldStEvDel
3. Min Power PtM
4. Ishort
5. Ishort del
6. 2Inom del
7. Gen >V BOC
8. Gen <V BOC
9. Gen >V Sd
10. Gen V del
11. Gen >f
12. Gen <f
13. Gen f del
14. Reverse power
15. ReversePwr del
16. ExcitationLoss
17. ExctLoss del
18. EarthFaultCurr
19. EthFltCurr del
20. Gen V unbal
21. Gen V unb del
22. Gen I unbal
23. Gen I unb del

Setpoints - Load shedding

1. Ld shed active
2. Ld shed level
3. Ld shed delay
4. Ld recon level
5. Ld recon delay
6. AutoLd recon

Setpoints - Mains protect

1. Mains >V MP
2. Mains <V MP
3. Mains V del
4. Mains Avg>V MP
5. Mains >f

Setpoints - Process Control

Setpoints - SUS control

Setpoints - Sync/load Ctrl

3. GtoM AngleReq
4. Phase window
5. Dwell time
6. Freq gain
7. Freq int
8. Freq reg loop
9. Angle gain
10. Speed gov bias
11. SpdGovPWM rate
12. SpeedGovLowLim
13. SpeedGovHiLim
14. TauSpeedActuat
15. Load ramp
16. Load gain
17. Load int
18. RampStartLevel
19. GCB open level
20. GCB open del
21. Sync timeout

Setpoints - Timer settings

1. TimerChannel 1
2. TimerChannel 2
3. TimerChannel 3
4. TimerChannel 4
5. TimerChannel 5
6. TimerChannel 6
7. TimerChannel 7
8. TimerChannel 8
9. TimerChannel 9
10. TimerChannel 10
11. TimerChannel 11
12. TimerChannel 12
13. TimerChannel 13
14. TimerChannel 14
15. TimerChannel 15
16. TimerChannel 16

Setpoints - Volt/PF Control

1. AVRRegChar
2. Voltage gain
3. Voltage int
4. PF gain
5. PF int
6. AVR DCout bias
7. TauVoltActuat

Value groups

Values are data objects measured or calculated by the controller and provided to the operator. Values are objects intended for reading, not writing. Each value is represented by the unique communication object number or Modbus register number. Assignment table of these numbers to the values can be obtained by GenConfig using the function File -> Generate Cfg Image.

Values can be also used as inputs into PLC blocks, as sources for logical analog inputs or as sources for physical analog outputs (including ECU outputs).

Values group - Analog CU

Values group - Bin inputs CU

Values group - Bin outputs CU

Values group - Engine values

ComAp

Values group - Force value

1. ExtValue1
2. ExtValue2
3. ExtValue3
4. ExtValue4

Values group - Gener values

1. Act power
2. Act pwr L1
3. Act pwr L2
4. Act pwr L3
5. React power
6. React pwr L1
7. React pwr L2
8. React pwr L3
9. Appar pwr
10. Appar pwr L1
11. Appar pwr L2
12. Appar pwr L3
13. Pwr factor
14. Load char
15. Pwr factor L1
16. Load char L1
17. Pwr factor L2
18. Load char L2
19. Pwr factor L3
20. Load char L3
21. Gen freq
22. Gen V L1-N
23. Gen V L2-N
24. Gen V L3-N
25. Gen V
26. Gen curr L1
27. Gen curr L2
28. Gen curr L3
29. Gen V unbal
30. Gen I unbal
31. Slip freq
32. Angle

Values group - Info

1. Controller mode
2. SW version
3. Application
4. SW branch
5. Password decode
6. CAN16
7. CAN32
8. Reg16
9. Reg32
10. Engine state
11. Breaker state
12. Timer text
13. Timer val

14. ECU DiagSource
15. NextTime1-4
16. NextDate1-4
17. NextTime5-8
18. NextDate5-8
19. NextTime9-12
20. NextDate9-12
21. NextTime13-16
22. NextDate13-16
23. AirGate ID
24. AirGate status

Values group - Log Bout

1. LogBout 1
2. LogBout 2
3. LogBout 3
4. LogBout 4
5. LogBout 5
6. LogBout 6
7. LogBout 7
8. LogBout 8
9. RemoteControl

Values group - Load shedding

1. StatLdShed

Values group - Mains values

1. Mains freq
2. Mains V L1-N
3. Mains V L2-N
4. Mains V L3-N
5. Mains V
6. Mains V L1-L2
7. Mains V L2-L3
8. Mains V L3-L1
9. Mains V unbal
10. Im3/EarthFC
11. P mains
12. Q mains
13. Mains PF
14. Mains LChr
15. Object P
16. Object Q
17. Object PF
18. Object LChr
19. MaxVectorS

Values group - Statistics

1. kWhours
2. kVArhours
3. kVAhours

4. *Run hours*
5. *Num starts*
6. *NumUnsc start*
7. *Service time 1*
8. *Service time 2*
9. *Service time 3*
10. *Service time 4*
11. *Total downtime*
12. *DnTimeReqToRun*
13. *PulseCounter 1*
14. *PulseCounter 2*
15. *PulseCounter 3*
16. *PulseCounter 4*

Values group - Sync/Load ctrl

1. *ActPwrReq*
2. *SpdRegOut*
3. *Speed request*
4. *SpeedReq RPM*
5. *ReqEngineSpeed*
6. *SystLoadCtrl*

Values group - Volt/PF ctrl

1. *VoltRegOut*
2. *SystPfCtrl*

Binary input functions

Analog input functions

Binary output functions

Common functions

Breaker control

Control loops

Status information

1. Ready for load
2. Stand-by ready
3. Gen-set active
4. Operational
5. Ready
6. Not ready
7. CrankProcedure
8. Cranking
9. Starting
10. Idle run
11. Running
12. ForwardSynchro
13. ReverseSynchro
14. Warming
15. Soft load
16. Loaded
17. Soft unload
18. Cooling
19. Stopping
20. Off mode
21. Man mode
22. Sem mode (IS-NT only)
23. Aut mode
24. Test mode
25. Gen params OK
26. MainsParams OK
27. In synchronism
28. StartButnEcho
29. StopButnEcho
30. FltResButnEcho
31. HrnResButnEcho
32. GCBButnEcho
33. MCBButnEcho
34. CtrlHeartBeat
35. Bin selector 1
36. Bin selector 2
37. Bin selector 3
38. Bin selector 4
39. Logical 0
40. Logical 1
41. TimerAct 1-4
42. TimerAct 5-8
43. TimerAct 9-12
44. TimerAct 13-16
45. TimerActiveCom
46. kWh pulse

Fixed protections output

1. Alarm
2. Alarm flashing
3. Horn
4. Horn flashing
5. Common Hst
6. Common MP
7. Common LoP (IS-NT only)

8. Common Al
9. Common Wrn
10. CommonActLev 1
11. CommonAlLev 1
12. Common OfL
13. Common BOC
14. Common Stp
15. Common Sd
16. CommonActLev 2
17. CommonAlLev 2
18. Common Fls
19. T cyl differ (IS-NT only)
20. Vgen <>
21. Vmains <>
22. VectorShiftTrp
23. VectorShiftAct
24. Overcurrent
25. ECU comm error
26. PeriphCommErr
27. CtrlHBeat FD
28. Not lubricated
29. CAN2 bus empty
30. ECU
31. SHBinCfgErr
32. SHAinCfgErr
33. ECUDiagBlocked
34. WrongConfig
35. Dongle incomp
36. Emergency stop
37. WrnServiceT1+2
38. WrnServiceT3+4
39. Overspeed
40. Underspeed
41. Start fail
42. Sd Stop fail
43. ChrgAlternFail
44. Pickup fail
45. Sd ExtBattFlat
46. Stp GCB fail
47. Wrn MCB fail
48. Wrn NCB fail
49. Stp Sync fail
50. WrnRSync fail
51. WrnSpdRegLim
52. WrnVoltRegLim
53. WrnTestOnLdFail
54. Sd Oil press B
55. OfL StartBlck
56. Start blocking
57. Fuel theft

Configurable protection outputs

1. PLC State 1
2. PLC State 2
3. PLC State 3
4. PLC State 4
5. UnivState 1
6. UnivState 2

7. *UnivState 3*
8. *UnivState 4*
9. *UnivState 5*
10. *UnivState 6*
11. *UnivState 7*
12. *UnivState 8*
13. *UnivState 9*
14. *UnivState 10*
15. *UnivState 11*
16. *UnivState 12*
17. *UnivState 13*
18. *UnivState 14*
19. *UnivState 15*

Appendix

Table of setpoints

Group: ProcessControl

Setpoint: Base load

Group	Process Control
Range [units]	0 .. *Nomin power* [kW]
Related FW	3.1.0
Description	This setpoint is used for adjusting of the requested gen-set power in *Baseload* mode, i.e. if the setpoint *Load ctrl PtM* is set to BASELOAD. **NOTE:** The actual setpoint units and range depend on setting of the Power format in GenConfig. **NOTE:** If the this setpoint is adjusted to lower value than *Min Power PtM* the gen-set power is limited the *Min Power PtM* setpoint.

Setpoint: Base PF

Group	Process Control
Range [units]	0.60 .. 1.20 [-]
Related FW	3.1.0
Description	This setpoint is used for adjusting of the requested gen-set power factor value if the power factor control mode is set to BASEPF (setpoint *PF ctrl PtM*). Values over 1.00 mean capacitive load character, i.e. setting 0.95 means 0.95L and setting 1.05 means 0.95C.

Setpoint: Import load

Group	Process Control
Range [units]	-32000 .. 32000 [kW]
Related FW	3.1.0
Description	This setpoint is used for adjusting of the requested **mains import** if the gen-set load control mode is set to IMP/EXP (*Load ctrl PtM* = IMP/EXP) This setpoint is also used for adjusting of the maximum allowed export if *export limit* function is active (*Export limit* = ENABLED). **NOTE:** Negative value of import is **export**, i.e. the power flows *into the mains*. **NOTE:**

	The actual setpoint units and range depend on setting of the Power format in GenConfig.

Setpoint: Import PF

Group	Process Control
Range [units]	0.60 .. 1.20 [-]
Related FW	3.1.0
Description	The setpoint is used to adjust the requested power factor at the mains when *PF ctrl PtM* = PF-IM/EX. Values over 1.00 mean capacitive load character. **EXAMPLE:** Setting 0.95 means 0.95L and setting 1.05 means 0.95C.

Setpoint: Load ctrl PtM

Group	Process Control
Range [units]	BASELOAD, IM/EX, ANEXT BASELOAD, ANEXT IM/EX, T BY PWR [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used for selection of the load control mode in parallel to mains operation. • BASELOAD: Gen-set load is maintained at constant level adjusted by the setpoint *Base load*. • IM/EX: Gen-set load is controlled so, that the mains import is maintained constant at the level adjusted by setpoint *Import load*. • ANEXT BASELOAD: Gen-set load is maintained at constant level given by the analog input *LdCtrl:AnExBld*. • ANEXT IM/EX: Gen-set load is controlled so, that the mains import is maintained constant at the level given by the analog input *LdCtrl:AnExI/E*. This option is available in IS-NT only. • T BY PWR: Gen-set load is controlled so, that the analog input *LdCtrl:TByPwr* is maintained at constant level given by setpoint *TempByPwr Treq*. The regulation loop is adjusted by setpoints *TempByPwr gain* and *TempByPwr int*. This option is available in IS-NT only. **NOTE:** If the baseload value needs to be changed remotely via a communication interface select the ANEXT BASELOAD mode and then configure one of the objects *ExtValue1* .. *ExtValue4* as the source for the analog input *LdCtrl:AnExBld*. These objects can be written remotely via communication (e.g. via MODBUS). **CAUTION!** Do not use cyclic write of the baseload setpoint for remote load control. It may cause the internal EEPROM memory damage.

Setpoint: PF ctrl PtM

Group	Process Control
Range [units]	BASEPF, PF-IM/EX, ANEXT BASEPF, ANEXT PF-IM/EX [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used for selection of the power factor control mode in parallel to mains operation. • BASEPF: Gen-set power factor is maintained at constant level adjusted by the setpoint *Base PF*. • PF-IM/EX: Gen-set power factor is controlled so, that the mains power factor is maintained constant at the level adjusted by setpoint *Import PF*. • ANEXT BASEPF: Gen-set power factor is maintained at constant level given by the analog input *PFCtrl:AnExBPF*. This option is available in IS-NT only. • ANEXT PF-IM/EX: Gen-set load is controlled so, that the mains power factor is maintained constant at the level given by the analog input *PFCtrl:AnExI/E*. This option is available in IS-NT only.

Setpoint: I/E-Pm meas

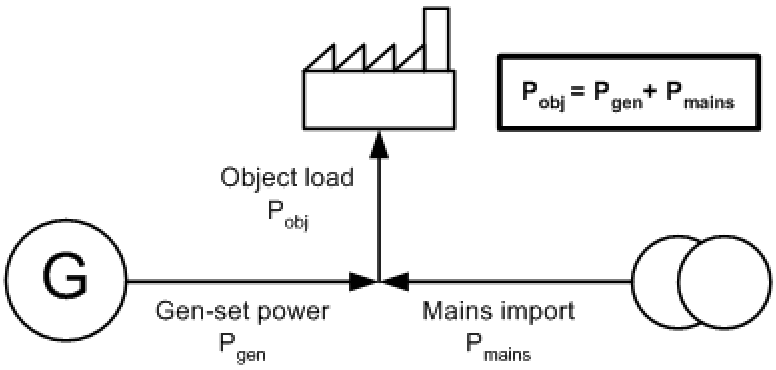
Group	Process Control
Range [units]	NONE, IM3 CT INPUT, ANALOG INPUT [-]
Related FW	3.1.0
Description	This setpoint is used to select, which method is used for measurement of the active power (P) imported from the mains. • NONE: Active power from the mains is not measured. • IM3 CT INPUT: Active power from the mains is calculated from the mains L3-N voltage and the current measured at the controller Im3 terminal and then multiplied by 3. • ANALOG INPUT: Active power from the mains is measured by an external device and passed the controller via analog input *LdCtrl:I/E-Pm*. **NOTE:** If the mains import is not measured or measured externally, the Im3 terminal can be used for *Earth fault current protection* This protection is present in default archive and **should be removed** in GenConfig (Protections tab) if the Im3 input is used for mains import measurement.

Setpoint: I/E-Qm meas

Group	Process Control
Range [units]	NONE, IM3 CT INPUT, ANALOG INPUT [-]
Related FW	3.1.0
Description	This setpoint is used to select, which method is used for measurement of the

	reactive power (Q) imported from the mains. • NONE: Reactive power from the mains is not measured. **NOTE:** It is possible to perform import/export load control without reactive power measurement, i.e. based on active power measuement only. The gen-set power factor will be maintained at constant level given by *Base PF* setpoint. However, this kind of operation may lead in certain conditions to bad power factor values at the mains. • IM3 CT INPUT: Reactive power from the mains is calculated from the mains L3-N voltage and the current measured at the controller Im3 terminal and then multiplied by 3. • ANALOG INPUT: Rective power from the mains is measured by an external device and passed the controller via analog input *PFCtrl:I/E-Qm*. **NOTE:** If the reactive power is measured, then the measurement method should match the method used for active power measurement, i.e. if the setpoint *I/E-Pm meas* is set to IM3 CT INPUT, the *I/E-Qm meas* should not be set to ANALOG INPUT and vice versa.

Setpoint: PeakLevelStart

Group	Process control
Range [units]	*PeakLevelStop* .. 32000 [kW]
Related FW	3.1.0
Force value possible	YES
Description	If the object consumption (*Object P*) exceeds this setpoint for time longer than *PeakAutS/Sdel*, the gen-set starts automatically. Adjusting the *PeakAutS/Sdel* to 0 (OFF) disables the autostart. See also the setpoint *PeakLevelStop*.  **NOTE:** The actual setpoint units and range depend on setting of the Power format in GenConfig.

Setpoint: PeakLevelStop

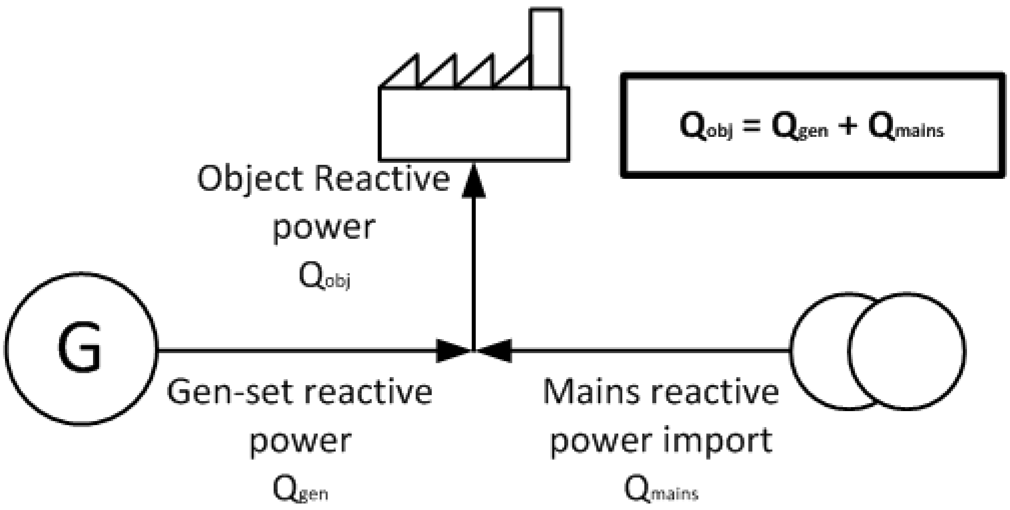
Group	Process control
Range [units]	0 .. *PeakLevelStart* [kW]
Related FW	3.1.0
Force value possible	YES
Description	If the object consumption (*Object P*) drops below this setpoint for time longer than *PeakAutS/Sdel*, the gen-set stops automatically. See also the setpoint *PeakLevelStart*. **NOTE:** The actual setpoint units and range depend on setting of the Power format in GenConfig.

Setpoint: PeakAutS/S del

Group	Process control
Range [units]	OFF, 1 .. 3200 [s]
Related FW	3.1.0
Force value possible	YES
Description	The setpoints adjusts the delay for automatic Peak start/stop function. Set 0 (OFF) to disable Peak automatic start function. See also the setpoints *PeakLevelStart* and *PeakLevelStop*. **NOTE:** The delay for this function is counted down in any mode if the conditions are fulfilled (i.e. in OFF when the Mains Import in kW is higher than *PeakLevelStart*).

Setpoint: Peak kVA Start

Group	Process control
Range [units]	*Peak kVA Stop* .. 32000 [kVA]
Related FW	3.1.0
Force value possible	YES
Description	If the object apparent consumption (*Object P* to the power of 2 + *Object Q* to the power of 2) exceeds this setpoint for time longer than *PeakKVAS/S del*, the gen-set starts automatically (in SPtM application) or group of gen-sets is started by InteliMains. Adjusting the *PeakKVAS/S del* to 0 (OFF) disables the autostart. See also the setpoint *Peak kVA Stop*.



NOTE:
The actual setpoint units and range depend on setting of the Power format in GenConfig.

Setpoint: Peak kVA Stop

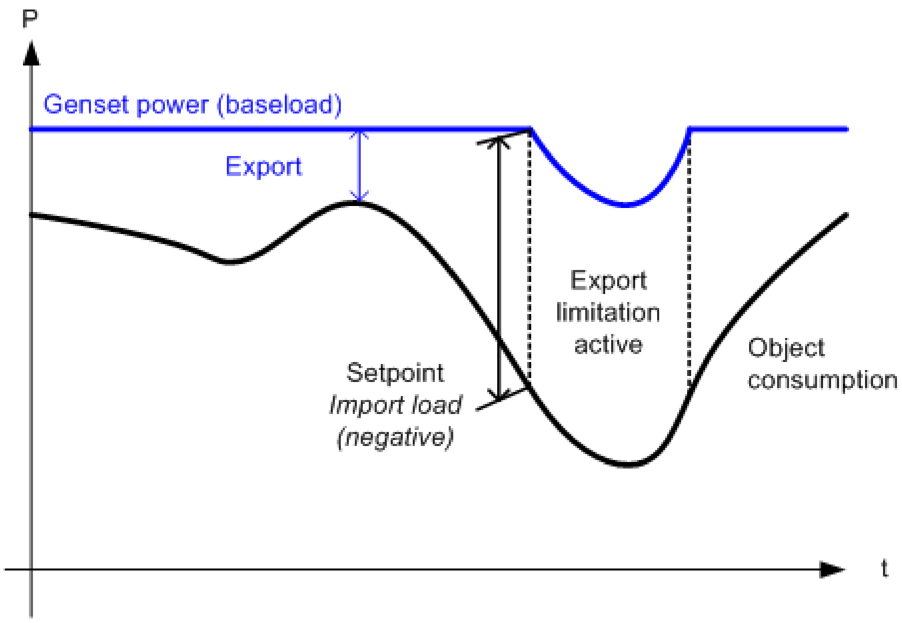
Group	Process control
Range [units]	0 .. *Peak kVA Start* [kW]
Related FW	3.1.0
Force value possible	YES
Description	If the object apparent consumption (*Object P* to the power of 2 + *Object Q* to the power of 2) drops below this setpoint for time longer than *PeakKVAS/S del*, the gen-set stops automatically (in SPtM application) or gen-set group is stopped by InteliMains. See also the setpoint *Peak kVA Start*. **NOTE:** The actual setpoint units and range depend on setting of the Power format in GenConfig.

Setpoint: PeakKVAS/S del

Group	Process control
Range [units]	OFF, 1 .. 3200 [s]
Related FW	3.1.0
Force value possible	YES
Description	The setpoints adjusts the delay for automatic Peak kVA start/stop function. Set 0 (OFF) to disable Peak kVA automatic start function. See also the setpoints *Peak kVA Start* and *Peak kVA Stop*. **NOTE:** The delay for this function is counted down in any mode if the conditions are

	fulfilled (i.e. in OFF when the Mains Import in kVA is higher than *Peak kVA Start*).

Setpoint: Export limit

Group	Process control
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used to enable and disable the *Export limit* function. If the function is enabled, the gen-set power is limited so that mains import is always higher or equal to the setpoint *Import Load*.  PRINCIPLE OF THE EXPORT LIMIT FUNCTION This function can be used if the setpoint *Load ctrl PtM* is set to BASELOAD, ANEXT BASELOAD or T BY PWR. **NOTE:** If the import value/setpoint is negative, it actually means export. This function can be used to protect the system from unwanted export. You may set maximum export value or you can set it possitive to keep some import even in cases that there are abrupt load changes. **NOTE:** See the setpoint *I/E-Pm meas* for details about mains import measurement methods.

Setpoint: Derating1 strt

Group	Process control
Range [units]	-32000 .. +32000 [x]

Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for adjusting the starting point of the *Power derating 1* function, where the gen-set nominal power is still 100% of the setpoint *Nomin power*. See the chapter Power derating for details. **NOTE:** The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input *PowerDerating1* is assigned.

Setpoint: Derating1 end

Group	Process control
Range [units]	-32000 .. +32000 [x]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for adjusting the end point of the *Power derating 1* function, where the gen-set nominal power is reduced to the value adjusted by setpoint *Derated1 pwr*. See the chapter Power derating for details. **NOTE:** The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input *PowerDerating1* is assigned.

Setpoint: Derated1 pwr

Group	Process control
Range [units]	0 .. 100 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for adjusting the final power level for the *Power derating 1* function. The nominal power is not reduced below this setpoint even if the respective analog input increases further. See the chapter Power derating for details.

Setpoint: Derating2 strt

Group	Process control

Range [units]	-32000 .. +32000 [x]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for adjusting the starting point of the *Power derating 2* function, where the gen-set nominal power is still 100% of the setpoint *Nomin power*. See the chapter Power derating for details. **NOTE:** The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input *PowerDerating2* is assigned.

Setpoint: Derating2 end

Group	Process control
Range [units]	-32000 .. +32000 [x]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for adjusting the end point of the *Power derating 2* function, where the gen-set nominal power is reduced to the value adjusted by setpoint *Derated2 pwr*. See the chapter Power derating for details. **NOTE:** The setpoint actual physical dimension depends on configuration of the physical analog input to which the logical input *PowerDerating1* is assigned.

Setpoint: Derated2 pwr

Group	Process control
Range [units]	0 .. 100 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for adjusting the final power level for the *Power derating 2* function. The nominal power is not reduced below this setpoint even if the respective analog input increases further. See the chapter Power derating for details.

Setpoint: TempByPwr Treq

Group	Process control
Range [units]	-32000 .. +32000 [°C]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used for adjusting the requested temperature for the *Temperature-By-Power* control loop. The *Temperature-By-Power* is active if the setpoint *Load ctrl PtM* is set to T BY PWR position and the logical analog input *LdCtrl:TByPwr* is attached to the physical analog input where the temperature is measured. See also the setpoints *TempByPwr int* and *TempByPwr gain*. **NOTE:** As the "regulating action" of the *Temperature-By-Power* control loop is changing of the gen-set power the regulated value (i.e. some temperature) must depend on the gen-set power. Typical usage of this function is regulation of the output temperature of the heating water at a CHP unit.

Setpoint: TempByPwr gain

Group	Process control
Range [units]	0.00 .. 100.00 [%]
Related FW	3.1.0
Description	This setpoint is used to adjust the gain factor for the *Temperature-By-Power* control loop. See also the setpoints *TempByPwr Treq* and *TempByPwr int*.

Setpoint: TempByPwr int

Group	Process control
Range [units]	0.00 .. 100.00 [%]
Related FW	3.1.0
Description	This setpoint is used to adjust the integration factor for the *Temperature-By-Power* control loop. See also the setpoints *TempByPwr Treq* and *TempByPwr gain*.

Setpoint: Overheat prot

Group	Process control
Range [units]	DISABLED, ENABLED
Related FW	3.1.0
Force value possible	YES

Description	The setpoint is used to enable/disable the *Overheat protection*, which is used for limitation of the gen-set power when there is not enough heat outlet from the gen-set to avoid shutdown due to oveheating. If the *Overheat protection* is enabled and the temperature at the logical analog input *LdCtrl:TByPwr*: • increases over the setpoint *TempByPwr Treq*, the *Temperature-By-Power* load control loop is temporarily activated to reduce the power and consequently the temperature. • returns back under the setpoint *TempByPwr Treq*, the *Temperature-By-Power* regulation loop is deactivated and previous load control mode (e.g. Baseload) takes place. **NOTE:** See more information about the *Temperature-By-Power* load control mode in the description of the setpoint *TempByPwr Treq*.

Setpoint: Island enable

Group	Process Control
Range [units]	NO, YES [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used to enable/disable the island operation, i.e. supplying the load while the mains is disconnected. • **Island mode** is recognized if the mains breaker is **open**, e.g. the feedback input *MCB feedback* is not active. • **Parallel mode** is recognized if the mains breaker is **closed**, e.g. the feedback input *MCB feedback* is active. If the island mode is recognized and island operation is disabled the controller will open the generator breaker, cool-down the gen-set and stop it. While this situation persists the controller behavior is following: • The gen-set start in AUT mode is blocked, it can be started in MAN mode only. • The GCB can't be closed. • The message *OfL StartBlck* is present in the alarm list (see the alarm output *OfL StartBlck*). **NOTE:** See table with examples in the description of the setpoint *MFStart enable*.

Setpoint: ParallelEnable

Group	Process Control
Range [units]	NO, YES [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used to enable/disable the parallel operation, i.e. supplying the load in parallel with the mains. • **Island mode** is recognized if the mains breaker is **open**, e.g. the feedback input *MCB feedback* is not active. • **Parallel mode** is recognized if the mains breaker is **closed**, e.g. the feedback input *MCB feedback* is active. If the parallel mode is recognized and parallel operation is disabled the controller will open the generator breaker, cool-down the gen-set and stop it. While this situation persists the controller behavior is following: • The gen-set start in AUT mode is blocked, it can be started in MAN mode only. • The GCB can't be closed. • The message *OfL StartBlck* is present in the alarm list (see the alarm output *OfL StartBlck*). **NOTE:** See table with examples in the description of the setpoint *MFStart enable*.

Setpoint: Synchro enable

Group	Process Control
Range [units]	NONE, FORWARD, REVERSE, BOTH [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used for enable/disable forward and reverse synchronization. • NONE: No synchronizing is enabled. • FORWARD: GCB synchronizing is enabled. • REVERSE: MCB synchronizing is enabled. • BOTH: GCB and MCB synchronizing are enabled. **NOTE:** Although synchronizing of the particular breaker is disabled the breaker can be closed to a "dead" (voltage-free) bus. **NOTE:** See table with examples in the description of the setpoint *MFStart enable*.

Setpoint: MFStart enable

Group	Process Control
Range [units]	NO, YES [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used to enable/disable automatic start of the gen-set when a mains failure occurs.

EXAMPLES OF SETTINGS:

DESCRIPTION OF THE BEHAVIOR	REQUIRED ADJUSTMENT
AMF gen-set, no synchronizing, no test-on-load function. This behavior is used if the both MCB and GCB too slow for synchronizing or if synchronizing is generally not allowed by the local electricity company.	Island enable = YES ParallelEnable = NO Synchro enable = NONE MFStart enable = YES
AMF gen-set with test-on-load function and with synchronized return to the mains. No continuous parallel operation.	Island enable = YES ParallelEnable = NO Synchro enable = BOTH MFStart enable = YES
AMF gen-set without test-on-load function and with synchronized return to the mains. No continuous parallel operation.	Island enable = YES ParallelEnable = NO Synchro enable = REVERSE MFStart enable = YES
Gen-set operating parallel to mains with additional AMF functionality, synchronized return to the mains.	Island enable = YES ParallelEnable = YES Synchro enable = BOTH MFStart enable = YES
Gen-set operating parallel to mains with additional AMF functionality, switchover return to the mains (e.g. if the mains breaker is not suitable for synchronizing).	Island enable = YES ParallelEnable = YES Synchro enable = FORWARD MFStart enable = YES
Gen-set operating only in parallel to the mains. No island operation at all.	Island enable = NO ParallelEnable = YES

		[Synchro enable](#) = FORWARD
		[MFStart enable](#) = NO

Setpoint: #Neutral cont

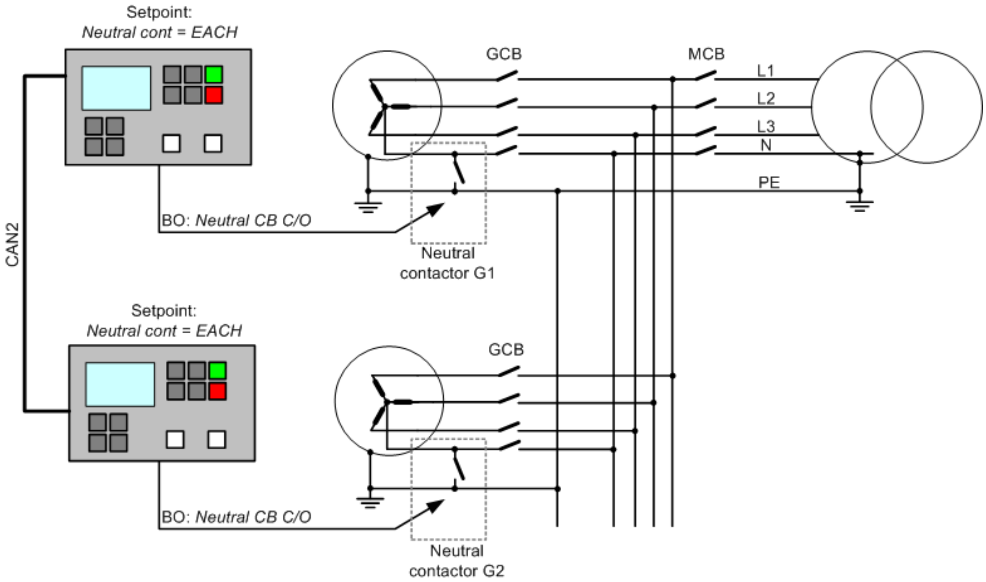
<table>
<tr><td>Group</td><td>Process control</td></tr>
<tr><td>Range [units]</td><td>EACH, COMMON [-]</td></tr>
<tr><td>Related FW</td><td>3.1.0</td></tr>
<tr><td>Description</td><td>
The setpoint is used for adjusting the behavior of the Neutral CB C/O output according to actual site wiring.

The neutral contactor is used to connect the neutral wire (N) with the protective wire (PE) in a TN-S system. This connection must exist in one moment at one point of the circuit only.

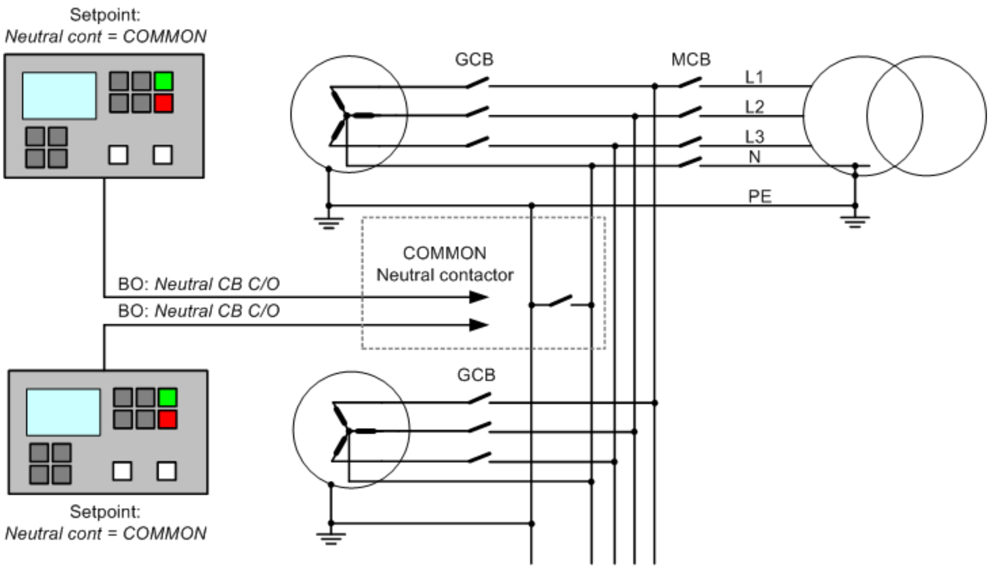
The EACH option should be used if each gen-set has it's own neutral contactor. Four-pole GCB must be used for this case.

• The output is always opened while the gen-set is not running.
• The output is always opened while the MCB is closed.
• While the gen-set is running and GCB is open, the output closes when generator voltage in at least one phase exceeds 85% of the nominal voltage. It opens when the generator voltage in all phases drops below 50% of the nominal voltage.
• While the gen-set is running, MCB is open and GCB is closed, then the position of the output is given by an internal algorithm, which ensures, that always exactly one gen-set connected to the bus has the neutral contactor closed.

NOTE:
Functional CAN2 communication between the controllers is required for this function.



PRINCIPIAL SCHEME OF A SITE IF NEUTRAL CONT = EACH
</td></tr>
</table>

	The **COMMON** option should be used if there is one common neutral contactor for the whole site. The outputs *Neutral CB C/O* from all controllers are combined together and the combined signal is used to control the breaker. Three-pole GCB must be used for this case. • The output is always opened while the gen-set is not running. • The output is always opened while the MCB is closed. • While the gen-set is running the output closes when generator voltage in at least one phase exceeds 85% of the nominal voltage. It opens when the generator voltage in all phases drops below 50% of the nominal voltage. That means if at least one gen-set in the site is running and having proper voltage, the neutral breaker is closed. **NOTE:** If there are more logical groups the "common" option is related to the group. That means one common neutral contactor is expected for each group.  PRINCIPIAL SCHEME OF A SITE IF NEUTRAL CONT = COMMON **NOTE:** As there is always a connection between the N and PE wires at the mains side the generator neutral contactors are always open when the mains breaker is closed.

Setpoint: WatchedContr

Group	Process Control
Range [units]	0 .. 16 [min]
Related FW	3.1.0
Description	This setpoint is used at redundant controller to specify the address of the related main controller in CAN-based rendundant systems. Adjust this setpoint to 0 if the

	controller is not used as redundant or if wired rendundancy system is used.

Group: SUS control

Setpoint: SUS sequence

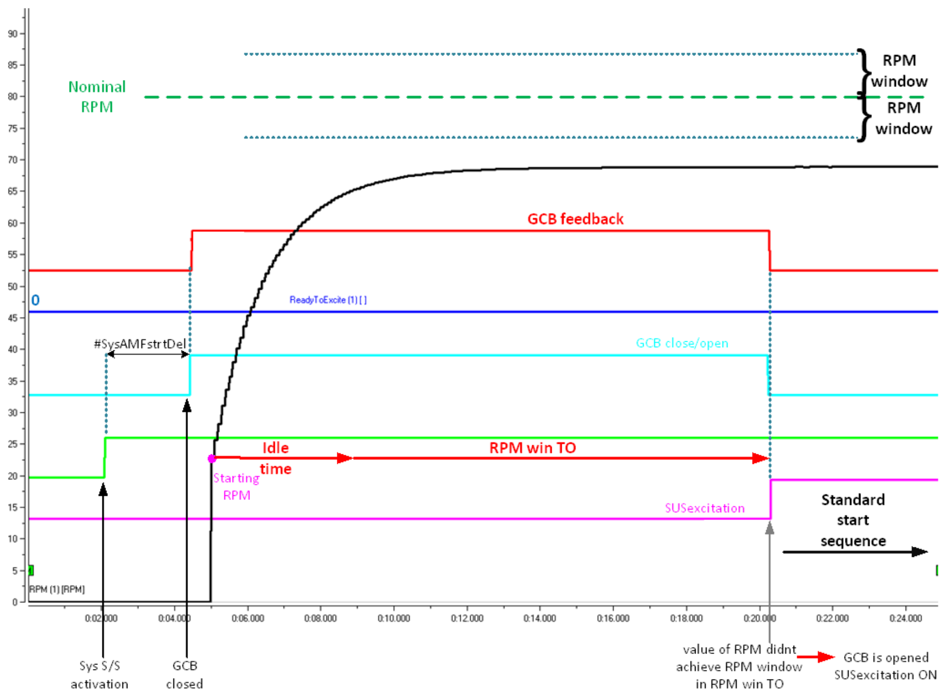
Group	SUS control
Range [units]	ENABLED, DISABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for selection of the start sequence (standard start sequence, or Start Up Synchro sequence with closed GCB and not excited alternator) **ENABLED**: Standard start sequence (opened GCB) **DISABLED**: SUS start sequence (closed GCB) Conditions for performance of SUS sequence • Setpoint “SUS sequence” (SUS control group) – ENABLED • RPM pick-up is connected • No voltage on the bus (actually voltage on the bus must be lower than 1/3 of GenNomV. MINT, Combi application only) • MCB is opened (SPtM, SPI application only) • LBI:GCB Disabled is not activated • LBI: SUS excit blck – is activated before Start command (in case of configuration: setpoint ExcitationCtrl=EXTERNAL only (SUS control group) • In case of enabled power management – the gen-sets are started based on actual Load reserves. • GCB feedback must come during Prestart time (Engine params groups). If it doesn’t come during Prestart time, then it is switched to STANDARD start sequence **CAUTION!** The residual magnetism of the armature can cause that there can apperar the voltage on the bus during the SUS start sequence (in MINT and Combi application only). Because of that the limit for the protection for closing of the GCB to the dead bus is during the SUS start sequence increased from 15V to value equal to 1/3 of the setpoint GenNomV. The value higher then 1/3 of the setpoint GenNomV is used as the limit of the protection during the SUS start sequence. If the voltage of the gen-set (actually the bus voltage) is higher than this limit, the SUS sequence is interrupted and GCB is opened. Gen-set continues in standard start sequence.

Setpoint: RMP window

Group	SUS control

Range [units]	0.0 .. 100.0 [%]
Related FW	3.1.0
Description	RPM window is area around nominal RPM , where percentage value specifies area above and below Nominal RPM (Basic settings: Nominal RPM). If the gen-set' RPM achieve this RPM window and stay into this window for 1 second, then *ReadyToExcite* is activated. Example: RPM window: 10% , Nominal RPM: 1500, 10% of nominal RPM = 150 RPM, RPM window is (1500-150 ÷ 1500+150) so RPM window is from 1350 to 1650 RPM.

Setpoint: RPM win TO

Group	SUS control
Range [units]	2.0 .. 6000.0 [s]
Related FW	3.1.0
Description	RPM window TimeOut is time for reaching required RPM window. This timer starts when RPM achieves starting RPM (Engine params: Starting RPM) and Idle time is counted (Engine params: Idle time).In case of LBO:ReadyToExcite activation – RPM win TO is finished. If RPM of gen-set don't achieve RPM window (or LBO:ReadyToExcite is not activated in timer RPM win TO), then the GCB is opened and standard start sequence is performed. 

Setpoint: ExcitationCtrl

Group	SUS control
Range [units]	INTERNAL,EXTERNAL [-]
Related FW	3.1.0
Description	This setpoint defines source of decision logic for activation of excitation output LBO *SUS excitation*. **INTERNAL**: Controller activates/deactivates excitation based on setpoint #SUS min power. **EXTERNAL**: It's determinated for cases, where request for excitation comes from external device (eq external PLC). External device gives request for excitation via LBI *SUS excit blck* and controller activates/deactivates excitation - based of LBI *SUS excit blck* (its valid for SUS sequence only).(Condition #SUS Min power is ignored, excitation is controlled via LBI *SUS excit blck*). LBI *SUS excit blck* must be activated before Start command comes, if not – STANDARD start sequence is performed. In case, when the system has active LBO *ReadyToExcite* and it waits for deactivation LBI *SUS excit blck* – and the RPM drop out from RPM window – gen-set is switched over to STANDARD start sequence.

Group: Basic settings

Setpoint: Nomin Power

Group	Basic Settings
Range [units]	1 .. 32000 [kW]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for adjusting the gen-set nominal (rated) power, i.e. the maximum allowed gen-set power level. IS-NT controllers provide two independent *power derating* functions, which can be used for derating of the gen-set according to an analog value (e.g. temperature). See the setpoints *Derating1 strt* and *Derating2 strt*. The nominal power or derated nominal power is used as the basis (100%) for gen-set power protections, as the upper limit of the requested power in the parallel-to-mains operation, for power management and other functions. **NOTE:** The actual setpoint units and range depend on setting of the Power format in GenConfig.

Setpoint: Nomin current

Group	Basic Settings
Range [units]	1 .. 10000 [A]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for adjusting the generator nominal current. The nominal current is used as the basis (100%) for generator thermal-overcurrent protection (*2Inom del*), and for short current protection (*Ishort*). **NOTE:** The setpoints *CT ratio prim* and *CT ratio sec* must be adjusted properly to obtain correct generator current readings. **CAUTION!** The maximum measurable input current to the controller current terminals is 11A. **WARNING!** Do not discconnect the CT terminals from the controller while there is nonzero current in the CT primary circuit!

Setpoint: CT ratio prim

Group	Basic Settings
Range [units]	1 .. 15000 [A]
Related FW	3.1.0
Description	Nominal current of the **primary side** of the generator current transformers. The secondary side is adjusted by setpoint *CT ratio sec*.

Setpoint: CT ratio sec

Group	Basic settings
Range [units]	/5A, /1A [-]
Related FW	3.1.0
Description	Nominal current of the **secondary side** of the generator current transformers. The primary side is adjusted by setpoint *CT ratio prim*. **NOTE:** The CT secondary nominal current is adjustable only in IG-NTC and IS-NT. The IG-NT has the CT secondary nominal current adjusted fixedly to 5A regardless of this setpoint.

Setpoint: Im3/ErFlCurCTp

Group	Basic settings

Range [units]	1 .. 15000 [A]
Related FW	3.1.0
Description	Nominal current of the **primary side** of the current transformer connected to the controller terminals labeled *IN*. The secondary side is adjusted by setpoint *Im3/ErFlCurCTs*. **NOTE:** The *IN* terminals can be used either for measurement of earth current or mains current (mains import). See also the setpoint *I/E-Pm meas*.

Setpoint: Im3/ErFlCurCTs

Group	Basic settings
Range [units]	/5, /1 [A]
Related FW	3.1.0
Description	Nominal current of the **secondary side** of the current transformer connected to the controller terminals labeled *IN*. The primary side is adjusted by setpoint *Im3/ErFlCurCTp*. **NOTE:** The *IN* terminals can be used either for measurement of earth current or mains current (mains import). See also the setpoint *I/E-Pm meas*. **NOTE:** The CT secondary nominal current is adjustable only in IG-NTC and IS-NT. The IG-NT has the CT secondary nominal current adjusted fixedly to 5A regardless of this setpoint.

Setpoint: VT ratio

Group	Basic Settings
Range [units]	0.1 .. 500.0 [V/V]
Related FW	3.1.0
Description	The setpoint is used to adjust the generator voltage transformers ratio. **NOTE:** Adjust the setpoint to the value of **1.0** if the generator voltage is connected directly to the controller terminals, i.e. without transformers. **NOTE:** Example: if you have transformers with ratio 6000/100V adjust the setpoint to the value of **60.0**. **NOTE:** The range of the generator voltage inputs must be adjusted properly. See the setpoint *Vg InpRangeSel*.

Setpoint: Vg InpRangeSel

Group	Basic settings
Range [units]	277V, 120V [-]
Related FW	3.1.0
Description	This setpoint selects the range of the generator voltage terminals. The 120V range is available only in IG-NTC and IS-NT. The IG-NT has the range adjusted fixedly to 277V regardless of this setpoint. **NOTE:** The 277V range is suitable for both European (230V) and American (277V) measurement. The range 120V is intended for high-voltage applications where voltage transformers with 100V secondary range are used or for alternative American (120V) measurement.

Setpoint: Vm VT ratio

Group	Basic Settings
Range [units]	0.1 .. 500.0 [V/V]
Related FW	3.1.0
Description	The setpoint is used to adjust the mains voltage transformers ratio. **NOTE:** Adjust the setpoint to the value of **1.0** if the mains voltage is connected directly to the controller terminals, i.e. without transformers. **NOTE:** Example: if you have transformers with ratio 6000/100V adjust the setpoint to the value of **60.0**. **NOTE:** The range of the mains voltage inputs must be adjusted properly. See the setpoint *Vm InpRangeSel*.

Setpoint: Vm InpRangeSel

Group	Basic settings
Range [units]	277V, 120V [-]
Related FW	3.1.0
Description	This setpoint selects the range of the mains voltage terminals. The 120V range is available only in IG-NTC and IS-NT. The IG-NT has the range adjusted fixedly to 277V regardless of this setpoint. **NOTE:** The 277V range is suitable for both European (230V) and American (277V) measurement. The range 120V is intended for high-voltage applications where voltage transformers with 100V secondary range are used or for alternative American (120V) measurement.

Setpoint: Vb InpRangeSel

Group	Basic settings
Range [units]	277V, 120V [-]
Related FW	3.1.0
Description	This setpoint selects the range of the bus voltage terminals. The 120V range is available only in IG-NTC and IS-NT. The IG-NT has the range adjusted fixedly to 277V regardless of this setpoint. **NOTE:** See all notes mentioned above.

Setpoint: GenNomV

Group	Basic Settings
Range [units]	10 .. 34641 [V]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to adjust the nominal (rated) generator voltage (phase to neutral). If you do not know the phase-neutral nominal voltage, you can adjust the phase-phase nominal voltage *GenNomVph-ph*. The controller will then recalculate the phase-neutral nominal voltage automatically. **NOTE:** The actual setpoint units and range depend on setting of the Power format in GenConfig. **NOTE:** If different voltage on gen-set and on Bus/Mains is required the following procedure is required: Both setpoints (*MainsNomV* and *GenNomV*) must be adjusted to the same values according to the value of actual generator nominal voltage. E.g. gen-set nominal is 231 V but Bus/Mains nominal is 240 V. In this case both setpoints need to be adjusted to 231 V and setpoints of corresponding protections for Bus/Mains need to be set assymetrically. For 240 V on Bus/Mains it is typical to open MCB when voltage reaches 254 V or 225 V. Since the setpoint is adjusted to 231 V corresponding protection setpoints need to be adjusted to *Mains >V MP* = 106% and *Mains <V MP* = 97 % (hence the desired values are reached).

Setpoint: GenNomVph-ph

Group	Basic Settings
Range [units]	17 .. 60000 [V]
Related FW	3.1.0
Description	This setpoint is used to adjust the nominal (rated) generator voltage (phase to phase). This setpoint is also recalculated automatically when the phase-neutral nominal voltage *GenNomV* is changed.

	This setpoint can be used if you know the phase-phase nominal voltage only. The controller will recalculate the phase-neutral nominal voltage automatically when this setpoint is changed. **NOTE:** The actual setpoint units and range depend on setting of the Power format in GenConfig. **NOTE:** If different voltage on gen-set and on Bus/Mains is required the following procedure is required: Both setpoints (*GenNomVph-ph* and *MainsNomVph-ph*) must be adjusted to the same values according to the value of actual generator nominal voltage. E.g. gen-set nominal is 400 V but Bus/Mains nominal is 415 V. In this case both setpoints need to be adjusted to 400 V and setpoints of corresponding protections for Bus/Mains need to be set assymetrically. For 415 V on Bus/Mains it is typical to open MCB when voltage reaches 440 V or 390 V. Since the setpoint is adjusted to 400 V corresponding protection setpoints need to be adjusted to *Mains >V MP* = 106% and *Mains <V MP* = 97 % (hence the desired values are reached).

Setpoint: MainsNomV

Group	Basic Settings
Range [units]	10 .. 34641 [V]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to adjust the nominal mains voltage (phase to neutral). If you do not know the phase-neutral nominal voltage, you can adjust the phase-phase nominal voltage *MainsNomVph-ph*. The controller will then recalculate the phase-neutral nominal voltage automatically. **NOTE:** The actual setpoint units and range depend on setting of the Power format in GenConfig. **NOTE:** If different voltage on gen-set and on Bus/Mains is required the following procedure is required: Both setpoints (*MainsNomV* and *GenNomV*) must be adjusted to the same values according to the value of actual generator nominal voltage. E.g. gen-set nominal is 231 V but Bus/Mains nominal is 240 V. In this case both setpoints need to be adjusted to 231 V and setpoints of corresponding protections for Bus/Mains need to be set assymetrically. For 240 V on Bus/Mains it is typical to open MCB when voltage reaches 254 V or 225 V. Since the setpoint is adjusted to 231 V corresponding protection setpoints need to be adjusted to *Mains >V MP* = 106% and *Mains <V MP* = 97 % (hence the desired values are reached).

Setpoint: MainsNomVph-ph

Group	Basic settings

Range [units]	17 .. 60000 [V]
Related FW	3.1.0
Description	**In application SPtM and SPI.** This setpoint is used to adjust the nominal mains voltage (phase to phase). This setpoint is also recalculated automatically when the phase-neutral nominal voltage *MainsNomV* is changed. This setpoint can be used if you know the phase-phase nominal voltage only. The controller will recalculate the phase-neutral nominal voltage automatically when this setpoint is changed. **NOTE:** The actual setpoint units and range depend on setting of the Power format in GenConfig. **NOTE:** If different voltage on gen-set and on Bus/Mains is required the following procedure is required: Both setpoints (*GenNomVph-ph* and *MainsNomVph-ph*) must be adjusted to the same values according to the value of actual generator nominal voltage. E.g. gen-set nominal is 400 V but Bus/Mains nominal is 415 V. In this case both setpoints need to be adjusted to 400 V and setpoints of corresponding protections for Bus/Mains need to be set assymetrically. For 415 V on Bus/Mains it is typical to open MCB when voltage reaches 440 V or 390 V. Since the setpoint is adjusted to 400 V corresponding protection setpoints need to be adjusted to *Mains >V MP* = 106% and *Mains <V MP* = 97 % (hence the desired values are reached).

Setpoint: FixVoltProtSel

Group	Basic settings
Range [units]	PHASE-NEUTRAL, PHASE-PHASE [-]
Related FW	3.1.0
Description	PHASE-NEUTRAL: The generator and mains/bus voltage protections are based on phase-neutral voltages and the phase-neutral nominal voltages are taken as 100%. PHASE-PHASE: The generator and mains/bus voltage protections are based on phase-phase voltages and the phase-phase nominal voltages are taken as 100%. **NOTE:** Both options require different settings of protection levels to achieve identical results. **EXAMPLE:** Phase-nominal voltage is 231V, actual voltages are L1N = 231V, L2N = 231V, L3N = 219.5V => the L3N voltage is at 95% of the nominal. The same situation evaluated from phase-phase voltages gives following results: nominal phase-phase voltage is 400V, measured voltages are L12 = 400V, L23 = 390V, L31 = 390V => the L23 and L31 are at 97.5% of the nominal. It is obvious that if the situation is evaluated from phase-neutral voltages the tripping level must be adjusted to 95%, whereas the same situation evaluated from phase-phase voltages require tripping level adjusted to 97.5%.

Setpoint: Nominal Freq

Group	Basic Settings
Range [units]	50 Hz, 60 Hz [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint adjusts nominal system frequency (choose 50 Hz or 60 Hz). Setpoint *Nom frq offset* is used for setting offset to the chosen nominal frequency (-2 to +2 Hz with step 0.01 Hz). Controller regulates to the *Nominal Freq* + *Nom frq offset* frequency. The value *Nominal Freq* + *Nom frq offset* is used as 100% for generator and mains/bus frequency protections and as requested value for frequency regulation (except synchronizing) if the setpoint *Freq reg loop* is set to ALL THE TIME.

Setpoint: Nom frq offset

Group	Basic Settings
Range [units]	-2.00 .. 2.00 [Hz]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint adjusts offset of nominal system frequency (*Nominal Freq*) with step 0.01 Hz. Controller regulates to the *Nominal Freq* + *Nom frq offset* frequency. The value *Nominal Freq* + *Nom frq offset* is used as 100% for generator and mains/bus frequency protections and as requested value for frequency regulation (except synchronizing) if the setpoint *Freq reg loop* is set to ALL THE TIME.

Setpoint: Gear Teeth

Group	Basic Settings
Range [units]	1 .. 500 [-]
Related FW	3.1.0
Description	Number of teeth on the engine's flywheel for the pick-up sensor. Adjust the setpoint to Fgen->RPM (0), if the pick-up sensor is not used. Then the engine speed will be calculated from the generator frequency. **NOTE:** Generator voltage must be higher than 10V effective to measure the speed from the frequency correctly. If this condition is not fulfiled at low speeds (cranking) it is

	reccommended using additional running indication as e.g. D+ signal to prevent overcranking of the engine. See the binary output *Starter* for additional information. **CAUTION!** The starting procedure of gas engine may not work without the pickup. The pickup must me always used for gas engines.

Setpoint: Nominal RPM

Group	Basic Settings
Range [units]	100 .. 4000 [RPM]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint adjusts the nominal gen-set speed. The nominal speed is used: • As 100% for the overspeed protection (setpoint *Overspeed*) • For current speed calculation if it is calculated from generator frequency. See the setpoint *Gear teeth*. **NOTE:** The setpoints *Nominal RPM* and system frequency (*Nominal Freq* + *Nom frq offset*) must correspond to each other, i.e. if the engine speed is at nominal value then the generator frequency must be at nominal value as well.

Setpoint: ControllerMode

Group	Basic Settings
Range [units]	OFF, MAN, SEM, AUT, TEST [-]
Related FW	3.1.0
Description	This setpoint can be used to select the controller mode. It is equivalent to selecting the mode by the buttons on the front panel. Currently active mode is displayed on the controller main screen. **NOTE:** If any of the mode forcing inputs *Remote OFF*, *Remote MAN*, *Remote AUT* or *Remote TEST* is active, then the currenly active mode can be different than the mode selected by the setpoint (resp. panel buttons). **OFF**: The GCB is opened and the engine is immediately stopped in this mode without unloading and cooling. After that the controller is in *Not ready* state and can not be started any way. The MCB is closed permanently (*MCB Opens On* = GENRUN) or is open or closed

		according to the mains is present or not (*MCB Opens On* = MAINSFAIL).
	MAN	The engine can be started and stopped manually using START and STOP buttons (or external buttons wired to appropiate binary inputs) in MAN mode. When the engine is running, GCB can be closed to a dead bus or synchronizing can be started by the GCB button. Also MCB can be closed and opened manually using the MCB button, regardless the mains is present or not. No autostart is performed. No reaction to the inputs *Sys Start/Stop* or *Rem Start/Stop*.
	SEM	(IS-NT only) - The gen-set is started and stopped only manually using START and STOP buttons (or external buttons wired to appropiate binary inputs), however the the full start sequence up to the moment when the engine is loaded is automatic as well as unloading and stop sequence. The only case when the gen-set starts automatically in SEMI is the start/stop initiated by the AMF function.
	AUT	This is fully automatic operation. The engine is started and stopped by: • Binary input *Rem Start/Stop* (SPtM, SPI, COMBI) • Mains import dependent autostart function (peak start/stop) (SPtM, SPI, Combi) • AMF function (SPtM, Combi) • Power management (MINT, Combi) Buttons MCB, GCB, START, STOP including the appropriate binary inputs for external buttons are not active. The full start sequence up to the moment when the engine is loaded is automatic as well as unloading and stop sequence. **WARNING!** If an red alarm is present and the gen-set is in AUT mode, it can start by self after all red alarms becomes inactive and are acknowledged!!! If you want to avoid this situation, adjust the setpoint *FltRes GoToMAN* to the ENABLED position.
	TEST	(SPtM, Combi) - the gen-set is started when the controller is switched to TEST mode and remains running unloaded until the mode is changed. If a mains failure occurs, the gen-set takes over the load.

Setpoint: FltRes GoToMAN

Group	Basic Settings
Range [units]	DISABLED,ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint can be used to aviod possible unexpected automatic start of the gen-set in AUT mode after the gen-set was stopped by a protection and then fault reset was pressed.

	ENABLED — The controller mode is automatically changed from any mode except OFF to MAN if any red-level protection is acknowledged by pressing of the fault reset. **DISABLED** — The automatic change of the controller mode is disabled. **NOTE:** The function will not work if the current controller mode is forced by one of the inputs *Remote AUT* or *Remote TEST*.

Setpoint: Local buttons

Group	Basic settings
Range [units]	PANEL, EXTBUTTONS, BOTH [-]
Related FW	3.1.0
Description	The setpoint selects which set of control buttons is currently active. Its function depends on which type of controller is used. Please refer to the section which suits your controller/display version. • First section deals with the case of IGS-NT with built-in monochrome display. • Second section deals with the case of IGS-NT-BB with IV5 display. • Third section deals with the case of IGS-NT-BB with IV8. **NOTE:** If you have IGS-NT (built-in display) and you use additional IV display all the sections may be relevant (depending on the type of additional displays). **IGS-NT (built-in monochrome display)** **PANEL** — The built-in buttons on the controller front panel (IG-NT) or terminal #1 (IS-NT) are enabled, the binary inputs for external buttons are disabled. **EXTBUTTONS** — The built-in buttons are disabled and the binary inputs for external buttons are enabled. **BOTH** — Both built-in buttons and binary inputs for external buttons are enabled. **NOTE:** In case that additional IV display is connected to a controller it behaves in the way described below. **NOTE:** The binary inputs for external buttons may be the following: GCBButton, MCBButton, FaultResButton, HornResButton, StartButton, StopButton etc. **IGS-NT-BB with IV-5 display**

Situation is depicted in the following figure.

- Buttons in red box are inactive when EXTBUTTONS option is selected and active when PANEL or BOTH option is selected.
- Buttons in green box are active when any option is selected.
- Behavior of buttons in orange box depends on functions assigned to each button individually. If any function in the list in the note below is assigned to these buttons then it behaves as buttons in the red box, if any other function is assigned to these buttons it behaves as buttons in the green box.
- The binary inputs for external buttons are affected in the same way as in the case of IGS-NT (built-in monochrome display) by this setpoint.

NOTE:
In the case that more IV displays are connected they all behave the same (they are all clones of each other).

NOTE:
The binary inputs for external buttonst may be the following (depending on used application): *GCBButton*, *MCBButton*, *MGCBButton*, *FDRButton*, *BTBButton*, *FaultResButton*, *HornResButton*, *StartButton*, *StopButton* etc.

IGS-NT-BB with IV-8 display

Situation is depicted in the following figure.

- Buttons in red box are inactive when EXTBUTTONS option is selected and active when PANEL or BOTH option is selected.
- Buttons in green box are active when any option is selected.
- Behavior of buttons in orange box depends on functions assigned to each button individually. If any function in the list in the note below is assigned to these buttons then it behaves as buttons in the red box, if any other function is assigned to these buttons it behaves as buttons in the green box.

- The binary inputs for external buttons are affected in the same way as in the case of IGS-NT (built-in monochrome display) by this setpoint.

NOTE:
In the case that more IV displays are connected they all behave the same (they are all clones of each other).

NOTE:
The binary inputs for external buttonst may be the following (depending on used application): *GCBButton*, *MCBButton*, *MGCBButton*, *FDRButton*, *BTBButton*, *FaultResButton*, *HornResButton*, *StartButton*, *StopButton* etc.

Setpoint: DispBaklightTO

Group	Basic settings
Range [units]	OFF, 1-240 min, NO TIMEOUT [min]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts timeout after which the display (internal display or IS display #1) backlight is switched off. **NOTE:** When IntelliVision is used this setpoint does not adjust its behavior. Its backlight is adjusted by internal IntelliVision "setpoint".

OFF	The backlight is off all the time
NO TIMEOUT	The backlight is on all the time

Setpoint: DispBklStrtOff

Group	Basic settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	If this setpoint is in ENABLED position the display backlight is temporarily switched off during gen-set start.

Setpoint: UserBtn pulse

Group	Basic settings
Range [units]	0.2 .. 10.0 [s]
Related FW	standard v3.1.0
Force value possible	YES
Description	This setpoint adjusts the duration of User Button 1..16 pulse. For more information read the description of LBO *User Button 1*.

Setpoint: ConvCoefPulse1

Group	Engine Params
Range [units]	1 .. 6500 [-]
Related FW	3.1.0
Description	This setpoint adjusts the rate of increasing of the PulseCounter #1 module. The module counts pulses at the input *PulseCounter 1* and if the input pulses counter reaches value given by this setpoint, the counter value *PulseCounter 1* (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.

Setpoint: ConvCoefPulse2

Group	Basic settings
Range [units]	1 .. 6500 [-]
Related FW	3.1.0
Description	This setpoint adjusts the rate of increasing of the PulseCounter #2 module. The module counts pulses at the input *PulseCounter 2* and if the input pulses counter reaches value given by this setpoint, the counter value *PulseCounter 2* (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.

Setpoint: ConvCoefPulse3

Group	Basic settings
Range [units]	1 .. 6500 [-]
Related FW	3.1.0
Description	This setpoint adjusts the rate of increasing of the PulseCounter #3 module. The module counts pulses at the input *PulseCounter 3* and if the input pulses counter reaches value given by this setpoint, the counter value *PulseCounter 3* (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.

Setpoint: ConvCoefPulse4

Group	Basic settings
Range [units]	1 .. 6500 [-]
Related FW	3.1.0
Description	This setpoint adjusts the rate of increasing of the PulseCounter #4 module. The module counts pulses at the input *PulseCounter 4* and if the input pulses counter reaches value given by this setpoint, the counter value *PulseCounter 4* (in the group Statistic) is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.

Group: Comms settings

Setpoint: Gen-set name

Group	Comms settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint is intended for a custom name of the gen-set, which is used for identification of the gen-set in saved archives or remote connections. Maximal length of the name is 15 characters. The setpoint can't be modified via the IG-NT built-in terminal.

Setpoint: Contr. address

Group	Comms settings
Range [units]	1 .. 32 [-]
Related FW	3.1.0
Description	This setpoint adjusts the address of the particular controller at the CAN2 and/or RS485 bus. Each gen-set connected to the same bus **must have unique address**. If the setpoint *CANnegotiation* (**COMBI application only**) is in AUT position, the address is assigned automatically. The setpoint *Contr. addr* is preffered then, however if it is in conflict with other controller present on the CAN2 bus other

	address will be assigned to aviod address collision. **NOTE:** Address 1 is reccommended for standalone gen-sets. **NOTE:** If you are connecting to the gen-set remotely you have to adjust the proper controller address in connection settings of the remote client (InteliMonitor, GenConfig, Modbus client etc.) **NOTE:** Address of the controller is also used for Modbus communication via RS485 etc. Address adjusted by this setpoint is therefore universal address of the controller.

Setpoint: RS232(1) mode

Group	Comms settings
Range [units]	DIRECT, MODEM (HW), MODEM (SW), MODBUS-DIRECT, MODBUS-MDM(HW), ECU LINK [-]
Related FW	3.1.0
Description	This setpoint selects the connection type for the serial port COM1. • Available as RS232 in all controller types. • Available also as RS485 in the IG-NT if the external display bus is not used. Selectable by the setpoint *RS485(1) conv.* (not available in IG-NT-BB, IG-NTC-BB, IS-NTC-BB and IS-NT - see *RS485(1) conv.*). See the diagram of all related terminals in the chapter Communication.

DIRECT	Connection to a local PC via RS232 or RS485 (with internal or external converter) interface. Use this option also for IG-IB connected via RS232 cable. The internal RS485 converter is enabled/disabled by the setpoint *RS485(1) conv.*
MODEM (HW)	Modem point-to-point connection to a remote PC with hardware data flow control using signals RTS/CTS. Full modem cable is required for this option.
MODEM (SW)	Modem point-to-point connection to a remote PC with software data flow control. 3-wire cable (RX, TX, GND) is sufficient for this option. Use this option only if your modem does not provide RTS/CTS signals.
MODBUS	Modbus RTU connection in slave mode via RS232 or RS485 (with internal or external converter) interface. The internal RS485 converter is enabled/disabled by the setpoint *RS485(1) conv.*, the communication speed is adjustable by the setpoint *RS232(1)MBCSpd*. See the latest communication guide for more information about MODBUS protocol.
MODBUS-MDM(HW)	Modbus RTU connection in slave mode via modem

	with hardware data flow control. The communication speed is adjustable by the setpoint *RS232(1)MBCSpd*. See the latest communication guide for more information about MODBUS protocol.
ECU-LINK	Connection to an electronic-controlled engine which uses non-J1939 ECU. The proper ECU type must be also configured with GenConfig.

Setpoint: RS232(2) mode

Group	Comms settings
Range [units]	DIRECT, MODEM (HW), MODEM (SW), MODBUS-DIRECT, MODBUS-MDM(HW), ECU LINK [-]
Related FW	3.1.0
Description	This setpoint selects the connection type for the serial port COM2.

- Available as RS232 or RS485 in the IG-NTC and IS-NT controllers. Selectable by the setpoint *RS485(2) conv.*.
- Available only as RS485 in the IG-NTC-BB and IS-NTC-BB controllers.
- Not available in IG-NT.

See the diagram of all related terminals in the chapter Communication.

DIRECT	Connection to a local PC via RS232 or RS485 (with internal or external converter) interface. Use this option also for IG-IB connected via RS232 cable. The internal RS485 converter is enabled/disabled by the setpoint *RS485(2) conv.*
MODEM (HW)	Modem point-to-point connection to a remote PC with hardware data flow control using signals RTS/CTS. Full modem cable is required for this option.
MODEM (SW)	Modem point-to-point connection to a remote PC with software data flow control. 3-wire cable (RX, TX, GND) is sufficient for this option. Use this option only if your modem does not provide RTS/CTS signals.
MODBUS	Modbus RTU connection in slave mode via RS232 or RS485 (with internal or external converter) interface. The internal RS485 converter is enabled/disabled by the setpoint *RS485(2) conv.*, the communication speed is adjustable by the setpoint *RS232(2)MBCSpd*. See the latest communication guide for more information about MODBUS protocol.
MODBUS-MDM(HW)	Modbus RTU connection in slave mode via modem with hardware data flow control. The communication speed is adjustable by the setpoint *RS232(2)MBCSpd*. See the latest communication guide for more information about MODBUS protocol.
ECU-LINK	Connection to an electronic-controlled engine which

	| | uses non-J1939 ECU. The proper ECU type must be also configured with GenConfig. | **NOTE:** The COM2 prot is not available in the basic IG-NT version. **NOTE:** The RS232 connector is no more available in hardware version 2.0 and above. The COM2 port is redirected to the RS485(2) terminals all the time. That means modem is not supported at COM2 in these hardware versions. For modem use the COM1 port instead.

Setpoint: RS232(1)MBCSpd

Group	Comms settings
Range [units]	9600, 19200, 38400, 57600 [bps]
Related FW	3.1.0
Description	The setpoint adjusts the communication speed on the COM1 connector when it is switched to MODBUS or MODBUS-MDM(HW) mode. See also the setpoint *RS232(1) mode*.

Setpoint: RS232(2)MBCSpd

Group	Comms settings
Range [units]	9600, 19200, 38400, 57600 [bps]
Related FW	3.1.0
Description	The setpoint adjusts the communication speed on the COM2 connector when it is switched to MODBUS or MODBUS-MDM(HW) mode. See also the setpoint *RS232(2) mode*.

Setpoint: RS232(1)MdmIni

Group	Comms settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint can be used to add extra AT commands at the end of the initialization sequence of the modem connected to the COM1 port. The command can be entered with as well as without the "AT" prefix, are separated with semicolon and maximal length is 31 characters. The setpoint can't be modified via the IG-NT built-in terminal.

Setpoint: RS485(1) conv.

Group	Comms settings

Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Description	This setpoint selects function of the built-in RS485(1) converter. **ENABLED**: The communication port COM1 is redirected to the integrated RS485(1) converter. The RS232(1) connector has no function and the external display interface is not available. **DISABLED**: The communication port COM1 is present at the RS232(1) connector and the RS485(1) connector is used for the external display interface. **NOTE:** The redirection is applied only for DIRECT, MODBUS and ECU-LINK modes. See the setpoint *RS232(1) mode*. **NOTE:** This setpoint must be set to **DISABLED** at controllers that do not have internal display. i.e. InteliVision-5 or InteliVision-8 is connected to the RS485(1) terminals.

Setpoint: RS232(2)MdmIni

Group	Comms settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint can be used to add extra AT commands at the end of the initialization sequence of the modem connected to the COM2 port. The command can be entered with as well as without the "AT" prefix, are separated with semicolon and maximal length is 31 characters. The setpoint can't be modified via the IG-NT built-in terminal. Using a modem at the COM2 port is not supported since the hardware version 2.0. For modem use the COM1 port instead.

Setpoint: RS485(2) conv.

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Description	This setpoint selects function of the built-in RS485(2) converter. **ENABLED**: The communication port COM2 is redirected to the integrated RS485(2) converter. The RS232(2) connector has no function. **DISABLED**: The communication port COM2 is present at the RS232(2) connector.

	NOTE: The redirection is applied only for DIRECT, MODBUS and ECU-LINK modes. See the setpoint *RS232(2) mode*. **NOTE:** This setpoint has no function for IG-NT(C)-BB and IS-NTC-BB as this controller modifications do not provide the RS232 connector at the COM2 port. The port is redirected to the RS485 interface all the time regardless of this setpoint.

Setpoint: CAN bus mode

Group	Comms settings
Range [units]	32C,8C [-]
Related FW	3.1.0
Description	CAN bus speed selection. • 32C: High speed CAN (250 kbps) applicable up to 32 controllers, CAN bus length limited up to 200 meters. • 8C: Low speed CAN (50 kbps) applicable up to 8 controllers, CAN bus length limited up to 900 meters. Change of this setpoint is applied after the **controller is switched off and on again**. **NOTE:** Use low speed for long distance connection only. Set all connected controllers to the same speed.

Setpoint: CAN2emptDetect

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	Enables the detection of missing other controllers on the CAN2 bus. If the setpoint is in ENABLED position and there aren't any other controllers detected on the CAN2 bus (the complete bus, not only within the logical group) the alarm *CAN2Empty* is issued.

Setpoint: LB/UART Log

Group	Comms settings
Range [units]	DISABLED, ENABLED
Related FW	3.1.0

Force value possible	YES
Description	The setpoint enables/disables logging of remote communication activity. If logging is enabled connection and disconnection of each remote terminal as well as entering access code are recorded into the history. **NOTE:** The terminal is disconnected automatically after 5 min of inactivity and next communication request from the same terminal is considered as a new connection. When logging is enabled in certain conditions the history may be filled up with large number of records related to the communication and important records may be overwritten quite fast.

Setpoint: CANAddrSwitch1

Group	Comms settings
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint selects function of the terminal address 122 at the CAN2 line. See the latest communication guide for details about this topic. **MODEM** – The address is used for modem connection via I-LB **OTHER** – The address is used for direct connection to any other device as e.g. IV8 or I-RD.

Setpoint: CANAddrSwitch2

Group	Comms settings
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint selects function of the terminal address 125 at the CAN2 line. See the latest communication guide for details about this topic. **MODEM** – The address is used for modem connection via I-LB **OTHER** – The address is used for direct connection to any other device as e.g. IV8 or I-RD

Setpoint: IP address

Group	Comms settings
Range [units]	[-]
Related FW	3.1.0
Description	• In *fixed settings mode* 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. • In *Automatic settings mode* this setpoint is used to display the IP address, which has been assigned by the DHCP server. It is not possible to change the setpoint value manually in this setting (the value is immediately reverted back by controller communication module IB-COM).

Setpoint: IP Addr mode

Group	Comms settings
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to select the method how the ethernet connection is adjusted.

FIXED	The ethernet connection is adjusted fixedly according to the setpoints *IP address*, *Net mask*, *Gateway IP*, *DNS IP*. .
	This method should be used for classic ethernet or Internet connection. When this type of connection is opening the controller is specified by it's IP address. That means it would be inconvenient if the IP address were not fixed (static).
AUTOMATIC	The ethernet connection settings is obtained **automatically from the DHCP server.** The obtained settings is then copied to the related setpoints (it is not possible to set those setpoints manually in this setting, for more information please see the following setpoints: *IP address*, *Net mask*, *Gateway IP* and *DNS IP*). If the process of obtaining the settings from DHCP server is not successful the value *000.000.000.000* is copied to the setpoint *IP address* and the module continues trying to obtain the settings.
	This method is beneficial for AirGate connection as it makes the connection very easy, in fact "plug and play". When this type of connection is opening the controller is specified by it's AirGate ID and the IP address does not play any role.

CAUTION!
If you need to use fixed ethernet settings you should consult the proper setting with your IT specialist.

Setpoint: Net mask

Group	Comms settings
Range [units]	[-]
Related FW	3.1.0
Description	• In *fixed settings mode* this setpoint is used to adjust the network mask of the network segment where the controller is connected.

	• In *Automatic settings mode* this setpoint is used to display the network mask which has been assigned by the DHCP server. It is not possible to change the setpoint value manually in this setting (the value is immediately reverted back by controller communication module IB-COM).

Setpoint: Gateway IP

Group	Comms settings
Range [units]	[-]
Related FW	3.1.0
Description	• In *fixed settings mode* this setpoint is used to adjust the IP address of the gateway of the network segment where the controller is connected. • In *Automatic settings mode* this setpoint is used to display the gateway IP address which has been assigned by the DHCP server. It is not possible to change the setpoint value manually in this setting (the value is immediately reverted back by controller communication module IB-COM). A gateway is a device which connects the respective segment with the other segments and/or Internet.

Setpoint: ComApProtoPort

Group	Comms settings
Range [units]	1 .. 255 [-]
Related FW	3.1.0
Description	This setpoint is used to adjust the port, which is used for ethernet connection to a PC with any of ComAp PC program (i.e. InteliMonitor, GenConfig). **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.

Setpoint: AirGate

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
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 him. 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 uses the "AirGate" service, which hides all the issues with static/public address into a black box and you do not need to take care about it. You just need only a connection to the Internet. The AirGate server address is adjusted by the setpoint [AirGate addr](#).

Setpoint: AirGate IP

Group	Comms settings
Range [units]	max. 32 characters [-]
Related FW	3.1.0
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 address *airgate.comap.cz* if your company does not operate it's own AirGate server.

Setpoint: SMTP authent

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Description	Switch this setpoint to ENABLED position if your *SMTP server* requires authentificated access. You have also adjust *SMTP user name* and *SMTP password*. Ask your internet provider or IT manager for this information. **NOTE:** Most of public free SMTP servers require authentification. You will get instructions when you register to the freemail service.

Setpoint: SMTP user name

Group	Comms settings
Range [units]	max. 32 characters [-]
Related FW	3.1.0
Description	Use this setpoint to enter the user name for the SMTP server if *SMTP authentification* is enabled.

Setpoint: SMTP password

Group	Comms settings
Range [units]	max. 32 characters [-]
Related FW	3.1.0

Description	Use this setpoint to enter the password for the SMTP server if *SMTP authentification* is enabled.

Setpoint: SMTP address

Group	Comms settings
Range [units]	max. 32 characters
Related FW	3.1.0
Description	**CAUTION!** Proper setting of SMTP-related setpoints as well as controller mailbox are essential for sending alerts via e-mails. This setpoint is used for entering the domain name (e.g. *smtp.yourprovider.com*) or IP address (e.g. 74.125.39.109) of the SMTP server. Please ask your internet provider or IT manager for this information. **NOTE:** You may also use one of free SMTP servers, e.g. *smtp.gmail.com*. However, please note that some free SMTP servers may cause delays (in hours..) when sending e-mails. **NOTE:** If you do not want to send active e-mails, you may leave this setpoint blank, as well as other setpoints related to SMTP server and e-mail settings.

Setpoint: Contr mailbox

Group	Comms settings
Range [units]	max. 32 characters [-]
Related FW	3.1.0
Description	Enter an **existing e-mail address** into this setpoint. This address will be used as **sender** address in active e-mails that will be sent from the controller. **Do not enter your** or other recipient's e-mail address. Recipient's addresses are to be entered into the setpoints *AcallCH1-Addr*, *AcallCH2-Addr* and *AcallCH3-Addr*. **NOTE:** Most of SMTP server will reject sending e-mails that contain nonexisting address in the sender address field.

Setpoint: Time zone

Group	Comms settings
Range [units]	- [-]
Related FW	3.1.0
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 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 occured.

Setpoint: DNS IP

Group	Comms settings
Range [units]	[-]
Related FW	3.1.0
Description	• In *fixed settings mode* this setpoint is used to adjust the domain name server (DNS), which is needed to traslate domain names in e-mail addresses and server names into correct IP addresses. • In *Automatic settings mode* this setpoint is used to display DNS server, which has been assigned by the DHCP server. It is not possible to change the setpoint value manually in this setting (the value is immediately reverted back by controller communication module IB-COM).

Setpoint: ECU Diag

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to disable reading of diagnostic codes from the ECU if an external diagnostic tool is connected to the engine. A message *ECU Diag disabled* is displayed in the alarm list while ECU diagnostics is disabled.

Setpoint: SHxOcol detect

Group	Comms settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Description	This setpoint is used to enable/disable evaluation of collisions of virtual shared peripherial modules. A collision means that there is more than one source (shared outputs module) active on the CAN2 bus. **NOTE:** In certain situations multiple sites with bus tie breakers may need to have more

	shared outputs sources as the CAN bus line is in some points interrupted according to bus tie breakers position. Normally a collision would be indicated if there were more sources on the bus and this setpoint can be used to disable the evaluation of collisions in this special case.

Group: Engine params

Setpoint: Starting RPM

Group	Engine Params
Range [units]	0 .. 1000 [RPM]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts "firing" speed level. When this level is reached during cranking, the engine is considered as started and the starter motor is disengaged, i.e. the output *Starter* is deactivated. **NOTE:** There are also other symptoms that causes disengagement of the starter. See the separate chapter Starting sequence. This setpoint is also used as the speed limit for the *Underspeed* protection, which is activated 5s after the starter was disengaged and the controller continued from *Starting* to *Idle* or *Running* phase.

Setpoint: Starting POil

Group	Engine Params
Range [units]	0.0 .. 10.00 [bar]
Related FW	3.1.0
Force value possible	YES
Description	Oil pressure can be used as one of the symptoms that are used for detection that the engine is running. This setpoint adjusts oil pressure limit above which the engine is considered as started. **NOTE:** Learn more in the separate chapter Starting sequence. **NOTE:** The logical analog input *Oil pressure* must be configured onto the apporpriate analog input where the oil pressure sensor is connected.

Setpoint: Prestart time

Group	Engine Params
Range [units]	0 .. 3600 [s]

Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjust length of the prestart period before starter is engaged. The output *Prestart* is active during the prestart period. Adjust the setpoint to zero if you want to disable the prestart function.

Setpoint: Prelubr time

Group	Engine params
Range [units]	0 .. 3600 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for adjusting duration of the prelubrication cycle. See the output *Prelubr pump* for details about prelubrication.

Setpoint: Prelubr pause

Group	Engine params
Range [units]	1 .. 3000 [min]
Related FW	3.1.0
Force value possible	YES
Description	YES This setpoint is used for adjusting the pause between two consequent prelubrication cycles. See the output *Prelubr pump* for details about prelubrication.

Setpoint: MaxCrank Time

Group	Engine Params
Range [units]	1 .. 240 [s]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint adjusts the maximum duration the *starter motor* is energized within one cranking cycle. If there is none of *running engine symptoms* activated within this period the particular cranking attempt is finished and either a *cranking pause* follows or *start fail* alarm is issued. **NOTE:** At gas engines the last cranking cycle is extended about 25% and the engine is cranked with closed gas valve during this additional time to ventilate the remaining gas.

	NOTE: If magnetic pickup is used and the controller does not detect non-zero RPM within 2s (gas engine) or 5s (diesel engine) after energizing the starter motor then cranking pause follows immediately (as the pinion is probably not properly engaged). **NOTE:** Learn more in the separate chapter Starting sequence.

Setpoint: CrnkFail pause

Group	Engine Params
Range [units]	5 .. 60 [s]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint adjusts the pause between two subsequent cranking cycles. **NOTE:** Learn more in the separate chapter Starting sequence.

Setpoint: Crank attempts

Group	Engine Params
Range [units]	1 .. 10 [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint adjusts the maximum number of cranking cycles. The alarm *Start fail* is issued when the engine does not start within this number of cranking cycles. **NOTE:** An gas engines the last cranking cycle is extended about 25% and the engine is cranked with closed gas valve during this additional time to ventilate the remaining gas. **NOTE:** Learn more in the separate chapter Starting sequence.

Setpoint: Idle time

Group	Engine Params
Range [units]	1 .. 3600 [s]
Related FW	3.1.0
Force value	YES

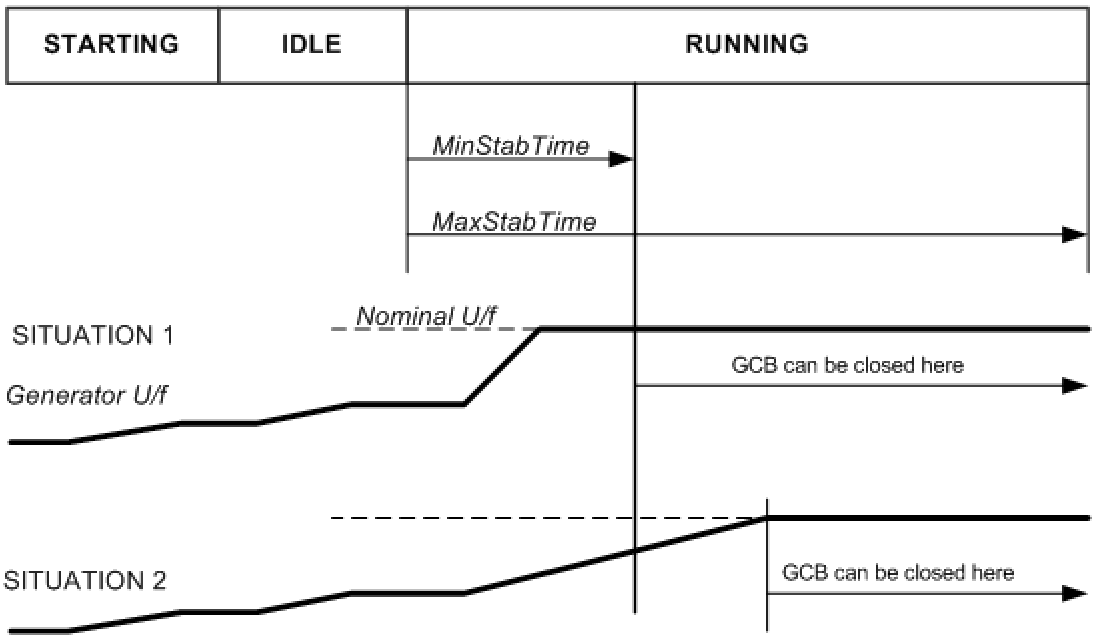
possible	
Description	This setpoint adjusts duration of the idle period, which begins in the moment when the engine is started (e.g. the *starter motor* is disengaged). The output *Idle/Nominal* is not active to keep the engine at idle speed (if the governor supports idling) during idle period.

Setpoint: Min stab time

Group	Engine Params
Range [units]	1 .. *Max Stab Time* [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the minimum time between the end of the idle period and closing of the GCB. Closing of the GCB is blocked during this period even if generator voltage and frequency are in limits.

Setpoint: Max Stab Time

Group	Engine Params
Range [units]	*Min Stab Time* .. 3600 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the **maximum** time between the end of the idle period and reaching proper generator voltage and frequency. If the proper generator voltage and frequency is not reached within this period generator voltage and/or frequency alarm is issued and the gen-set is stopped.



Setpoint: Warming load

Group	Engine params
Range [units]	0 .. 100 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to adjust the requested load level during *warming* period in % of the *Nomin power*. The warming period takes place after the gen-set has been synchronized to the mains if the temperature measured at the logical analog input *Warming Temp* is below the value of *Warming temp*. The gen-set load is maintained at *Warming load*, which should be adjusted to cca 20-30% of the nominal load to allow the engine reaching of it's operational temperature smoothly. The warming period is finished either when the temperature reaches the warming level or if duration of the warming period reaches *Max warm time*.

Setpoint: Warming temp

Group	Engine params
Range [units]	-32000 .. 32000 [°C]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the warming temperature. The warming phase is finished when either the water temperature at the logical analog input *Warming temp*

	reaches this level or the *Max warm time* elapses. **NOTE:** See also the setpoint *Warming load*.

Setpoint: Max warm time

Group	Gener Protect
Range [units]	0 .. 3600 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the maximum duration of the warming phase after the genset was sychchronized to the mains. The warming phase is finished when either the water temperature at the logical analog input *Warming Temp* reaches this level or the *Max warm time* elapses.

Setpoint: Cooling speed

<table>
<tr><td>Group</td><td>Engine Params</td></tr>
<tr><td>Range [units]</td><td>IDLE, NOMINAL</td></tr>
<tr><td>Related FW</td><td>3.1.0</td></tr>
<tr><td>Force value possible</td><td>YES</td></tr>
<tr><td>Description</td><td>This setpoint is used to select whether the cooling phase is performed at idle or nominal speed, i.e. whether the output Idle/Nominal is open or closed during the idle phase.
<table>
<tr><td>NOMINAL</td><td>Gen-set performs cooling at nominal speed, generator voltage and frequency protections remain active during cooling phase.</td></tr>
<tr><td>IDLE</td><td>Gen-set performs cooling at idle speed, generator protections are not active in the cooling phase (except of Gen >V Sd).</td></tr>
</table></td></tr>
</table>

Setpoint: Cooling time

Group	Engine Params
Range [units]	0 .. 3600 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to adjust the length of the *Cooling* phase, which takes place after the gen-set has been unloaded (GCB opened) and before it is stopped. The cooling phase can be performed either at nominal or at idle speed. See the

	setpoint *Cooling speed*. If the cooling phase length optimalization is enabled, the actual length depend on the actual genset load in the moment the stop sequence was started. See the setpoint *Cooldown optim*.

Setpoint: CoolDnAfterBOC

Group	Engine Params
Range [units]	STOP, INFIN COOLING [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint selects the controller behavior in cooling phase after a BOC alarm: **STOP**: The controller behaves as usually, e.g. the cooling phase lasts for period adjusted by the setpoint *Cooling time* and then the gen-set is stopped. **INFIN COOLING**: The cooling phase is not finished automatically when the *Cooling time* elapses. The gen-set remains in cooling until another event changes the it's state, e.g. it is manually stopped. If the gen-set is in AUT mode and the alarm is not active and has been reset the gen-set returns to loaded state automatically.

Setpoint: Cooldown optim

Group	Engine params
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Description	This setpoint enables optimalization of the cooling phase length based on the previous gen-set load. **DISABLED**: The length of the cooling phase is given by the setpoint *Cooling time* regardless of the previous gen-set load. **ENABLED**: The length of the cooling phase is linearly reduced according to the gen-set load in the moment the stop sequence started (i.e. prior to the gen-set begun to ramp down or opened the GCB). If the load was 100% of the *nominal power* the length will be 100% of the setpoint *Cooling time*, if the load was 50% the length will be reduced to 50% etc...

Setpoint: AfterCool time

Group	Engine params

Range [units]	0 .. 3600 [s]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used to adjust the length of the *aftercooling* period, i.e. how long the *cooling pump* remains running after the gen-set has been stopped.

Setpoint: Stop time

Group	Engine Params
Range [units]	0 .. 240 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to adjust the time period the gen-set needs to stop completely. If the gen-set does not stop within this period the alarm *Stop fail* is issued. The setpoint also adjusts the minimal length of stop solenoid activation. See the output *Stop Solenoid* for more information.

Setpoint: SDVentil time

Group	Engine Params
Range [units]	0 .. 60 [s]
Related FW	3.1.0
Description	This setpoint is used to adjust the length of the preventilation phase at gas engines, i.e. if the setpoint *Fuel solenoid* is switched to GAS ENGINE. The preventilation phase is a period of cranking without opened gas valve which takes place prior to the first start attempt after a shutdown or after switching on the controller. The purpose of the preventilation phase is to clean the engine and exaust system from possible unburned gas.

Setpoint: Fuel Solenoid

Group	Engine Params
Range [units]	DIESEL ENGINE, GAS ENGINE [-]
Related FW	3.1.0
Description	This setpoint is used to select the type of starting sequence. The diagrams of both sequences are indicated in the separate chapter Starting sequence. The main difference in the behavior of the *fuel Solenoid* at diesel and gas engine is that at diesel engines the fuel solenoid is activated **prior to the starter motor**,

	whereas at gas engines it is **not activated until the gen-set reaches 30RPM**. **CAUTION!** It is strongly recommended to use pickup sensor for gas engines.

Setpoint: FuelSol offset

Group	Engine Params
Range [units]	-5.0 .. 5.0 [s]
Related FW	3.1.0
Description	This setpoint is used for fine adjustment of the moment when the *Fuel Solenoid* output is activated. The time is related to the activation of the *Starter* output, where negative values mean the fuel solenoid is activated in advance to the starter motor and positive values mean the fuel solenoid is delayed after the starter motor. **NOTE:** This setpoint is taken into accout at diesel engines only, i.e. if the setpoint *Fuel solenoid* is set to DIESEL ENGINE.

Setpoint: D+ Function

Group	Engine Params
Range [units]	ENABLED,CHRGFAIL,DISABLED [-]
Related FW	3.1.0
Description	This setpoint adjusts the function of the D+ terminal. **ENABLED**: The D+ terminal is used for running engine detection as well as for charger failure alarm detection. **CHRGFAIL**: The D+ terminal is used for charger failure alarm detection only. **DISABLED**: The D+ terminal is not used. **NOTE:** Some alternators provide a terminal labelled as "L" instead of "D+". It is not possible to connect this "L" terminal to the "D+" terminal of the controller.

Setpoint: Bin selector 1

Group	Engine params
Range [units]	OFF, ON [-]
Related FW	3.1.0
Force value possible	YES

Description	The setpoint is used to switch on and off the output *Bin selector 1*.

Setpoint: Bin selector 2

Group	Engine params
Range [units]	OFF, ON [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used to switch on and off the output *Bin selector 2*.

Setpoint: Bin selector 3

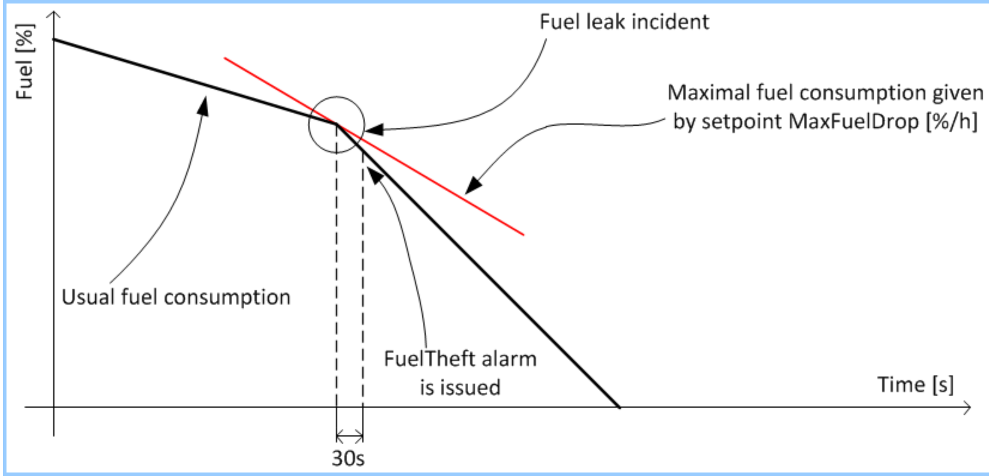
Group	Engine params
Range [units]	OFF, ON [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used to switch on and off the output *Bin selector 3*.

Setpoint: Bin selector 4

Group	Engine params
Range [units]	OFF, ON [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint is used to switch on and off the output *Bin selector 4*.

Setpoint: MaxFuelDrop

Group	Engine params
Range [units]	OFF, 1 .. 50 [%/h]
Related FW	3.1.0
Description	This setpoint adjusts the maximal allowed drop of the fuel level within one hour. If measured drop is higher then *Fuel theft* alarm is issued. The setpoint should be adjusted according to the maximal hour fuel rate of the engine and capacity of the tank. **NOTE:** The logical analog input *Fuel level* must be configured onto the physical analog

	input where fuel level sensor is connected. **EXAMPLE:** A 100kW engine has specific fuel rate of 180g/kWh. Fuel tank capacity is 200l. The hour fuel rate at nominal power is then 100 * 180 = 18000g per hour, what is about 21 litres (density cca 830g/l => 18000/830 = 21). The maximal hour rate is then about 10% of the tank capacity, so optimal adjustment for this case will be 15% (with certain reserve). 

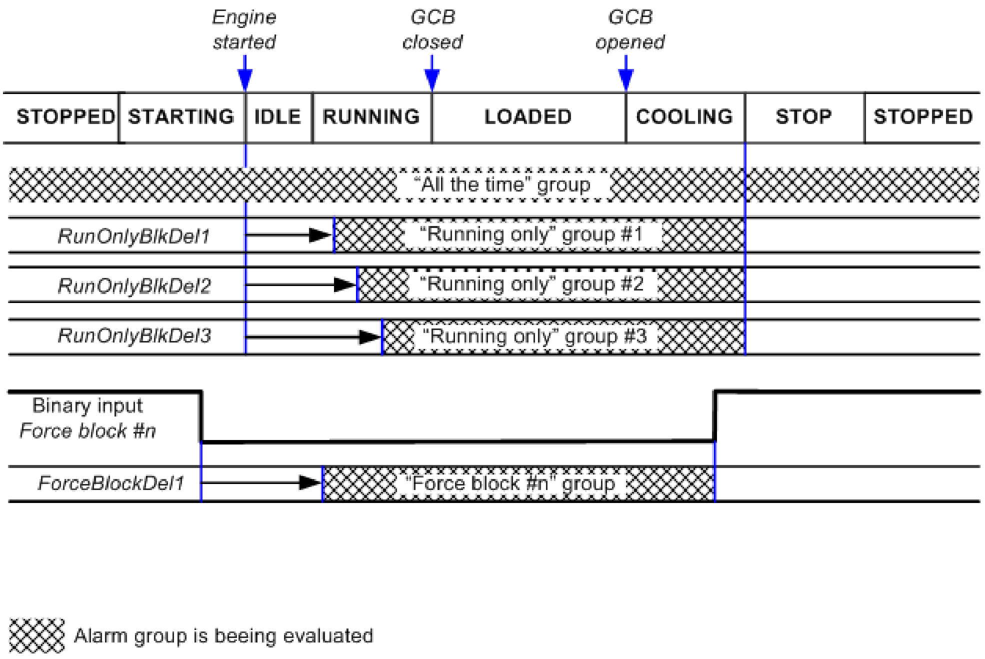
Group: Engine protect

Setpoint: Horn Timeout

Group	Engine Protect
Range [units]	OFF, 1s - 3600s, NO TIMEOUT [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts time after which the *Horn* output is automatically deactivated although the alarms still haven't been reset. If the setpoint is adjusted to OFF the horn output is not activated at all, the NO TIMEOUT position means the horn output is not deactivated until the alarms are reset.

Setpoint: RunOnlyBlkDel1

Group	Engine protect
Range [units]	0.0 .. 3000.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the delay after engine start when the alarms configured as *RunOnlyBlkDel1* (i.e. "running only", group #1) are started to be evaluated. The "running only" alarms are not beeing evaluated while the engine is not running or then, after start, while the adjusted delay is running.

	 ALARM GROUPS ACCORDING TO BLOCKING TYPE

Setpoint: RunOnlyBlkDel2

Group	Engine protect
Range [units]	0.0 .. 3000.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the delay after engine start when the alarms configured as *RunOnlyBlkDel2* (i.e. "running only", group #2) are started to be evaluated. The "running only" alarms are not beeing evaluated while the engine is not running or then, after start, while the adjusted delay is running. See the setpoint *RunOnlyBlkDel1* for diagram of alarm groups and their blocking periods.

Setpoint: RunOnlyBlkDel3

Group	Engine protect
Range [units]	0.0 .. 3000.0 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the delay after engine start when the alarms configured as *RunOnlyBlkDel3* (i.e. "running only", group #3) are started to be evaluated. The "running only" alarms are not beeing evaluated while the engine is not running or then, after start, while the adjusted delay is running. See the setpoint *RunOnlyBlkDel1* for diagram of alarm groups and their blocking

	periods.

Setpoint: BinInp delay 1

Group	Engine protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the delay #1 which can be assigned to an input configured as alarm input (protection). **NOTE:** Protections configured at a binary inputs can have either fixed 0.5s evaluation delay or there are three independent delay setpoints and one of them can be assigned to each particular binary input protection.

Setpoint: BinInp delay 2

Group	Engine protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the delay #2 which can be assigned to an input configured as alarm input (protection). **NOTE:** Protections configured at a binary inputs can have either fixed 0.5s evaluation delay or there are three independent delay setpoints and one of them can be assigned to each particular binary input protection.

Setpoint: BinInp delay 3

Group	Engine protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the delay #3 which can be assigned to an input configured as alarm input (protection). **NOTE:** Protections configured at a binary inputs can have either fixed 0.5s evaluation delay or there are three independent delay setpoints and one of them can be assigned to each particular binary input protection.

Setpoint: ForceBlockDel1

Group	Engine protect
Range [units]	0.0 .. 60.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the delay after the binary input *Force block 1* has been deactivated, when the alarms configured as *Force block #1* are started to be evaluated.

Setpoint: ForceBlockDel2

Group	Engine protect
Range [units]	0.0 .. 60.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the delay after the binary input *Force block 2* has been deactivated, when the alarms configured as *Force block #2* are started to be evaluated.

Setpoint: ForceBlockDel3

Group	Engine protect
Range [units]	0.0 .. 60.0 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the delay after the binary input *Force block 3* has been deactivated, when the alarms configured as *Force block #3* are started to be evaluated.

Setpoint: ResetActAlarms

Group	Engine protect
Range [units]	[-]
Related FW	3.1.0
Description	

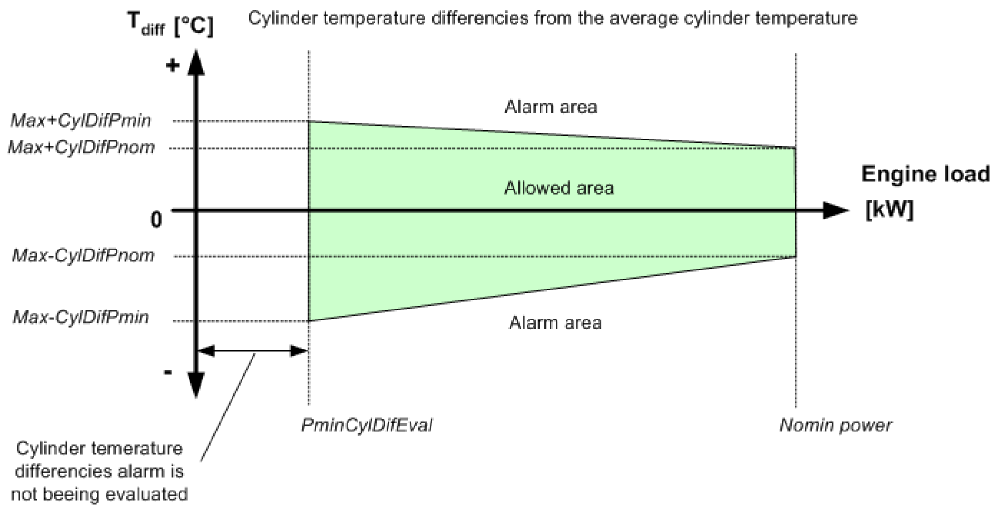
DISABLED	Pressing of the fault reset button (at any terminal or external button) resets only **inactive** alarms. Active alarms remain in the alarmlist unchanged and must be reset again when they become inactive.
ENABLED	Pressing of the fault reset button (at any terminal or external button) resets **all** alarms that are currently present in the alarm list. Inactive alarms disappear from the alarm list immediately, active alarms are changed to "confirmed" state and disappear when the alarm condition disappear or the alarm starts to be

	blocked. **NOTE:** ENABLED position corresponds to the method how the IG-classic and IS-classic controllers handled the alarms.

Setpoint: Overspeed

Group	Engine Protect
Range [units]	0 .. 200 [%]
Related FW	3.1.0
Description	This setpoint adjusts the threshold level for overspeed protection. **NOTE:** The overspeed protection is evaluated all the time and without any delay.

Setpoint: Max+CylDifPmin

Group	Engine protect
Range [units]	-32000 .. +32000 [°C]
Related FW	3.1.0
Description	This setpoint adjusts the maximum allowed **positive** difference between a particular cylinder temperature and average cylinder temperature **at minimum power** level adjusted by setpoint *PminCylDifEval*. This setpoint is one of four setpoints that define the allowed area of cylinder temperature differencies depending on gen-set power. See the picture below.  ALLOWED AREA OF CYLINDER TEMPERATURE DIFFERENCIES DEPENDING ON GENSET POWER If the difference of actual cylinder temperature from the average temperature is out of the allowed range at one or more cylinders the alarm *Wrn CylTemp* is issued after the delay *CylDifEvalDel* elapses. The alarm is intended for detection that

	there is a problem with combustion at the particular cylinders. **NOTE:** Logical analog inputs *Cyl temp "n"* must be configured onto the appropriate physical analog inputs where the cylinder temperature sensors are connected. Use the "Cylinder temperature configuration wizard" in GenConfig - Analog inputs tab for easy configuration of cylinder temperature sensors. **NOTE:** The cylinder temperature difference protection is available in IS-NT only.

Setpoint: Max-CylDifPmin

Group	Engine protect
Range [units]	-32000 .. +32000 [°C]
Related FW	3.1.0
Description	This setpoint adjusts the maximum allowed **negative** difference between a particular cylinder temperature and average cylinder temperature **at minimum power** level adjusted by setpoint *PminCylDifEval*. This setpoint is one of four setpoints that define the allowed area of cylinder temperature differencies depending on gen-set power. See the setpoint *Max+CylDifPmin* for more details.

Setpoint: Max+CylDifPnom

Group	Engine protect
Range [units]	-32000 .. +32000 [°C]
Related FW	3.1.0
Description	This setpoint adjusts the maximum allowed **positive** difference between a particular cylinder temperature and average cylinder temperature **at nominal power**. This setpoint is one of four setpoints that define the allowed area of cylinder temperature differencies depending on gen-set power. See the setpoint *Max+CylDifPmin* for more details.

Setpoint: Max-CylDifPnom

Group	Engine protect
Range [units]	-32000 .. +32000 [°C]
Related FW	3.1.0
Description	This setpoint adjusts the maximum allowed **negative** difference between a particular cylinder temperature and average cylinder temperature **at nominal power**. This setpoint is one of four setpoints that define the allowed area of cylinder temperature differencies depending on gen-set power. See the setpoint *Max+CylDifPmin* for more details.

Setpoint: PminCylDifEval

Group	Engine protect
Range [units]	0.0 .. *Nomin power* [kW]
Related FW	3.1.0
Description	This setpoint adjusts the gen-set power level below which the cylinder temperature difference protection is not evaluated. Learn more about this protection in the description of the setpoint *Max+CylDifPmin*.

Setpoint: CylDifEvalDel

Group	Engine protect
Range [units]	0 .. 600 [s]
Related FW	3.1.0
Description	This setpoint adjusts the evaluation delay of the cylinder temperature difference protection. Learn more about this protection in the description of the setpoint *Max+CylDifPmin*.

Setpoint: Service time 1

Group	Engine protect
Range [units]	0 .. 65535 [h]
Related FW	3.1.0
Description	This setpoint is used as maintenance interval counter #1. There are four independent maintenance interval counters, all of them work the same way - their values are decremented every hour while the gen-set is running and when the zero value is reached the related alarm is issued (i.e. *WrnServiceT1+2* or *WrnServiceT3+4*). The alarm remains active until the respective counter is readjusted back to nonzero value. Each of the maintenance intervals can be used for different type of regular maintenance works such as oil change, spark plug change etc. When the particular maintenance works have been performed, readjust the appropriate counter again to the period of next regular maintenance cycle. The counter will then count down again. The unused maintenance timers should be adjusted to maximal value, i.e. 65535.

Setpoint: Service time 2

Group	Engine protect
Range [units]	0 .. 65535 [h]
Related FW	3.1.0
Description	This setpoint is used as maintenance interval counter #2. There are four independent maintenance interval counters, all of them work the same way - their

	values are decremented every hour while the gen-set is running and when the zero value is reached the related alarm is issued (i.e. *WrnServiceT1+2* or *WrnServiceT3+4*). The alarm remains active until the respective counter is readjusted back to nonzero value. Each of the maintenance intervals can be used for different type of regular maintenance works such as oil change, spark plug change etc. When the particular maintenance works have been performed, readjust the appropriate counter again to the period of next regular maintenance cycle. The counter will then count down again. The unused maintenance timers should be adjusted to maximal value, i.e. 65535.

Setpoint: Service time 3

Group	Engine protect
Range [units]	0 .. 65535 [h]
Related FW	3.1.0
Description	This setpoint is used as maintenance interval counter #3. There are four independent maintenance interval counters, all of them work the same way - their values are decremented every hour while the gen-set is running and when the zero value is reached the related alarm is issued (i.e. *WrnServiceT1+2* or *WrnServiceT3+4*). The alarm remains active until the respective counter is readjusted back to nonzero value. Each of the maintenance intervals can be used for different type of regular maintenance works such as oil change, spark plug change etc. When the particular maintenance works have been performed, readjust the appropriate counter again to the period of next regular maintenance cycle. The counter will then count down again. The unused maintenance timers should be adjusted to maximal value, i.e. 65535.

Setpoint: Service time 4

Group	Engine protect
Range [units]	0 .. 65535 [h]
Related FW	3.1.0
Description	This setpoint is used as maintenance interval counter #4. There are four independent maintenance interval counters, all of them work the same way - their values are decremented every hour while the gen-set is running and when the zero value is reached the related alarm is issued (i.e. *WrnServiceT1+2* or *WrnServiceT3+4*). The alarm remains active until the respective counter is readjusted back to nonzero value. Each of the maintenance intervals can be used for different type of regular maintenance works such as oil change, spark plug change etc. When the particular maintenance works have been performed, readjust the

	appropriate counter again to the period of next regular maintenance cycle. The counter will then count down again. The unused maintenance timers should be adjusted to maximal value, i.e. 65535.

Group: Analog protect

Setpoint: Batt >V

Group	Analog protect
Range [units]	8.0 .. 40.0 [V]
Related FW	3.1.0
Description	This setpoint adjusts the warning level for battery overvoltage alarm.

Setpoint: Batt <V

Group	Analog protect
Range [units]	8.0 .. 40.0 [V]
Related FW	3.1.0
Description	This setpoint adjusts the warning level for battery undervoltage alarm.

Setpoint: Batt volt del

Group	Analog protect
Range [units]	0 .. 600 [s]
Related FW	3.1.0
Description	This setpoint adjusts the delay for battery *overvoltage* and *undervoltage* alarms.

Group: Gener protect

Setpoint: OverldStrtEval

Group	Gener Protect
Range [units]	100 .. 200 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint specifies the power level relative to the *nominal power*, where the thermal overload protection starts to be evaluated. See the setpoint *2PovrldStEvDel* for more information about the thermal overload protection.

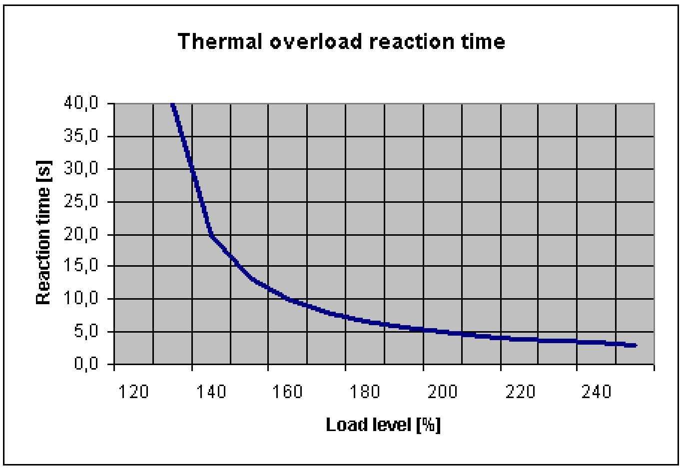
Setpoint: 2POvrldStEvDel

Group	Gener Protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the reaction time of the thermal overload protection if the load level is 200% of the base level given by the setpoint *OverldStrtEval*. The reaction time of the thermal overload protection is not fixed; it depends on how much is the load above the limit (base level). The higher is the load the shorter the reaction time will be.

Example: 2POvrldStEvDel = 5 s, OverldStrtEval = 120 %

$$\text{REACTION TIME [s]} = \frac{\text{2POvrldStEvDel [s]} \cdot (200 - \text{OverldStrtEval [\%]})}{\text{Engine load [\%]} - \text{OverldStrtEval [\%]}}$$

Load level [% of P_{nom}]	Reaction time [s]
100	no alarm
110	no alarm
120	3600,0
130	40,0
140	20,0
150	13,3
160	10,0
170	8,0
180	6,7
190	5,7
200	5,0
210	4,4
220	4,0
230	3,6
240	3,3
250	3,1



EXAMPLE OF THERMAL OVERLOAD PROTECTION CURVE

NOTE:
The thermal overload protection is *Breaker open and cool down (BOC)* type.

Setpoint: Min Power PtM

Group	Gener protect
Range [units]	1 .. 100 [%]
Related FW	3.1.0
Description	This setpoint is used for adjusting of the lower limit of the requested gen-set power in parallel to the mains operation. If the requested load (given by the active load control mode, e.g. Baseload, Import/Export etc.) is below this limit the requested load is limited to the level adjusted by this setpoint. The only situation, where the *Min Power PtM* is ignored, is the warming procedure after the gen-set is synchronized to the mains, i.e. the *Warming load* can be

	adjusted also below the sepoint *Min Power PtM*. This setpoint is also used as the requested load level if a protection of *Low power* type is active.

Setpoint: Ishort

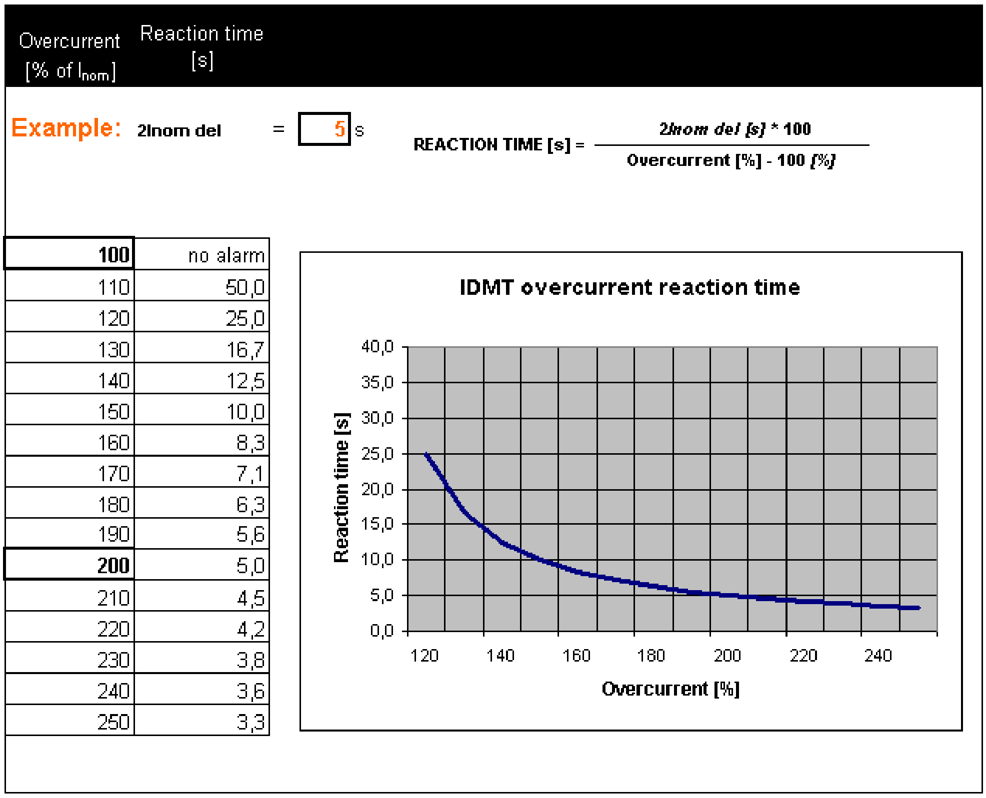
Group	Gener Protect
Range [units]	100 .. 500 [%]
Related FW	3.1.0
Description	This setpoint adjusts the threshold level (in % of the *nominal current*) for the generator fast overcurrent protection. The protection is activated (alarm *Ishort* is issued) when the generator current in at least one phase exceeds the threshold limit for time longer than *Ishort del*. **NOTE:** The protection type is *Breaker open and cool down* (BOC).

Setpoint: Ishort del

Group	Gener Protect
Range [units]	0.00 .. 10.00 [s]
Related FW	3.1.0
Description	This setpoint adjust the delay for generator fast overcurrent protection. The limit for the protection is adjusted by the setpoint *Ishort*. **NOTE:** Although the resolution of this setpoint is 0.01s, in fact the adjusted delay is rounded to the next higher multiple of the period of the generator voltage. The period is either 0.02s for 50Hz systems or 0.0166s for 60Hz systems. E.g. if the delay is set to 0.03s at 50Hz system the real delay will be 0.04s.

Setpoint: 2Inom del

Group	Gener Protect
Range [units]	1 .. 600.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the reaction time of the IDMT overcurrent protection if the overcurrent level is 200% of the *nominal current*. The reaction time of the IDMT overcurrent protection is not fixed; it depends on how much is the actual current above the limit (nominal). The higher is the overcurrent the shorter the reaction time will be.



EXAMPLE OF IDMT OVERCURRENT PROTECTION CURVE

NOTE:
The IDMT overcurrent protection is *Breaker open and cool down (BOC)* type.

Setpoint: Gen >V BOC

Group	Gener Protect
Range [units]	*Gen <V BOC* .. 150 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the generator overvoltage protection. The threshold is adjusted in % of the nominal generator voltage, which is either *GenNomV* or *GenNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection activates if the voltage in at least one phase gets over the threshold for time longer than *Gen V del*. **NOTE:** The asociated protection to this setpoint is *Breaker open and cool down (BOC)* type. There is also *Shutdown* overvoltage protection, which is adjusted by setpoint *Gen >V Sd*. **NOTE:** The BOC protections are active after the *Max stab time* elapsed or after the GCB was closed, then while the GCB is closed and then also during cooling (if *Cooling speed* = NOMINAL).

Setpoint: Gen <V BOC

Group	Gener Protect
Range [units]	20 .. *Gen >V BOC* [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the generator undervoltage protection. The threshold is adjusted in % of the nominal generator voltage, which is either *GenNomV* or *GenNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection activates if the voltage in at least one phase drops below the threshold for time longer than *Gen V del*. **NOTE:** The generator undervoltage protection is *Breaker open and cool down (BOC)* type. **NOTE:** The BOC protections are active after the *Max stab time* elapsed or after the GCB was closed, then while the GCB is closed and then also during cooling (if *Cooling speed* = NOMINAL).

Setpoint: Gen >V Sd

Group	Gener protect
Range [units]	50 .. 150 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the generator overvoltage **shutdown** protection. The threshold is adjusted in % of the nominal generator voltage, which is either *GenNomV* or *GenNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection activates if the voltage in at least one phase gets over the threshold for time longer than *Gen V del*. **NOTE:** The asociated protection to this setpoint is *Shutdown* type. There is also *Breaker open and cool down (BOC)* overvoltage protection, which is adjusted by setpoint *Gen >BOC*. **The BOC overvoltage protection is intended to be used as first level protection with lower threshold, whereas the shutdown one is intended as second level with higher threshold.**

Setpoint: Gen V del

Group	Gener protect
Range [units]	0.00 .. 600.00 [s]
Related FW	3.1.0
Description	The setpoint adjusts the delay for generator under- and overvoltage protections. The thresholds for these protections are adjusted by setpoints *Gen >V BOC*, *Gen <V BOC* and *Gen >V Sd*. **NOTE:** Although the resolution of this setpoint is 0.01s, in fact the adjusted delay is rounded to the next higher multiple of the period of the generator voltage. The period is either 0.02s for 50Hz systems or 0.0166s for 60Hz systems. E.g. if the delay is set to 0.03s at 50Hz system the real delay will be 0.04s.

Setpoint: Gen >f

Group	Gener Protect
Range [units]	*Gen <f* .. 150 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the generator overfrequency protection. The threshold is adjusted in % of the system frequency (*Nominal Freq* + *Nom frq offset*). The protection activates if the frequency in phase L3 gets over the threshold for time longer than *Gen f del*. **NOTE:** The generator overfrequency protection is *Breaker open and cool down (BOC)* type. **NOTE:** The BOC protections are active after the *Max stab time* elapsed or after the GCB was closed, then while the GCB is closed and then also during cooling (if *Cooling speed* = NOMINAL).

Setpoint: Gen <f

Group	Gener Protect
Range [units]	50 .. *Gen >f* [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the generator underfrequency protection. The threshold is adjusted in % of the system frequency (*Nominal Freq* + *Nom frq offset*).

	The protection activates if the frequency in phase L3 drops below the threshold for time longer than *Gen f del*. **NOTE:** The generator underfrequency protection is *Breaker open and cool down (BOC)* type. **NOTE:** The BOC protections are active after the *Max stab time* elapsed or after the GCB was closed, then while the GCB is closed and then also during cooling (if *Cooling speed* = NOMINAL).

Setpoint: Gen f del

Group	Gener Protect
Range [units]	0.00 .. 600.00 [s]
Related FW	3.1.0
Description	The setpoint adjusts the delay for generator under and overfrequency protections. The thresholds for these protections are adjusted by setpoints *Gen >f* and *Gen <f*. **NOTE:** Although the resolution of this setpoint is 0.01s, in fact the adjusted delay is rounded to the next higher multiple of the period of the generator voltage. The period is either 0.02s for 50Hz systems or 0.0166s for 60Hz systems. E.g. if the delay is set to 0.03s at 50Hz system the real delay will be 0.04s.

Setpoint: Reverse power

Group	Gener Protect
Range [units]	0 .. 50 [%]
Related FW	3.1.0
Description	This setpoint adjusts the threshold level for the generator reverse (negative) power protection. The threshold is adjusted in % of the generator *nominal power*. The protection activates if the generator power drops below the threshold for time longer than *ReversePwr del*. **NOTE:** The generator reverse power protection is *Breaker open and cool down (BOC)* type.

Setpoint: ReversePwr del

Group	Gener Protect
Range [units]	0 .. 600.0 [s]
Related FW	3.1.0
Description	The setpoint adjusts the delay for generator reverse power protection. The

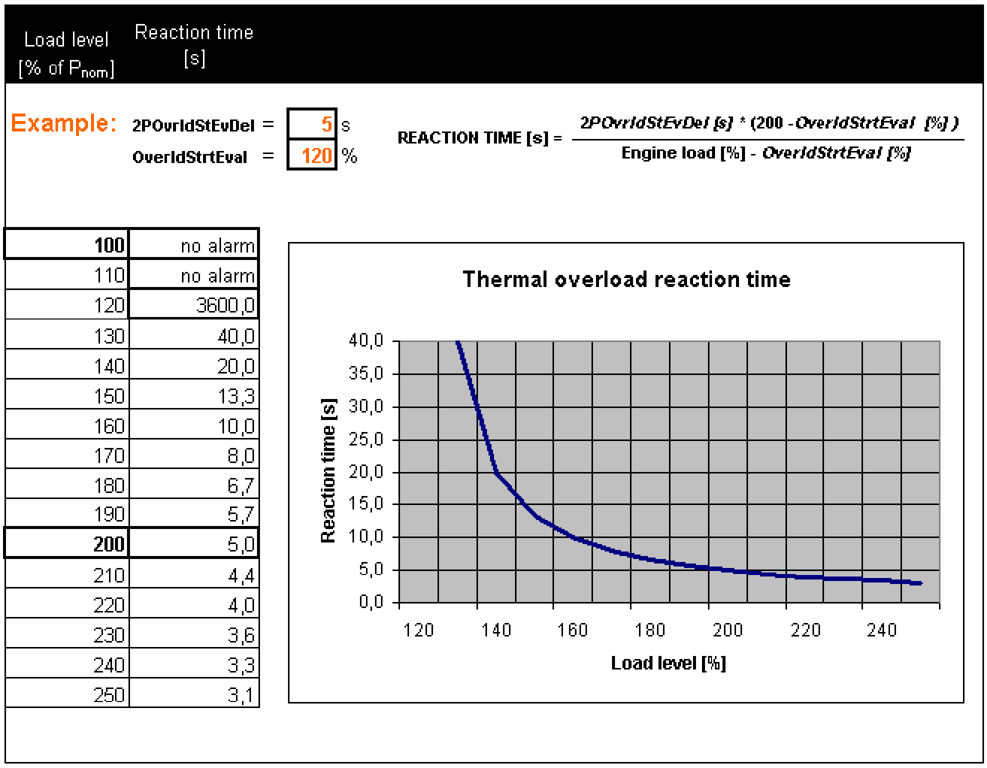
	threshold for the protection is adjusted by setpoint *Reverse power*.

Setpoint: Nom EthFltCurr

Group	Gener protect
Range [units]	0 .. 10000 [A]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjust the level of EarthFault Current when IDMT protection starts to get evaluated. Time of evaluation of this protection is given by the setpoint *2EthFltCur del*. When the EarthFault Current goes below the level given by *Nom EthFltCurr*, protection starts decreasing its thermal counter. For more information about this protection, refer to the setpoint *2EthFltCur del*.

Setpoint: 2EthFltCur del

Group	Gener protect
Range [units]	OFF, 0.1 .. 600.0 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the reaction time of the IDMT EarthFault Current protection if the current is 200% of the base level given by the setpoint *Nom EthFltCurr*. The reaction time of the IDMT EarthFault Current protection is not fixed; it depends on how much is the current above the limit (base level). The higher is the current the shorter the reaction time will be.



Load level [% of P_{nom}]	Reaction time [s]
100	no alarm
110	no alarm
120	3600,0
130	40,0
140	20,0
150	13,3
160	10,0
170	8,0
180	6,7
190	5,7
200	5,0
210	4,4
220	4,0
230	3,6
240	3,3
250	3,1

EXAMPLE OF IDMT CURRENT PROTECTION CURVE

NOTE:
The IDMT EarthFault Current protection is *Breaker open and cool down (BOC)* type.

NOTE:
This protection's internal counter accumulates and it starts continuously decreasing when the EarthFault Current goes below *Nom EthFltCurr*. This function prevents the protection from completely reseting when the EarthFault Current goes below *Nom EthFltCurr* for only a short period of time. This behavior emulates circuit-breaker with thermal current protection.

Setpoint: ExcitationLoss

Group	Gener protect
Range [units]	0 .. 150 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts excitation loss protection level. Corresponding level in kVA is calculated from *nominal power* of gen-set as a negative percentage given by this setpoint (e.g. this setpoint is adjusted to 50% and nominal power of gen-set is 200 kW, therefore excitation loss protection level is set to -100 kVAr) Delay for this protection is given by the setpoint *ExctLoss del*. This protection is breaker off and cooldown type. For more information on protection types please refer to the section Alarm types.

Setpoint: ExctLoss del

Group	Gener protect
Range [units]	OFF, 0.1 .. 600.0 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the delay for loss of excitation protection. Threshold of this protection is given by the setpoint *ExcitationLoss*.

Setpoint: Gen V unbal

Group	Gener protect
Range [units]	0 .. 200 [%]
Related FW	3.1.0
Description	This setpoint adjusts the threshold level for the generator voltage unbalance protection. The threshold is adjusted in % of the nominal generator voltage, which is either *GenNomV* or *GenNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection is *Breaker open and cool down* type and **is created in the default archive as universal analog protection** at the value *Gen V unbal*, which is calculated as maximum difference between two phase voltages. The protection activates if the voltage unbalance gets over the threshold for time longer than *Gen V unb del*. **NOTE:** The voltage unbalance protection is created in the default archive using the mechanism of *universal analog protections*. That means **this setpoint is one of general-purpose setpoints**, which may be used for different purpose if the protection is deleted from the configuration.

Setpoint: Gen V unb del

Group	Gener protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the delay for the generator voltage unbalance protection. The threshold for the protection is adjusted by setpoint *Gen V unbal*. **NOTE:** The generator voltage unbalance protection is created in the default archive using the mechanism of *universal analog protections*. That means **this setpoint is one of general-purpose setpoints**, which may be used for different purpose if the protection is deleted from the configuration.

Setpoint: Gen I unbal

Group	Gener protect
Range [units]	0 .. 200 [%]
Related FW	3.1.0
Description	This setpoint adjusts the threshold level for the generator current unbalance protection. The threshold is adjusted in % of the generator *nominal current*. The protection is *Breaker open and cool down* type and **is created in the default archive as universal analog protection** at the value *Gen I unbal*, which is calculated as maximum difference between two phase currents. The protection activates if the current unbalance gets over the threshold for time longer than *Gen I unb del*. **NOTE:** The current unbalance protection is created in the default archive using the mechanism of *universal analog protections*. That means **this setpoint is one of general-purpose setpoints**, which may be used for different purpose if the protection is deleted from the configuration.

Setpoint: Gen I unb del

Group	Gener protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the delay for the generator current unbalance protection. The threshold for the protection is adjusted by setpoint *Gen I unbal*. **NOTE:** The generator current unbalance protection is created in the default archive using the mechanism of *universal analog protections*. That means **this setpoint is one of general-purpose setpoints**, which may be used for different purpose if the protection is deleted from the configuration.

Group: Mains protect

Setpoint: Mains >V MP

Group	Mains protect
Range [units]	*Mains <V* .. 150 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the mains overvoltage protection. The threshold is adjusted in % of the nominal mains voltage, which is either *MainsNomV* or *MainsNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection activates if the voltage in at least one phase gets over the

	threshold for time longer than *Mains V del*. **NOTE:** The asociated protection to this setpoint is *Mains protect* type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of *Mains protect* type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).

Setpoint: Mains <V MP

Group	Mains protect
Range [units]	50 .. *Mains >V* [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the mains undervoltage protection. The threshold is adjusted in % of the nominal mains voltage, which is either *MainsNomV* or *MainsNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection activates if the voltage in at least one phase drops under the threshold for time longer than *Mains V del*. **NOTE:** The asociated protection to this setpoint is *Mains protect* type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of *Mains protect* type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).

Setpoint: Mains V del

Group	Mains protect
Range [units]	0.00 .. 600.00 [s]
Related FW	3.1.0
Description	The setpoint adjusts the delay for mains under- and overvoltage protections. The thresholds for these protections are adjusted by setpoints *Mains >V MP* and *Mains <V MP*. **NOTE:** Although the resolution of this setpoint is 0.01s, in fact the adjusted delay is rounded to the next higher multiple of the period of the mains voltage. The period is either 0.02s for 50Hz systems or 0.0166s for 60Hz systems. E.g. if the delay is set to 0.03s at 50Hz system the real delay will be 0.04s.

Setpoint: Mains Avg>V MP

Group	Mains protect

Range [units]	100.0 .. 150.0 [%]
Related FW	3.1.0
Description	This setpoint defines the trip level for mains overvoltage protection based on 10-minutes moving average of mains phase voltage. This protection is evaluated in each phase and is activated immediately when the moving average value exceeds limit adjusted by this setpoint.

Setpoint: Mains >f

Group	Mains protect
Range [units]	*Mains <f* .. 150.0 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the mains overfrequency protection. The threshold is adjusted in % of the system frequency (*Nominal Freq* + *Nom frq offset*). The protection activates if the frequency in phase L3 gets over the threshold for time longer than *Mains f del*. **NOTE:** The associated protection to this setpoint is *Mains protect* type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of *Mains protect* type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).

Setpoint: Mains <f

Group	Mains protect
Range [units]	50.0 .. *Mains >f* [% of system frequency (*Nominal Freq* + *Nom frq offset*)]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the threshold level for the mains underfrequency protection. The threshold is adjusted in % of the system frequency (*Nominal Freq* + *Nom frq offset*). The protection activates if the frequency in phase L3 drops under the threshold for time longer than *Mains f del*. **NOTE:** The associated protection to this setpoint is *Mains protect* type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of *Mains protect* type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled).

Setpoint: Mains f del

Group	Mains protect
Range [units]	0.00 .. 600.00 [s]
Related FW	3.1.0
Description	The setpoint adjusts the delay for mains under- and overfrequency protections. The thresholds for these protections are adjusted by setpoints *Mains >f* and *Mains <f*. **NOTE:** Although the resolution of this setpoint is 0.01s, in fact the adjusted delay is rounded to the next higher multiple of the period of the mains voltage. The period is either 0.02s for 50Hz systems or 0.0166s for 60Hz systems. E.g. if the delay is set to 0.03s at 50Hz system the real delay will be 0.04s.

Setpoint: VectorS prot

Group	Mains protect
Range [units]	DISABLED, PARALLEL ONLY, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint selects the function of the built-in vectorshift protection.

DISABLED	The vectorshift protection is disabled.
PARALLEL ONLY	The vectorshift protection is enabled only while the gen-set is running parallel to the mains, i.e. the both MCB and GCB are closed.
ENABLED	The vectorshift protection is active always while the MCB is closed, regardless of the GCB position.

NOTE:
The vectorshift protection is recorded into the history file, however it is not indicated in the Alarm list. When it occurs the controller opens either MCB or GCB depending on the setpoint *VS/ROCOF CB sel* (in SPI aplication GCB is always opened, *VS/ROCOF CB sel* setpoint is not available). If the MCB is not controlled in the particular application then GCB is opened.

NOTE:
If a vectorshift is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is then reclosed again after *Mains ret del*, as the mains is evaluated as healthy.

Setpoint: VS/ROCOF CBsel

Group	Mains protect
Range [units]	MCB, GCB [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint selects which breaker will be opened when the *vectorshift* or *ROCOF protection* is detected. **NOTE:** If the GCB is selected and a mains failure occurs the GCB will be opened immediately when the vectorshift or ROCOF is detected, however also MCB will be opened consequently due to other mains protection as underfrequency or undervoltage. **NOTE:** In Combi-SPI application GCB is always opened regardless of this setpoint. In Combi-SPI application controller controls only GCB.

Setpoint: VectorS limit

Group	Mains protect
Range [units]	1 .. 45 [°]
Related FW	3.1.0
Description	This setpoint adjusts the thershold level for the vectorshift protection. **NOTE:** To adjust this setpoint properly, check the value *Max VectorS*. The value is available on the controller screen, contains the maximal measured vectorshift value since the gen-set has been synchronized to the mains and after opening of GCB or MCB it is "frozen". In normal conditions the value should not be higher than 3° and the most common setting of the threshold is about 7°.

Setpoint: ROCOF prot

Group	Mains protect
Range [units]	DISABLED, PARALLEL ONLY, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint activates or deactivates ROCOF protection. See also setpoints *ROCOF Win*, *ROCOF df/dt* and *VS/ROCOF CB sel* (not available in SPI application).

Setpoint: ROCOF Win

Group	Mains protect
Range [units]	3 .. 30 [-]
Related FW	3.1.0
Description	This setpoint adjusts the averaging level for the ROCOF protection. It defines number of periods of the mains voltage in which the ROCOF protection is evaluated. The higher is the ROCOF Win the less sensitive is the protection for short oscillations of the frequency to both directions from the nominal value and the higher is the delay of evaluation.

Setpoint: ROCOF df/dt

Group	Mains protect
Range [units]	0.1 .. 10.0 [Hz/s]
Related FW	3.1.0
Description	This setpoint adjusts the trip level for ROCOF protection (Rate Of Change Of Frequency). The "filtration level" for the ROCOF protection is adjusted by setpoint *ROCOF Win*. **NOTE:** To activate or deactivate ROCOF protection use *ROCOF prot*. Choose proper breaker which will be opened if ROCOF protection activates by adjusting setpoint *VS/ROCOF CB sel* (not available in SPI application).

Setpoint: Mains V unbal

Group	Mains protect
Range [units]	0 .. 200 [%]
Related FW	3.1.0
Description	This setpoint adjusts the threshold level for the mains voltage unbalance protection. The threshold is adjusted in % of the nominal generator voltage, which is either *MainsNomV* or *MainsNomVph-ph*, depending on the position of the setpoint *FixVoltProtSel*. The protection **is created in the default archive as universal analog protection** at the value *Mains V unbal*, which is calculated as maximum difference between two mains phase voltages. The protection activates if the voltage unbalance gets over the threshold for time longer than *MainsV unb del*. **NOTE:** The associated protection to this setpoint is *Mains protect* type. This type of protection is recorded into the history file, however it is not indicated in the Alarm list. When a protection of *Mains protect* type occurs the controller opens either MCB (in applications where the MCB is controlled) or GCB (in applications where the MCB is not controlled). **NOTE:** The voltage unbalance protection is created in the default archive using the mechanism of *universal analog protections*. That means **this setpoint is one of**

	general-purpose setpoints, which may be used for different purpose if the protection is deleted from the configuration.

Setpoint: MainsV unb del

Group	Mains protect
Range [units]	0.0 .. 600.0 [s]
Related FW	3.1.0
Description	This setpoint adjusts the delay for the mains voltage unbalance protection. The threshold for the protection is adjusted by setpoint *Mains V unbal*. **NOTE:** The mains voltage unbalance protection is created in the default archive using the mechanism of *universal analog protections*. That means **this setpoint is one of general-purpose setpoints**, which may be used for different purpose if the protection is deleted from the configuration.

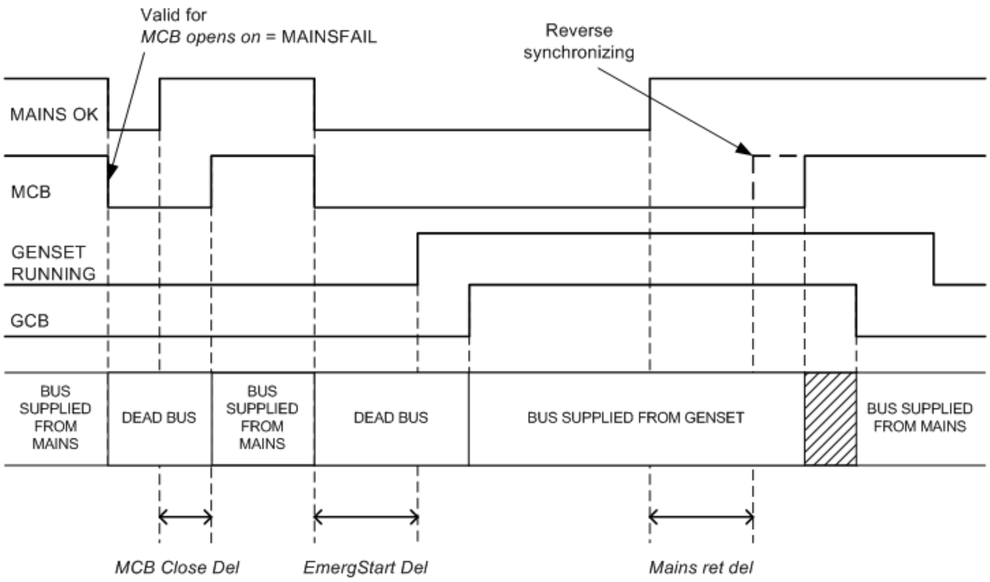
Group: AMF settings

Setpoint: EmergStart del

Group	AMF Settings
Range [units]	0 .. 600 [s]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint adjusts the delay of automatic gen-set start in AUT mode after the mains failed. See the setpoint *MCB close del* for a time diagram of all AMF-related delays. **NOTE:** Use the setpoint *MFStart enable* to enable/disable automatic start of the gen-set due to mains failure.

Setpoint: MCB Close del

Group	AMF Settings
Range [units]	0.0 .. 60.0 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the delay of automatic return from **dead bus** to **mains-powered bus** (i.e. closing of the MCB)after the mains restored. This delay applies if the mains failure duration is short and the gen-set has not been connected to the bus yet or if the gen-set is not running and supplying the bus from any other reason

	(failure, not in AUT etc.) **NOTE:** The delay of return from genset-powered bus to mains-powered bus (i.e. reverse synchronizing or changeover) is adjusted by setpoint *Mains ret del*.  AMF-RELATED DELAYS

Setpoint: MCB Opens on

Group	AMF Settings
Range [units]	MAINSFAIL, GEN RUN [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint selects the in which moment the MCB is opened after the mains failed. **MAINSFAIL**: The MCB is opened immediately when the mains failure is detected. This option expects the breaker is able to be controlled even there is no AC voltage at the moment, as the mains is failed and the genset is not running yet. Use this option for contators, for breakers equipped with undervoltage release coil or for breakers controlled by 24VDC. **GEN RUN**: The MCB open command is issued not until the gen-set is running and providing voltage (prior to GCB is closed!!). Use this option for AC controlled breakers. The wiring of the breaker control must be provided in such a way, that it automatically switches the AC control voltage either from the mains incomer (before MCB) or directly from the generator.

Setpoint: ReturnWithIntr

Group	AMF Settings
Range [units]	DISABLED,ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint adjusts behavior of the controller if the reverse synchronizing to the restored mains was not successful. **ENABLED**: If the reverse synchronization to the restored mains is not successful (i.e. *Sync fail* alarm is issued) the load is then transferred back to the mains by "changeover" sequence. **DISABLED**: The load remains to be supplied from the genset if the reverse synchronization is not successful. After the *Sync fail* alarm is reset the controller performs next attempt of reverse synchronization.

Setpoint: BreakerOverlap

Group	AMF Settings
Range [units]	0.0 .. 300.0 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint takes place in following situations: • **In AUT mode after reverse synchronization** if the gen-set will not continue in parallel operation. The setpoint adjusts the **maximum** time the both GCB and MCB breaker are closed together and the gen-set is beeing unloaded. The actual time can be shorter if the gen-set reaches the *GCB open level* earlier. The *GCB open del* does not take place. • **During the *Test on load* procedure, after forward synchronization**. The setpoint adjusts the **minimum** time the both GCB and MCB breakers are closed together and the load is beeing transferred from the mains to the gen-set. The actual time can be longer if the gen-set is not able to take over the load and fully unload the mains.

Setpoint: RetFromIsland

Group	AMF Settings
Range [units]	MANUAL, AUTO [-]
Related FW	3.1.0
Force value possible	YES
Description	The setpoint selects the behavior of the controller in the moment the GCB is

	closed to a dead bus (i.e. transition to the island operation). **MANUAL** — Controller remains in AUT mode and the manual return to Mains is done via MCB button. "Manual Restore" message is displayed in alarmlist to notify operator - it will disappear automatically after MCB close button is pushed (i.e. reverse synchronizing is started). **NOTE:** This option is intended for applications where the moment of reverse transfer of the load to the restored mains is to be controlled manually. Setting to MANUAL might be important only for applications with break transfers (with synchronizing disabled). **CAUTION!** If the controller is in MAN mode the MCB is **not closed** automatically when the mains is restored even if e.g. the gen-set has been stopped due to a failure. **AUTO** — The controller remains in AUT or TEST mode and the transfer of the load back to the mains is initiated automatically with delay adjusted by the setpoint *Mains ret del*.

Setpoint: ReturnTo mains

Group	AMF Settings
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint selects the behavior of the controler in TEST mode if the load is currently supplied from the gen-set and the mains has restored. **DISABLED** — The load remains to be supplied from the gen-set until the controller switched to different mode, e.g. to AUT mode., regardless of the fact that the mains is restored. **ENABLED** — When the mains has restored the gen-set is reverse-synchronized to the mains, then the load is transferred to the mains, GCB is opened and the gen-set remains running unloaded in TEST mode.

Setpoint: FwRet break

Group	AMF Settings
Range [units]	0.0 .. 60.0 [s]
Related FW	3.1.0
Force value possible	YES

Description	The setpoint adjusts the delay between the GCB is opened and consequently MCB is closed and vice versa changeover is used instead of synchronizing (i.e. synchronizing is disabled). This delay is also applied between MCB opening and GCB closing in TEST mode when the gen-set is running without load and then mains fails.

Setpoint: Mains ret del

Group	AMF Settings
Range [units]	0 .. 3600 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjust the delay of start of the reverse synchronizing (SPtM, Combi) or forward synchronizing (SPI) after the mains has recovered. See the setpoint *MCB close del* for the time diagram of all AMF-related delays.

Group: Sync/Load ctrl

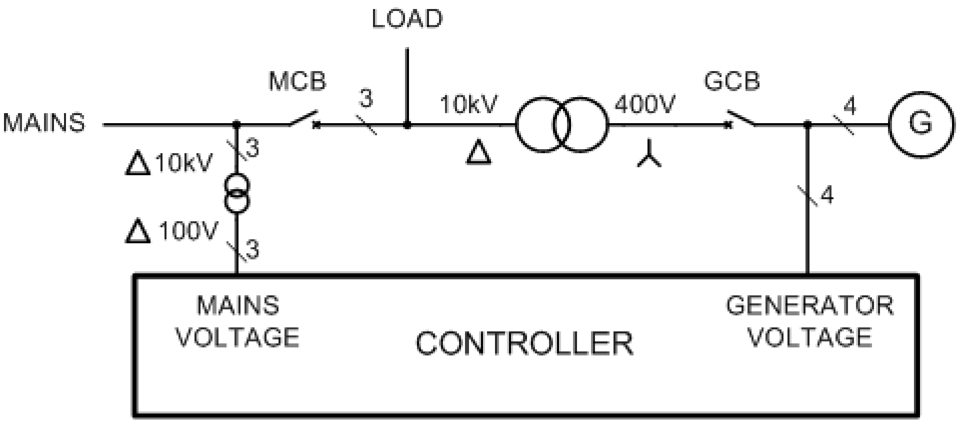
Setpoint: SpeedRegChar

Group	Sync/Load Ctrl
Range [units]	POSITIVE, NEGATIVE [-]
Related FW	3.1.0
Description	This setpoint selects the characteristic of the speed governor output of the controller. Adjust it according to the behavior of the remote speed input of your speed governor: **POSITIVE**: Select this option if raising of the voltage on the governor remote speed input causes engine speed to **raise**. **NEGATIVE**: Select this option if raising of the voltage on the governor remote speed input causes engine speed to **lower**.

Setpoint: Voltage window

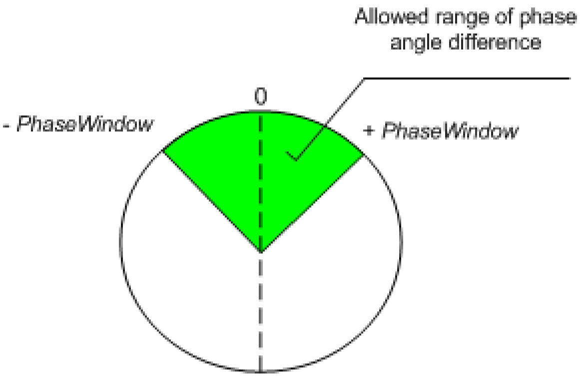
Group	Sync/Load Ctrl
Range [units]	0.0 .. 100.0 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts maximum difference between generator and mains/bus voltage in respective phases for voltage matching during synchronizing.

Setpoint: GtoM AngleReq

Group	Sync/Load ctrl
Range [units]	-45 .. 45 [°]
Related FW	3.1.0
Description	Requested angle between the phasors of the generator and mains voltage for synchronizing. This setpoint is intended for correction of the phase shift caused by a delta-triangle transformer located between the generator and mains voltage measuring points. In other situations the setpoint should be adjusted to 0. The diagram below shows a situation where the 230V/10kV triangle-delta transformer causes 30° phase shift between the primary and secondary side. That means when there is 0° phase difference at the both sides of the GCB the phase difference measured by the controller is 30°. Correct setting for this kind of wiring is then *GtoM AngleReq* = 30. 

Setpoint: Phase window

Group	Sync/Load Ctrl
Range [units]	0 .. 90 [°]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts maximum absolute value of difference between actual phase angle between the generator and mains/bus voltages for synchronizing. **NOTE:** To disable issuing the breaker close command (i.e. for test purpose) adjust this setpoint to 0. Synchronizing will continue until timeout occurs or the breaker is closed externally.

Setpoint: Dwell time

Group	Sync/Load Ctrl
Range [units]	0.0 .. 25.0 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the period of time that the phase angle difference must stay within +/-*Phase Window* and voltage difference within *Voltage Window* before the respective breaker, which is actually beeing synchronized, is closed.

Setpoint: Freq gain

Group	Sync/Load Ctrl
Range [units]	0.0 .. 200.0 [%]
Related FW	3.1.0
Description	This setpoint adjusts the gain factor (P-factor) of the frequency control PI loop. The integration factor (I-factor) for the frequency loop is adjusted by the setpoint *Freq int*. **NOTE:** See the chapter Regulation loops overview for general information about regulation loops and their adjustment.

Setpoint: Freq int

Group	Sync/Load Ctrl
Range [units]	0 .. 100 [%]
Related FW	3.1.0
Description	This setpoint adjusts the relative integration factor (I-factor) of the frequency control PI loop. The gain factor (P-factor) for the frequency loop is adjusted by the setpoint *Freq gain*.

Setpoint: Freq reg loop

Group	Sync/Load ctrl
Range [units]	ALL THE TIME, SYNC ONLY, GCB OPEN [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint selects when is the frequency regulation loop active. **SYNC ONLY**: The frequency regulation loop is active only during synchronizing to match the generator and mains frequencies together. It is assumed that in all other situations where the frequency is to be regulated the engine governor maintains it self. **NOTE:** This option is suitable for most governors. **ALL THE TIME**: SPtM, SPI, Combi: This option activates the frequency regulation loop also while the gen-set is running without load and during the island operation. The controller maintains frequency at it's nominal value adjusted by setpoint system frequency (*Nominal Freq* + *Nom frq offset*). **NOTE:** This option can be used e.g. for elimination of the droop at governors that do not support isochronous mode. **GCB OPEN**: MINT, COX: This option activates the frequency regulation loop also while the gen-set is running without load The controller maintains frequency at it's nominal value adjusted by the system frequency (*Nominal Freq* + *Nom frq offset*). The P and I factors of the frequency regulation loop are adjusted by setpoints *Freq gain* and *Freq int*.

Setpoint: Angle Gain

Group	Sync/Load Ctrl
Range [units]	0.0 .. 200.0 [%]
Related FW	3.1.0
Description	This setpoint is used for adjusting of the gain factor (P-factor) of the phase angle P-control loop. The synchronizing process contains two following steps: 1. The first step is to match the generator frequency to the mains frequency. In this step the frequency regulation loop (*Freq reg loop*) is active. 2. The following step is to match the phase angle difference of the mains and generator voltages to the setpoint *GtoM AngleReq*. The angle

	regulation loop is active in this step. As soon as the phase angle difference stays within the window adjusted by *Phase window* and the voltage difference stays in the *Voltage window*, both for period *Dwell time*, the circuit breaker closing command is issued. **NOTE:** See the chapter Regulation loops overview for general information about regulation loops and their adjustment.

Setpoint: Speed gov bias

Group	Sync/Load Cont
Range [units]	*SpeedGovLowLim* .. *SpeedGovHiLim* [V]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the initial voltage level for the speed governor output, which is present on the output, if no speed or power regulation loop is active.

Setpoint: SpdGovPWM rate

Group	Sync/Load ctrl
Range [units]	500 .. 3000 [Hz]
Related FW	3.1.0
Description	This setpoint adjusts the frequency of the speed governor output in PWM mode. The PWM mode of the speed governor output is activated by the jumper located next to the speed governor output terminals. The PWM interface is used for several governor types as e.g. CAT or Cummins. Adjust the PWM frequency according to the governor specification. **Adjust the setpoint to 1200Hz if the PWM interface is not used.**

Setpoint: SpeedGovLowLim

Group	Sync/Load Ctrl
Range [units]	-10.00 .. *SpeedGovHiLim* [V]
Related FW	3.1.0
Description	Lower limit of the speed governor output. Use this setpoint to adapt the governor output range to the input range of your governor.

Setpoint: SpeedGovHiLim

Group	Sync/Load Ctrl

Range [units]	*SpeedGovLowLim* .. 10.00 [V]
Related FW	3.1.0
Description	Upper limit of the speed governor output. Use this setpoint to adapt the governor output range to the input range of your governor.

Setpoint: TauSpeedActuat

Group	Sync/Load Ctrl
Range [units]	1.0 .. 300.0 [s]
Related FW	3.1.0
Description	This setpoint is used to adjust the trasformation ratio of the speed governor output to the pulses at the binary outputs *Speed up* and *Speed dn*. Adjust the setpoint to the pulse duration which is needed for the speed control device to travel from minimal position to the maximal position.

Setpoint: Load Ramp

Group	Sync/Load Ctrl
Range [units]	0 .. *GCB open del* [s]
Related FW	3.1.0
Force value possible	YES
Description	All changes of requested gen-set load (except in loadsharing mode) are not made as one step, but are ramped - i.e. the requested load is changing slowly with the rate adjusted by this setpoint. The rate is adjusted in seconds for 100% load change (from 0 to 100% of nominal power). The ramp takes place in following situations: • The gen-set has been just synchronized and is ramping up to the target load level (e.g. baseload in parallel to mains operation or average gen-set load in multiple loadsharing operation). The starting point of the ramp for this case is adjustable by the setpoint *RampStartLevel*. • The gen-set is running parallel to the mains and baseload is changed. • The gen-set is beeing unloaded before opening the GCB and stop. In this case the end load level is adjusted by setpoint *GCB Open Level* and the timeout for unloading is adjusted by setpoint *GCB Open Del*.

Setpoint: Load gain

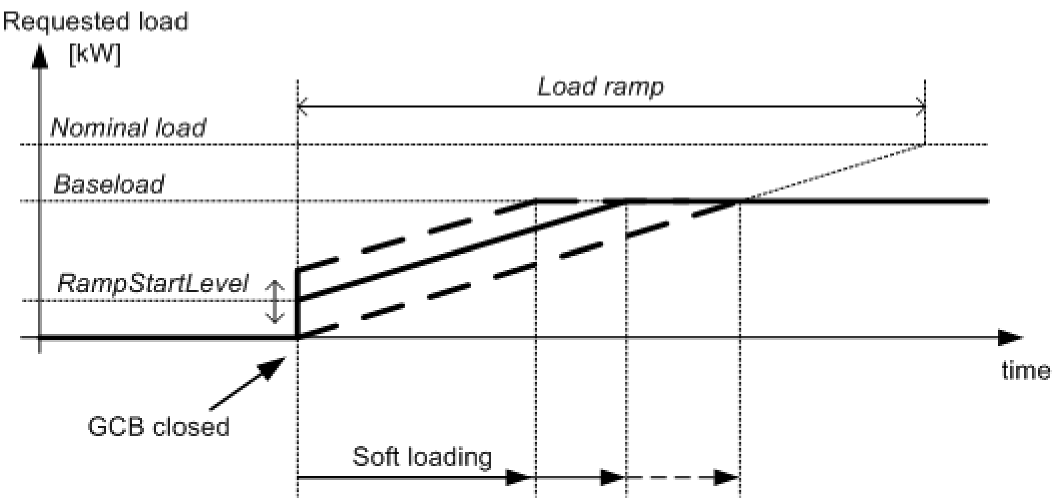
Group	Sync/Load Ctrl
Range [units]	0.0 .. 200.0 [%]
Related FW	3.1.0

Description	This setpoint adjusts the gain factor (P-factor) of the load control PI loop. The integration factor (I-factor) for the load control loop is adjusted by the setpoint *Load int*. **NOTE:** See the chapter Regulation loops overview for general information about regulation loops and their adjustment.

Setpoint: Load int

Group	Sync/Load Ctrl
Range [units]	0 .. 100 [%]
Related FW	3.1.0
Description	This setpoint adjusts the relative integration factor (I-factor) of the load control PI loop. The gain factor (P-factor) for the load control loop is adjusted by the setpoint *Load gain*.

Setpoint: RampStartLevel

Group	Sync/Load ctrl
Range [units]	0 .. 100 [%]
Related FW	3.1.0
Description	This setpoint adjusts the load level at which the *Load ramp* starts after the GCB has been closed. The intention of this setpoint is to give the gen-set certain "loading impulse" right after closing the GCB to avoid possible oscillations around 0kW or even reverse power if the ramp begun at 0kW. 

Setpoint: GCB open level

Group	Sync/Load Cont
Range [units]	0 .. 100 [%]

Related FW	3.1.0
Description	This setpoint adjusts the end point of the gen-set unloading ramp, i.e. power level at which the GCB is opened. If this level is not reached within time period adjusted by setpoint *GCB open del* the GCB is then opened regardless of the gen-set power. **NOTE:** The speed of the ramp is adjusted by the setpoint *Load ramp*.

Setpoint: GCB open del

Group	Sync/Load Ctrl
Range [units]	*Load ramp* .. 1800 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the maximum duration of the gen-set unloading ramp. If the end point of the ramp (*GCB open level*) is not reached within time period adjusted by this setpoint the GCB is then opened regardless of the gen-set power. **NOTE:** The speed of the ramp is adjusted by the setpoint *Load ramp*.

Setpoint: Sync timeout

Group	Sync/Load Ctrl
Range [units]	1 .. 1800, NO TIMEOUT [s]
Related FW	3.1.0
Description	This setpoint adjusts the maximum duration of forward or reverse synchronization. If the synchronizing is not successful within this period of time, the *Sync Timeout* or *RevSyncTimeout* alarm will be issued. **NOTE:** If the synchronizing is not successful within 1/10 of the *Sync timeout* or 60s (if *Sync timeout* <600s) the synchronization process is automatically restarted again, i.e. the speed governor output is reset to *bias* value and then frequency regulation loop is started again. If NO TIMEOUT is selected the automatic restart occurs every 180s. This method helps to sychronize successfully even in difficult conditions.

Group: Volt/PF ctrl

Setpoint: AVRRegChar

Group	Volt/PF Ctrl
Range [units]	POSITIVE, NEGATIVE [-]
Related FW	3.1.0

Description	This setpoint selects the characteristic of the AVRi output of the controller. Adjust it according to the behavior of the remote voltage adjustment input of your AVR: **POSITIVE** — Select this option if raising of the voltage on the remote voltage adjustment input causes the generator voltage to **raise**. **NEGATIVE** — Select this option if raising of the voltage on the remote voltage adjustment input causes the generator voltage to **lower**. **NOTE:** The characteristic can be also inverted by swapping the AVRi outputs that are connected to the AVR. However, it is recommended to use the *AVRRegChar* setpoint for selection of the characteristic instead of swapping the wires.

Setpoint: Voltage gain

Group	Volt/PF Ctrl
Range [units]	0.0 .. 200.0 [%]
Related FW	3.1.0
Description	This setpoint adjusts the gain factor (P-factor) of the voltage control PI loop. The integration factor (I-factor) for the voltage control loop is adjusted by the setpoint *Voltage int*. **NOTE:** See the chapter Regulation loops overview for general information about regulation loops and their adjustment.

Setpoint: Voltage Int

Group	Volt/PF Ctrl
Range [units]	0 .. 100 [%]
Related FW	3.1.0
Description	This setpoint adjusts the relative integration factor (I-factor) of the voltage control PI loop. The gain factor (P-factor) for the voltage control loop is adjusted by the setpoint *Voltage gain*.

Setpoint: PF gain

Group	Volt/PF Ctrl
Range [units]	0.0 .. 200.0 [%]
Related FW	3.1.0
Description	This setpoint adjusts the gain factor (P-factor) of the cos-phi control PI loop. The integration factor (I-factor) for the cos-phi control loop is adjusted by the setpoint *PF int*. **NOTE:**

	See the chapter Regulation loops overview for general information about regulation loops and their adjustment.

Setpoint: PF int

Group	Volt/PF Ctrl
Range [units]	0 .. 100 [%]
Related FW	3.1.0
Description	This setpoint adjusts the relative integration factor (I-factor) of the cos-phi control PI loop. The gain factor (P-factor) for the cos-phi control loop is adjusted by the setpoint *PF gain*.

Setpoint: AVR DCout bias

Group	Volt/PF Ctrl
Range [units]	0.0 .. 100.0 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the initial level for the AVRi output. This level is present on the output if no regulation loop is active. **NOTE:** The resulting voltage at the input of the AVR also depends on position of the trimmer at the AVRi module.

Setpoint: TauVoltActuat

Group	Volt/PF ctrl
Range [units]	1.0 .. 300.0 [s]
Related FW	3.1.0
Description	This setpoint is used to adjust the trasformation ratio of the AVRi output to the pulses at the binary outputs *AVR up* and *AVR dn*. Adjust the setpoint to the pulse duration which is needed for the AVR to change the requested voltage from minimum to maximum.

Group: Force value

Setpoint: Force value 1

Group	Force value
Range [units]	[-]
Related FW	3.1.0

Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 2

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 3

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching

	dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 4

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 5

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 6

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 7

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 8

Group	Force value
Range [units]	[-]

Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 9

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 10

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*.

	NOTE: It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 11

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 12

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function

	blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 13

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 14

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 15

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: Force value 16

Group	Force value
Range [units]	[-]
Related FW	3.1.0
Description	This is one of the 16 setpoints reserved for using as alternative setpoints for the force value functions. The alternative setpoint is to be assigned to a particular force value function and renamed in GenConfig. See also the input *Force value 1*. **NOTE:** It is not obligatory to use one of these reserved setpoints for a force value function. It is possible to use also any other setpoint or value with matching dimension and decimal resolution. **NOTE:** There isn't any relation between the default names of the force value function blocks, associated binary inputs and the default names of the reserved setpoints. In other words, the setpoint with default name *Force value 3* is **not related** to the *Force value 3* function block.

Setpoint: ExtValue1deflt

Group	Force value
Range [units]	-32000 .. 32000 [x]
Related FW	3.1.0
Force value	YES

possible	
Description	This setpoint adjusts the reset (initial) value of the *ExtValue 1*. This initial value is applied either when the controller is powered-on or when the *ExtValue 1* is reset by the binary input *ExtValue1reset*.

Setpoint: ExtValue1LoLim

Group	Force value
Range [units]	-32000 .. *ExtValue1HiLim* [X]
Related FW	3.1.0
Description	This setpoint adjusts the low limit of the value of *ExtValue 1* if the value is lowered/raised by the binary inputs *ExtValue1 up* and *ExtValue1 down*. The *ExtValue 1* is never lowered below this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 1* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue1HiLim

Group	Force value
Range [units]	*ExtValue1LoLim* .. 32000 [X]
Related FW	3.1.0
Description	This setpoint adjusts the high limit of the value of *ExtValue 1* if the value is lowered/raised by the binary inputs *ExtValue1 up* and *ExtValue1 down*. The *ExtValue 1* is never raised over this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 1* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue1 rate

Group	Force value
Range [units]	1 .. 10000 [X/s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the rate pre second at which the *ExtValue 1* is beeing

	changed while the input *ExtValue1 up* or *ExtValue1 down* is active.

Setpoint: ExtValue2deflt

Group	Force value
Range [units]	-32000 .. 32000 [x]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the reset (initial) value of the *ExtValue 2*. This initial value is applied either when the controller is powered-on or when the *ExtValue 2* is reset by the binary input *ExtValue2reset*.

Setpoint: ExtValue2LoLim

Group	Force value
Range [units]	-32000 .. *ExtValue2HiLim* [X]
Related FW	3.1.0
Description	This setpoint adjusts the low limit of the value of *ExtValue 2* if the value is lowered/raised by the binary inputs *ExtValue2 up* and *ExtValue2 down*. The *ExtValue 2* is never lowered below this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 2* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue2HiLim

Group	Force value
Range [units]	*ExtValue2LoLim* .. 32000 [X]
Related FW	3.1.0
Description	This setpoint adjusts the high limit of the value of *ExtValue 2* if the value is lowered/raised by the binary inputs *ExtValue2 up* and *ExtValue2 down*. The *ExtValue 2* is never raised over this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 2* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue2 rate

Group	Force value
Range [units]	1 .. 10000 [X/s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the rate pre second at which the *ExtValue 2* is beeing changed while the input *ExtValue2 up* or *ExtValue2 down* is active.

Setpoint: ExtValue3deflt

Group	Force value
Range [units]	-32000 .. 32000 [x]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the reset (initial) value of the *ExtValue 3*. This initial value is applied either when the controller is powered-on or when the *ExtValue 3* is reset by the binary input *ExtValue3reset*.

Setpoint: ExtValue3LoLim

Group	Force value
Range [units]	-32000 .. *ExtValue3HiLim* [X]
Related FW	3.1.0
Description	This setpoint adjusts the low limit of the value of *ExtValue 3* if the value is lowered/raised by the binary inputs *ExtValue3 up* and *ExtValue3 down*. The *ExtValue 3* is never lowered below this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 3* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue3HiLim

Group	Force value
Range [units]	*ExtValue3LoLim* .. 32000 [X]
Related FW	3.1.0
Description	This setpoint adjusts the high limit of the value of *ExtValue 3* if the value is lowered/raised by the binary inputs *ExtValue3 up* and *ExtValue3 down*. The

	ExtValue 3 is never raised over this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 3* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue3 rate

Group	Force value
Range [units]	1 .. 10000 [X/s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the rate pre second at which the *ExtValue 3* is beeing changed while the input *ExtValue3 up* or *ExtValue3 down* is active.

Setpoint: ExtValue4deflt

Group	Force value
Range [units]	-32000 .. 32000 [x]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the reset (initial) value of the *ExtValue 4*. This initial value is applied either when the controller is powered-on or when the *ExtValue 4* is reset by the binary input *ExtValue4reset*.

Setpoint: ExtValue4LoLim

Group	Force value
Range [units]	-32000 .. *ExtValue4HiLim* [X]
Related FW	3.1.0
Description	This setpoint adjusts the low limit of the value of *ExtValue 4* if the value is lowered/raised by the binary inputs *ExtValue4 up* and *ExtValue4 down*. The *ExtValue 4* is never lowered below this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 4* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue4HiLim

Group	Force value
Range [units]	*ExtValue4LoLim* .. 32000 [X]
Related FW	3.1.0
Description	This setpoint adjusts the high limit of the value of *ExtValue 4* if the value is lowered/raised by the binary inputs *ExtValue4 up* and *ExtValue4 down*. The *ExtValue 4* is never raised over this limit. **NOTE:** This limit is not taken into account if the value *ExtValue 4* is written remotely from a terminal using the appropriate command *ExtValue #n*. **NOTE:** For IS-NT only.

Setpoint: ExtValue4 rate

Group	Force value
Range [units]	1 .. 10000 [X/s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint adjusts the rate pre second at which the *ExtValue 4* is beeing changed while the input *ExtValue4 up* or *ExtValue4 down* is active.

Group: Load shedding

Setpoint: Ld shed active

Group	Load shedding
Range [units]	DISABLED, ISLAND ONLY, ISL+TRIP PARAL, ALL THE TIME [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used for adjustment when the load shedding function will be active (see also IM-NT-MCB/MGCB help for more information on MCB/MGCB).

DISABLED	The Load shedding function is disabled. All the outputs are open.
ISLAND ONLY	In Island operation (e.g. MCB is open and MGCB is closed) Load shedding outputs (e.g. *LdShed stage 1*) are controlled by load shedding function.
ISL+TRIP PARAL	This setting adjusts the same behavior as ISLAND

	<table><tr><td></td><td>ONLY but in addition to it all load shedding outputs are closed when gen-set group goes to island operation. For more information see the chapter Load shedding.</td></tr><tr><td>**ALL THE TIME**</td><td>Outputs are controlled by the load shedding function regardless of breaker positions.</td></tr></table> **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Setpoint: Ld shed level

Group	Load shedding
Range [units]	*Ld recon level* .. 200 [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to adjust the relative load level (in % of *nominal power* of gen-set) for load shedding. When the relative load level exceeds this level for more than *Ld shed delay* time the next load shedding output is closed. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Setpoint: Ld shed delay

Group	Load shedding
Range [units]	0.0 .. 600.0 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to adjust time period the relative load level must be above the *Ld shed level* limit to close the next load shedding output. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Setpoint: Ld recon level

Group	Load shedding
Range [units]	0 .. *Ld shed level* [%]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to adjust the relative load level (in % of *nominal power* of

	gen-set) for load reconnection. When the relative load level drops below this level for more than *Ld recon delay* time the next load can be reconnected back. The appropriate load shedding output is either opened automatically when the condition above is fulfiled (*AutoLd recon* = ENABLED) or manually by activation of the input *ManualLdRecon*. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Setpoint: Ld recon del

Group	Load shedding
Range [units]	0 .. 600 [s]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to adjust time period the relative load level must be below the *Ld recon level* limit to allow reconnection of next load group. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Setpoint: AutoLd recon

Group	Engine Protect
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint selects whether the reconnection of the load occurs automatically when the relative load level stays below the *reconnection limit* for a period of the *reconnection delay* or the reconnection must be initiated manually by the input *ManualLdRecon*. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Group: Timer settings

Setpoint: Timer channel 1

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel #1*. Output from this channel

	is available in the combined output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 2

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel #2*. Output from this channel is available in the combined output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 3

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel #3*. Output from this channel is available in the combined output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 4

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel #4*. Output from this channel is available in the combined output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 5

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0

Description	This setpoint adjusts the mode of the *Timer channel* #5. Output from this channel is available in the combined output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 6

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel* #6. Output from this channel is available in the combined output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 7

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel* #7. Output from this channel is available in the combined output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 8

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel* #8. Output from this channel is available in the combined output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 9

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0

Description	This setpoint adjusts the mode of the *Timer channel #9*. Output from this channel is available in the combined output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 10

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel #10*. Output from this channel is available in the combined output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 11

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel #11*. Output from this channel is available in the combined output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 12

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel #12*. Output from this channel is available in the combined output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 13

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0

Description	This setpoint adjusts the mode of the *Timer channel #13*. Output from this channel is available in the combined output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 14

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel #14*. Output from this channel is available in the combined output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 15

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel #15*. Output from this channel is available in the combined output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Setpoint: Timer channel 16

Group	Timer settings
Range [units]	[-]
Related FW	3.1.0
Description	This setpoint adjusts the mode of the *Timer channel #16*. Output from this channel is available in the combined output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Group: Act. calls/SMS

Setpoint: History record

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]

Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as *History record* occurs. See the chapter Alarm management for more information about protection types. **NOTE:** As the *History record* protection does not appear in the alarmlist, the SMS or e-mail may contain empty alarmlist.

Setpoint: Alarm only

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as *Alarm only* occurs. See the chapter Alarm management for more information about protection types.

Setpoint: Warning

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a *warning*-type protection occurs. See the chapter Alarm management for more information about protection types.

Setpoint: Off load

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a

	"protection" configured as *Off load* occurs. See the chapter Alarm management for more information about protection types. **NOTE:** As the *Off load* protection does not appear in the alarmlist, the SMS or e-mail may contain empty alarmlist.

Setpoint: BrkOpen&CoolDn

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a *BrkOpen&CoolDn*-type alarm occurs. See the chapter Alarm management for more information about protection types.

Setpoint: Mains protect

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a "protection" configured as *Mains protect* occurs. See the chapter Alarm management for more information about protection types. **NOTE:** As the *Mains protect* protection does not appear in the alarmlist, the SMS or e-mail may contain empty alarmlist.

Setpoint: Slow stop

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a *Slow stop*-type alarm occurs. See the chapter Alarm management for more information about protection types.

Setpoint: Shutdown

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a *Shutdown*-type alarm occurs. See the chapter Alarm management for more information about protection types.

Setpoint: ShutdownOvr

Group	Act. calls/SMS
Range [units]	DISABLED, ENABLED [-]
Related FW	3.1.0
Force value possible	YES
Description	This setpoint is used to enable sending SMS and/or e-mail alerts when a *Sd Override*-type alarm occurs. See the chapter Alarm management for more information about protection types.

Setpoint: AcallCH1-Type

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to specify the alert type of the active calls - channel 1. See the chapter Alarm messaging for more details.

Setpoint: AcallCH1-Addr

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to specify the recipient address for the active calls - channel 1. The content of the address must correspond to the selected alert type (e.g. it must contain e-mail address if the alert type is e-mail). See the chapter Alarm messaging for more details.

Setpoint: AcallCH2-Type

Group	Act. calls/SMS

Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to specify the alert type of the active calls - channel 2. See the chapter Alarm messaging for more details.

Setpoint: AcallCH2-Addr

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to specify the recipient address for the active calls - channel 2. The content of the address must correspond to the selected alert type (e.g. it must contain e-mail address if the alert type is e-mail). See the chapter Alarm messaging for more details.

Setpoint: AcallCH3-Type

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to specify the alert type of the active calls - channel 3. See the chapter Alarm messaging for more details.

Setpoint: AcallCH3-Addr

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to specify the recipient address for the active calls - channel 2. The content of the address must correspond to the selected alert type (e.g. it must contain e-mail address if the alert type is e-mail). See the chapter Alarm messaging for more details.

Setpoint: AcallCH4-Type

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to specify the alert type of the active calls - channel 4. See the chapter Alarm messaging for more details.

Setpoint: AcallCH4-Addr

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to specify the recipient address for the active calls - channel 4. The content of the address must correspond to the selected alert type (e.g. it must contain e-mail address if the alert type is e-mail). See the chapter Alarm messaging for more details.

Setpoint: AcallCH5-Type

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to specify the alert type of the active calls - channel 5. See the chapter Alarm messaging for more details.

Setpoint: AcallCH5-Addr

Group	Act. calls/SMS
Range [units]	[-]
Related FW	3.1.0
Description	The setpoint is used to specify the recipient address for the active calls - channel 5. The content of the address must correspond to the selected alert type (e.g. it must contain e-mail address if the alert type is e-mail). See the chapter Alarm messaging for more details.

Setpoint: NumberRings AA

Group	Act. calls/SMS
Range [units]	1 .. 30 [-]
Related FW	3.1.0
Description	This setpoint is used to adjust the number of rings after which the modem, which is attached to he controller, answers the incoming call. Number of rings prior to answering the modem connection from PC to controller. **NOTE:** Any change of this setpoint is applied first after next switching the controller or modem off and on or after disconnecting the modem from the controller and connecting it back.

Setpoint: ActCallAttempt

Group	Act. calls/SMS
Range [units]	1 .. 250 [-]
Related FW	3.1.0
Description	This setpoint is used to adjust the maximum number of consequent attempts to perform an active data call. The next attempt is performed 120s after the previous unsuccessful attempt.

Setpoint: Acall+SMS lang

Group	Act. calls/SMS
Range [units]	1 .. 7 [-]
Related FW	3.1.0
Description	The setpoint specifies in which language the active SMS and e-mail messages are issued. Adjust the setpoint to the index of the required language. The index can be obtained from the tab Languages in GenConfig. Index 1 is always english.

Group: Date/Time

Setpoint: Time stamp act

Group	Date/Time
Range [units]	DISABLED, ENGINE RUNNING, ALWAYS [-]
Related FW	3.1.0
Description	The setpoint selects the *Time stamp* function mode. **DISABLED**: The function is disabled. **ENGINE RUNNING**: While the engine is running the *Time stamps* records are recorded into the history log with period adjusted by setpoint *Time Stamp Per*. **ALWAYS**: The *Time stamps* records are recorded into the history log with period adjusted by setpoint *Time Stamp Per* all the time while the controler is switched on.

Setpoint: Time Stamp Per

Group	Date/Time
Range [units]	1 .. 240 [min]
Related FW	3.1.0
Description	The setpoint adjusts the time interval for *Time stamp* records. See also the setpoint *Time stamp act*.

Setpoint: #SummerTimeMod

Group	Date/Time
Range [units]	DISABLED, WINTER, SUMMER, WINTER-S, SUMMER-S [-]
Related FW	3.1.0
Description	The setpoint is used to select the mode of automatic daylight saving time change. **DISABLED**: The automatic change to daylight saving time and back is disabled. **WINTER**: The automatic change is enabled, the current season is winter and the controller is located in the northern hemisphere. **SUMMER**: The automatic change is enabled, the current season is summer and the controller is located in the northern hemisphere. **WINTER-S**: The automatic change is enabled, the current season is winter and the controller is located in the southern hemisphere. **SUMMER-S**: The automatic change is enabled, the current season is summer and the controller is located in the southern hemisphere.

Setpoint: PremortHistPer

Group	Date/Time
Range [units]	100 ms, 300 ms, 500 ms, 1 s, 3 s [-]
Related FW	3.1.0
Description	This setpoint adjusts the period with which premortem history(fast history) records are written. Premortem history is triggered if level 2 alarm (for more information on alarm levels please refer to this section) is issued and the engine is running (at least one condition from this list is fullfiled). For any setting of this setpoint Premortem history contains 50 records.

Setpoint: #Time

Group	Date/Time
Range [units]	[HH:MM:SS]
Related FW	3.1.0
Description	The setpoint shows the current time from the internal RTC clock of the controller and can be also used to readjust it. **NOTE:** If the controller is connected to other controllers via the CAN2 bus, the setpoints #Time and #Date are automatically synchronized each hour with the controller that has lowest address. If date/time is changed at one controller it is automatically updated also in all other controllers in the group. **NOTE:** Setpoint with the symbol # are synchronized between controllers.

Setpoint: #Date

Group	Date/Time
Range [units]	[dd.mm.yyyy]
Related FW	3.1.0
Description	The setpoint shows the date from the internal RTC clock of the controller and can be also used to readjust it. **NOTE:** If the controller is connected to other controllers via the CAN2 bus, the setpoints #Time and #Date are automatically synchronized each hour with the controller that has lowest address. If date/time is changed at one controller it is automatically updated also in all other controllers in the group. **NOTE:** Setpoint with the symbol # are synchronized between controllers.

Table of values

Group: Engine values

Value: RPM

Group	Engine values
Units	1/min
Related FW	3.1.0
Description	Current engine speed. See the chapter Engine speed measurement for details about speed measurement methods.

Value: T Cyl aver

Group	Engine values
Units	°C
Related FW	3.1.0
Description	The value contains average cylinder temperature, i.e. average of all configured logical analog inputs *Cyl temp 1* ... *Cyl temp 32* **NOTE:** Available in IS-NT only.

Value: T Cyl max

Group	Engine values
Units	°C

Related FW	3.1.0
Description	The value contains the maximum of all cylinder temperatures, i.e. maximum of all configured logical analog inputs *Cyl temp 1* ... *Cyl temp 32* **NOTE:** The value is intended for creating the "high cylinder temperature" alarm using an universal analog protection. There is a special wizard at the I/O tab in GenConfig which makes the configuration of cylinder temperatures easy. **NOTE:** Available in IS-NT only.

Value: T Cyl min

Group	Engine values
Units	°C
Related FW	3.1.0
Description	The value contains the minimus of all cylinder temperatures, i.e. maximum of all configured logical analog inputs *Cyl temp 1* ... *Cyl temp 32* **NOTE:** The value is intended for creating the "misfiring cylinder" alarm using an universal analog protection. **NOTE:** Available in IS-NT only.

Group: Gener values

Value: Act power

Group	Generator
Units	kW
Related FW	3.1.0
Description	Generator total active power.

Value: Act pwr L1

Group	Gener values
Units	kW
Related FW	3.1.0
Description	Generator active power in phase L1.

Value: Act pwr L2

Group	Gener values
Units	kW

Related FW	3.1.0
Description	Generator active power in phase L2.

Value: Act pwr L3

Group	Gener values
Units	kW
Related FW	3.1.0
Description	Generator active power in phase L3.

Value: React power

Group	Gener values
Units	kVAr
Related FW	3.1.0
Description	Generator total reactive power.

Value: React pwr L1

Group	Gener values
Units	kVAr
Related FW	3.1.0
Description	Generator reactive power in phase L1.

Value: React pwr L2

Group	Gener values
Units	kVAr
Related FW	3.1.0
Description	Generator reactive power in phase L2.

Value: React pwr L3

Group	Gener values
Units	kVAr
Related FW	3.1.0
Description	Generator reactive power in phase L3.

Value: Appar pwr

Group	Gener values
Units	kVA

Related FW	3.1.0
Description	Generator total apparent power.

Value: Appar pwr L1

Group	Gener values
Units	kVA
Related FW	3.1.0
Description	Generator apparent power in phase L1.

Value: Appar pwr L2

Group	Gener values
Units	kVA
Related FW	3.1.0
Description	Generator apparent power in phase L2.

Value: Appar pwr L3

Group	Gener values
Units	kVA
Related FW	3.1.0
Description	Generator apparent power in phase L3.

Value: Pwr factor

Group	Gener values
Units	-
Related FW	3.1.0
Description	Generator cos-phi factor. **NOTE:** The "cos-phi" factor is widely used instead of power factor for pure harmonic waveforms, because a simplified method can be used for calculation of it's value. However, if this simplified method is used for significantly distorted waveforms, it may provide inaccurate results. This fact causes the controller "power factor" value may be different from a value measured by another true-rms measurement device if the waveform contains significant portion of higher harmonic frequencies.

Value: Load char

Group	Gener values
Units	-
Related FW	3.1.0

Description	Character of the generator load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).

Value: Pwr factor L1

Group	Gener values
Units	-
Related FW	3.1.0
Description	Generator power factor in phase L1.

Value: Load char L1

Group	Gener values
Units	-
Related FW	3.1.0
Description	Character of the generator load in the L1 phase. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).

Value: Pwr factor L2

Group	Gener values
Units	-
Related FW	3.1.0
Description	Generator power factor in phase L2.

Value: Load char L2

Group	Gener values
Units	-
Related FW	3.1.0
Description	Character of the generator load in the L2 phase. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).

Value: Pwr factor L3

Group	Gener values
Units	-
Related FW	3.1.0
Description	Generator power factor in phase L3.

Value: Load char L3

Group	Gener values

Units	-
Related FW	3.1.0
Description	Character of the generator load in the L3 phase. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).

Value: Gen freq

Group	Gener values
Units	Hz
Related FW	3.1.0
Description	Generator frequency. The frequency is measured in the phase L3.

Value: Gen V L1-N

Group	Gener values
Units	V
Related FW	3.1.0
Description	Generator voltage in phase L1. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V L2-N

Group	Gener values
Units	V
Related FW	3.1.0
Description	Generator voltage in phase L2. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V L3-N

Group	Gener values
Units	V
Related FW	3.1.0
Description	Generator voltage in phase L3. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V

Group	Gener values
Units	V
Related FW	3.1.0
Description	Generator voltage. Average from all three phases. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V L1-L2

Group	Gener values
Units	V
Related FW	3.1.0
Description	Generator voltage between phases L1 and L2. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V L2-L3

Group	Gener values
Units	V
Related FW	3.1.0
Description	Generator voltage between phases L2 and L3. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen V L3-L1

Group	Gener values
Units	V
Related FW	3.1.0
Description	Generator voltage between phases L3 and L1. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *VT ratio*.

Value: Gen curr L1

Group	Gener values
Units	A

Related FW	3.1.0
Description	Generator current in phase L1. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *CT ratio prim* and *CT ratio sec*.

Value: Gen curr L2

Group	Gener values
Units	A
Related FW	3.1.0
Description	Generator current in phase L2. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *CT ratio prim* and *CT ratio sec*.

Value: Gen curr L3

Group	Gener values
Units	A
Related FW	3.1.0
Description	Generator current in phase L3. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *CT ratio prim* and *CT ratio sec*.

Value: Gen V unbal

Group	Gener values
Units	%
Related FW	3.1.0
Description	Generator voltage unbalance. The value is calculated as maximal difference of two phase voltages at one moment and expressed in % of the nominal voltage. **NOTE:** This value can be used for creating the generator voltage unbalance protection using the "universal analog protections".

Value: Gen I unbal

Group	Gener values
Units	V
Related FW	3.1.0
Description	Generator current unbalance. The value is calculated as maximal difference of

	two phase currents at one moment and expressed in % of the nominal current. **NOTE:** This value can be used for creating the generator current unbalance protection using the "universal analog protections".

Value: Slip freq

Group	Gener values
Units	Hz
Related FW	3.1.0
Description	Differential frequency between the generator and the mains/bus.

Value: Angle

Group	Gener values
Units	°
Related FW	3.1.0
Description	The angle between the phasors of the generator and mains/bus voltage.

Group: Mains values

Value: Mains freq

Group	Mains values
Units	Hz
Related FW	3.1.0
Description	Mains frequency. The frequency is measured in the phase L3.

Value: Bus freq

Group	Bus values
Units	Hz
Related FW	3.1.0
Description	Bus frequency. The frequency is measured in the phase L3.

Value: Mains V L1-N

Group	Mains values
Units	V
Related FW	3.1.0
Description	Mains voltage in phase L1. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vm VT ratio*.

Value: Bus V L1-N

Group	Bus values
Units	V
Related FW	3.1.0
Description	Bus voltage in phase L1. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vb VT ratio*.

Value: Mains V L2-N

Group	Mains values
Units	V
Related FW	3.1.0
Description	Mains voltage in phase L2. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vm VT ratio*.

Value: Bus V L2-N

Group	Bus values
Units	V
Related FW	3.1.0
Description	Bus voltage in phase L2. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vb VT ratio*.

Value: Mains V L3-N

Group	Mains values
Units	V
Related FW	3.1.0
Description	Mains voltage in phase L3. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vm VT ratio*.

Value: Bus V L3-N

Group	Bus values
Units	V
Related FW	3.1.0
Description	Bus voltage in phase L3. **NOTE:**

	The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vb VT ratio*.

Value: Mains V

Group	Mains values
Units	V
Related FW	3.1.0
Description	Mains voltage. Average from all three phases. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vm VT ratio*.

Value: Bus V

Group	Bus values
Units	V
Related FW	3.1.0
Description	Bus voltage. Average from all three phases. **NOTE:** The ratio between the voltage measured at the input terminals and the displayed voltage is adjusted by the setpoint *Vb VT ratio*.

Value: Mains V L1-L2

Group	Mains values
Units	V
Related FW	3.1.0
Description	Mains voltage phase L1 to L2.

Value: Bus V L1-L2

Group	Bus values
Units	V
Related FW	3.1.0
Description	Bus voltage phase L1 to L2.

Value: Mains V L2-L3

Group	Mains values
Units	V
Related FW	3.1.0
Description	Mains voltage phase L2 to L3.

Value: Bus V L2-L3

Group	Bus values

Units	V
Related FW	3.1.0
Description	Bus voltage phase L2 to L3.

Value: Mains V L3-L1

Group	Mains values
Units	V
Related FW	3.1.0
Description	Mains voltage phase L3 to L1.

Value: Bus V L3-L1

Group	Bus values
Units	V
Related FW	3.1.0
Description	Bus voltage phase L3 to L1.

Value: Mains V unbal

Group	Mains values
Units	V
Related FW	3.1.0
Description	Mains voltage unbalance. The value is calculated as maximal difference of two phase voltages at one moment and expressed in % of the mains nominal voltage.

Value: Im3/EarthFC

Group	Mains values
Units	A
Related FW	3.1.0
Description	This value contains the current measured at the current input labeled "IN". This input is used either for measurement of the mains current in phase L3 or for earth fault current. The function depends on the setpoint *I/E-Pm meas*. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *Im3/ErFlCurCTp* and *Im3/ErFlCurCTs*.

Value: EarthFC

Group	Bus values
Units	A
Related FW	3.1.0
Description	This value contains the current measured at the current input labeled "IN". This

	input is used for measurement of the earth fault current. **NOTE:** The ratio between the current measured at the input terminals and the displayed current is adjusted by the setpoints *Im3/ErFlCurCTp* and *Im3/ErFlCurCTs*.

Value: P mains

Group	Mains values
Units	kW
Related FW	3.1.0
Description	Actual active power imported from the mains. Method of the mains import measurement is adjusted by the setpoint *I/E-Pm meas*.

Value: Q mains

Group	Mains values
Units	kVAr
Related FW	3.1.0
Description	Actual reactive power imported from the mains. Method of the mains import measurement is adjusted by the setpoint *I/E-Qm meas*.

Value: Mains PF

Group	Mains values
Units	-
Related FW	3.1.0
Description	Cos-phi factor at the mains inlet.

Value: Mains LChr

Group	Mains values
Units	-
Related FW	3.1.0
Description	Character of the load as it is seen from the mains side at the mains inlet. "L" means inductive load, "C" is capacitive and "R" is resistive load.

Value: Object P

Group	Mains values
Units	kW

Related FW	3.1.0
Description	Actual active power consumed by the object. This value is calculated as sum of the *genset active power* and the *active power imported from the mains*.

Value: Object Q

Group	Mains values
Units	kVAr
Related FW	3.1.0
Description	Actual reactive power consumed by the object. This value is calculated as sum of the *genset reactive power* and the *reactive power imported from the mains*.

Value: Object PF

Group	Mains values
Units	-
Related FW	3.1.0
Description	Cos-phi factor at the load. This value is computed indirectly from the values *Object P* and *Object Q*.

Value: Object LChr

Group	Mains values
Units	-
Related FW	3.1.0
Description	Character of the object load. This value is computed indirectly from the values *Object P* and *Object Q*.

Value: MaxVectorS

Group	Mains values
Units	º
Related FW	3.1.0
Description	This is maximal measured value of vector shift of the generator voltage. The value is reset to 0 automatically in the moment of closing the GCB.

Value: Mains Avg V1

Group	Mains values
Units	V

Related FW	3.1.0
Description	This value shows average Mains voltage in phase L1.

Value: Bus Avg V1

Group	Bus values
Units	V
Related FW	3.1.0
Description	This value shows average Bus voltage in phase L1.

Value: Mains Avg V2

Group	Mains values
Units	V
Related FW	3.1.0
Description	This value shows average Mains voltage in phase L2.

Value: Bus Avg V2

Group	Bus values
Units	V
Related FW	3.1.0
Description	This value shows average Bus voltage in phase L2.

Value: Mains Avg V3

Group	Mains values
Units	V
Related FW	3.1.0
Description	This value shows average Mains voltage in phase L3.

Value: Bus Avg V3

Group	Bus values
Units	V
Related FW	3.1.0
Description	This value shows average Bus voltage in phase L3.

Value: ROCOF

Group	Mains values / Bus values
Units	Hz/s
Related FW	3.1.0
Description	This value shows actual measured value of ROCOF.

Value: Max ROCOF

Group	Mains values / Bus values
Units	Hz/s
Related FW	3.1.0
Description	This value shows maximal measured value of ROCOF.

Group: Sync/Load ctrl

Value: ActPwrReq

Group	Sync/Load ctrl
Units	kW
Related FW	3.1.0
Description	This value contains actual required load level, which is used as the input into the load regulation loop in the parallel to mains operation.

Value: SpdRegOut

Group	Sync/Load ctrl
Units	V
Related FW	3.1.0
Description	This is the actual voltage on the speed governor output of the controller. In case the output is switched to PWM mode, the relation is 10V ~ 100% PWM.

Value: Speed request

Group	Sync/Load ctrl
Units	%
Related FW	3.1.0
Description	This value contains the speed control signal expressed in %. This value is used for digital interfacing (via a communication bus) with ECUs that require the requested speed in %. The relation between *Speed request* and *SpdRegOut* is following: • 0% is sent for SpeedRegOut = -10V • 100% is sent for SpeedRegOut = 10V **NOTE:** Most of ECU units use the J1939 TSC1 frame for speed control, where the requested speed is expressed directly in RPM. Use the value *SpeedReq RPM* for this purpose.

Value: SpeedReq RPM

Group	Sync/Load ctrl

Units	RPM
Related FW	3.1.0
Description	This value contains the speed which is currently requested by the controller from the attached ECU. This value is used for digital interfacing (via a communication bus) with ECUs that require the requested speed directly in RPM. The relation between *SpeedReq RPM* and *Speed request* is following: • 0.9 * Nominal RPM is sent for 0% • 1.1 * Nominal RPM is sent for 100%

Value: ReqEngineSpeed

Group	Sync/Load ctrl
Units	RPM
Related FW	3.1.0
Description	This value contains an exact copy of the required speed which is beeing sent to the ECU (e.g. in the TSC1 frame). It is intended for checking if the speed regulation chain is configured properly.

Value: SystLoadCtrl

Group	Sync/Load ctrl
Units	-
Related FW	3.1.0
Description	Code of the current load control mode. The description how to obtain the text representation of each code can be found at the value *Engine state*.

Group: Volt/PF ctrl

Value: VoltRegOut

Group	Volt/PF ctrl
Units	%
Related FW	3.1.0
Description	This is the actual PWM percentage on the AVRi output of the controller.

Value: SystPfCtrl

Group	Volt/PF ctrl
Units	-
Related FW	3.1.0
Description	Code of the current power factor control mode. The description how to obtain the text representation of each code can be found at the value *Engine state*.

Group: Force value

Value: ExtValue1

Group	Force value
Units	-
Related FW	3.1.0
Description	This data object is intended for remote control of the gen-set via the communication if some kind of data is to be passed into the controller. This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. Below is a typical example of using this object. **EXAMPLE:** The gen-set is required to be running in parallel-to-mains mode at constant load level (baseload), however the baseload level is adjusted from a supervisory PLC system via Modbus. **CAUTION!** It is **not allowed** to solve this task by cyclic writing of the baseload setpoint from the supervisory device. The EEPROM memory may become damaged when any setpoint is written repeatedly with a short period. The proper solution is following: 1. Go to GenConfig, download the configuration from the controller, select the LAI tab and configure the logical analog input *LdCtrl:AnExBld* onto the *ExtValue1*, which is located in the Force value group. If you do not see the LAI tab you have to switch the GenConfig to "advanced" mode. Then upload the configuration into the controller. 2. Go to InteliMonitor and change the setpoint *Load ctrl PtM* to ANEXT BASELOAD. 3. Now you have to program your PLC to write requested gen-set baseload into the Modbus register *ExtValue1* (register number 40392 for IG/IS-NT-2.4).

Value: ExtValue2

Group	Force value
Units	-
Related FW	3.1.0
Description	This data object is intended for remote control of the gen-set via the communication if some kind of data is to be passed into the controller. This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object *ExtValue1*.

Value: ExtValue3

Group	Force value
Units	-
Related FW	3.1.0
Description	This data object is intended for remote control of the gen-set via the communication if some kind of data is to be passed into the controller. This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object *ExtValue1*.

Value: ExtValue4

Group	Force value
Units	X
Related FW	3.1.0
Description	This data object is intended for remote control of the gen-set via the communication if some kind of data is to be passed into the controller. This object can be written via the communication (e.g. Modbus) without any limitation. Use GenConfig function Generate Cfg Image to get the communication object number or register number of this particular value object. See an example at the object *ExtValue1*.

Group: Load shedding

Value: StatLdShed

Group	Load shedding
Units	-
Related FW	3.1.0
Description	The value indicates the current load shedding stage. 0 indicates that the load shedding is not active. See the chapter Load shedding for more details.

Group: Analog CU

Value: UBat

Group	Analog CU
Units	V
Related FW	3.1.0
Description	Voltage at the controller power supply terminals.

Value: CPU Temp

Group	Analog CU
Units	ºC
Related FW	3.1.0
Description	Temperature inside the controller (on the CPU).

Value: D+

Group	Analog CU
Units	V
Related FW	3.1.0
Description	Voltage measured at the D+ terminal. If this voltage is > 80% of the *Ubat* the D+ terminal is evaluated as active and the engine is evaluated as running. See also the chapter Start sequence.

Value: AIN CU-1

Group	Analog CU
Units	configurable
Related FW	3.1.0
Description	This is the value of the analog input 1 of the controller. Analog inputs are fully configurable so the name and units depend on configuration. In the default configuration the input is used for oil pressure measurement.

Value: AIN CU-2

Group	Analog CU
Units	configurable
Related FW	3.1.0
Description	This is the value of the analog input 2 of the controller. Analog inputs are fully configurable so the name and units depend on configuration. In the default configuration the input is used for water temperature measurement.

Value: AIN CU-3

Group	Analog CU
Units	configurable
Related FW	3.1.0
Description	This is the value of the analog input 3 of the controller. Analog inputs are fully configurable so the name and units depend on configuration. In the default configuration the input is used for fuel level measurement.

Value: AIN CU-4

Group	Analog CU

Units	configurable
Related FW	3.1.0
Description	This is the value of the analog input 4 of the controller. Analog inputs are fully configurable so the name and units depend on configuration. In the default configuration the input is used for fuel level measurement.

Group: Bin inputs CU

Value: BIN

Group	Bin inputs CU
Units	-
Related FW	3.1.0
Description	This is a bit array containing status of physical binary inputs of the controller. Bit0 represents BI1, bit1 represents BI2 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left. **NOTE:** Click on button with **"..."** to get a clear list of BI names with their corresponding values.

Group: Bin outputs CU

Value: BOUT

Group	Bin outputs CU
Units	-
Related FW	3.1.0
Description	This is a bit array containing status of physical binary outputs of the controller. Bit0 represents BO1, bit1 represents BO2 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left. **NOTE:** Click on button with **"..."** to get a clear list of BI names with their corresponding values.

Group: Log Bout

Value: LogBout 1

Group	Log bout
Units	-

Related FW	3.1.0
Description	This is a bit array containing status of logical binary outputs 1-16 of the controller. Bit0 represents LBO1, bit1 represents LBO2 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left. **NOTE:** Click on button with **"..."** to get a clear list of BI names with their corresponding values.

Value: LogBout 2

Group	Log bout
Units	-
Related FW	3.1.0
Description	This is a bit array containing status of logical binary outputs 17-32 of the controller. Bit0 represents LBO17, bit1 represents LBO18 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left. **NOTE:** Click on button with **"..."** to get a clear list of BI names with their corresponding values.

Value: LogBout 3

Group	Log bout
Units	-
Related FW	3.1.0
Description	This is a bit array containing status of logical binary outputs 33-48 of the controller. Bit0 represents LBO33, bit1 represents LBO34 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left. **NOTE:** Click on button with **"..."** to get a clear list of BI names with their corresponding values.

Value: LogBout 4

Group	Log bout
Units	-
Related FW	3.1.0
Description	This is a bit array containing status of logical binary outputs 49-64 of the controller. Bit0 represents LBO49, bit1 represents LBO50 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left. **NOTE:** Click on button with **"..."** to get a clear list of BI names with their corresponding values.

Value: LogBout 5

Group	Log bout
Units	-
Related FW	3.1.0
Description	This is a bit array containing status of logical binary outputs 65-80 of the controller. Bit0 represents LBO65, bit1 represents LBO66 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left. **NOTE:** Click on button with **"..."** to get a clear list of BI names with their corresponding values.

Value: LogBout 6

Group	Log bout
Units	-
Related FW	3.1.0
Description	This is a bit array containing status of logical binary outputs 81-96 of the controller. Bit0 represents LBO81, bit1 represents LBO82 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left. **NOTE:** Click on button with **"..."** to get a clear list of BI names with their corresponding values.

Value: LogBout 7

Group	Log bout
Units	-
Related FW	3.1.0
Description	This is a bit array containing status of logical binary outputs 97-112 of the controller. Bit0 represents LBO97, bit1 represents LBO98 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.

Value: LogBout 8

Group	Log bout
Units	-
Related FW	3.1.0
Description	This is a bit array containing status of logical binary outputs 113-128 of the controller. Bit0 represents LBO113, bit1 represents LBO114 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.

Value: LogBout 9

Group	Log bout
Units	-
Related FW	3.1.0
Description	This is a bit array containing status of logical binary outputs 128-143 of the controller. Bit0 represents LBO128, bit1 represents LBO129 etc.. **NOTE:** All terminals display binary values in **"human-readable" form** - from left to right. That means the bit 0 is displayed in the most left position. This is different from common use in computer science, where binary values are displayed from right to left.

Value: RemoteControl

Group	Log bout
Units	-

Related FW	3.1.0
Description	This is a bit array containing status of the binary outputs *Remote control1* ... *Remote control8*.

Group: Info

Value: Controller mode

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains actual controller mode. The controller mode is selected by the setpoint *Controller mode* but the setpoint position can be overriden by binary inputs *Remote OFF*, *Remote MAN*, *Remote AUT* or *Remote TEST*.

Value: SW Version

Group	Info
Units	-
Related FW	3.1.0
Description	Major and minor firmware version number. E.g. value "2,4" means version 2.4. Release version number is not included.

Value: Application

Group	Info
Units	-
Related FW	3.1.0
Description	Code of the application type. E.g. 1 for SPtM, 2 for SPI, 3 for MINT etc. The value is intended for diagnostic purposes.

Value: SW Branch

Group	Info
Units	-
Related FW	3.1.0
Description	Firmware branch code. Contains 1 in case of standard branches.

Value: PasswordDecode

Group	Info
Units	-
Related FW	3.1.0

Description	This value contains encrypted serial number of the controller and administrator password and is intended for retrieving of the lost password. Send this number together with controller serial number to your distributor if you need to retrieve your password.

Value: CAN16

Group	Info
Units	-
Related FW	3.1.0
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. **NOTE:** The bit which corresponds to the own controller is always set to "1".

Value: CAN32

Group	Info
Units	-
Related FW	3.1.0
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. **NOTE:** The bit which corresponds to the own controller is always set to "1".

Value: Reg16

Group	Info
Units	-
Related FW	3.1.0
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.

Value: Reg32

Group	Info
Units	-
Related FW	3.1.0
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.

Value: GL16

Group	Info
Units	-
Related FW	3.1.0
Description	Bits of this value show "1" if the controller which has address corresponding with the bit position has GCB closed. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16.

Value: GL32

Group	Info
Units	-
Related FW	3.1.0
Description	Bits of this value show "1" if the controller which has address corresponding with the bit position has GCB closed. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 17-32.

Value: Engine state

Group	Info
Units	-
Related FW	3.1.0
Description	Code of the current state of the engine control. The text representation of each code can be obtained following way: 1. Open the archive in GenConfig and use the function File -> Generate Cfg Image -> Comm. objects to create a list of all communication objects. 2. Open the file, find the row containing this value and look for the column "Type". The column "Type" contains reference to a list of codes and their representations located in the bottom part of the file.

Value: Breaker state

Group	Info
Units	-
Related FW	3.1.0
Description	Code of the current state of the breaker control. The text representation of each code can be obtained by the procedure described at the value *Engine state*.

Value: Timer text

Group	Info
Units	-

Related FW	3.1.0
Description	Code of the currently running system process timer. The text representation of each code can be obtained by the procedure described at the value *Engine state*. Remaining time of the timer is available in the value *Timer val*.

Value: Timer val

Group	Info
Units	-
Related FW	3.1.0
Description	The value contains remaining time of the currently running system process timer. The name of the timer is available in the value *Timer text*.

Value: ECU DiagSource

Group	Info
Units	-
Related FW	3.1.0
Description	This value indicates from which source the ECU diagnostic messages are beeing received. The source depends on ECU type.

Value: NextTime1-4

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains time of next activation of the timer block 1-4 (i.e. of the output *TimerAct 1-4*). The related date is available in the value *NextDate1-4*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextDate1-4

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains date of next activation of the timer block 1-4 (i.e. of the output *TimerAct 1-4*). The related time is available in the value *NextTime1-4*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextTime5-8

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains time of next activation of the timer block 5-8 (i.e. of the output *TimerAct 5-8*). The related date is available in the value *NextDate5-8*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextDate5-8

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains date of next activation of the timer block 5-8 (i.e. of the output *TimerAct 5-8*). The related time is available in the value *NextTime5-8*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextTime9-12

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains time of next activation of the timer block 9-12 (i.e. of the output *TimerAct 9-12*). The related date is available in the value *NextDate9-12*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextDate9-12

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains date of next activation of the timer block 9-12 (i.e. of the output *TimerAct 9-12*). The related time is available in the value *NextTime9-12*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextTime13-16

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains time of next activation of the timer block 13-16 (i.e. of the output *TimerAct 13-16*). The related date is available in the value *NextDate13-16*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: NextDate13-16

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains date of next activation of the timer block 13-16 (i.e. of the output *TimerAct 13-16*). The related time is available in the value *NextTime13-16*. **NOTE:** More information about timers is available in the chapter General purpose timers.

Value: AirGate ID

Group	Info
Units	-
Related FW	3.1.0
Description	If the controller is connected to an AirGate server this value displays the ID string assigned by the server. This ID string is to be used in ComAp PC tools (e.g. InteliMonitor) to specify the respective controller when the connection is opened.

Value: AirGate status

Group	Info
Units	-
Related FW	3.1.0
Description	This value displays actual status of the connection to the AirGate server. **0** Not connected to AirGate. **1** Connected, registered, waiting for autorization. **2** Registration denied. **3** Can not register, no free capacity in the server.

	4	Can not register, other reason.
	5	Connected, registered, authorized.

Value: Latitude

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains latitude of the controller. This value is obtained from connected IB-NT with active GPS. Time is automatically synchronized as well when succesfull GPS fix is established. If no valid value is available from InternetBridge-NT, value ##### is displayed.

Value: Longitude

Group	Info
Units	-
Related FW	3.1.0
Description	This value contains longitude of the controller. This value is obtained from connected IB-NT with active GPS. Time is automatically synchronized as well when succesfull GPS fix is established. If no valid value is available from InternetBridge-NT, value ##### is displayed.

Group: Statistics

Value: kWhours

Group	Statistics
Units	kWh
Related FW	3.1.0
Description	Active energy counter. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: kVArhours

Group	Statistics
Units	kVAh
Related FW	3.1.0
Description	Reactive energy counter. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set

	statistics.

Value: kVAhours

Group	Statistics
Units	kVAh
Related FW	3.1.0
Description	Apparent energy counter.

Value: Run Hours

Group	Statistics
Units	h
Related FW	3.1.0
Description	Engine operation hours counter. If an ECU is configured and it provides engine hours value, the value is taken from ECU. If the value is not available from the ECU or ECU is not configured, the engine hours are incremented in the controller while the engine is running. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: Num starts

Group	Statistics
Units	-
Related FW	3.1.0
Description	Engine start commands counter. The counter is increased by 1 even if the particular start command will take more than one attempt. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: NumUnsc start

Group	Statistics
Units	-
Related FW	3.1.0
Description	Unsuccessful starts counter. The counter is incremented always when *Start fail* alarm is issued. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: Service time 1

Group	Statistics
Units	h
Related FW	3.1.0
Description	This is maintenance countdown timer #1. The timer is located in setpoints (group Engine protect) as well as in values (group Statistics). Adjust the timer to the requested maintenance interval. It will be then decremented while the gen-set is running. The alarm *WrnServiceTime* is issued as soon as the timer counts down to zero.

Value: Service time 2

Group	Statistics
Units	h
Related FW	3.1.0
Description	This is maintenance countdown timer #2. The timer is located in setpoints (group Engine protect) as well as in values (group Statistics). Adjust the timer to the requested maintenance interval. It will be then decremented while the gen-set is running. The alarm *WrnServiceTime* is issued as soon as the timer counts down to zero.

Value: Service time 3

Group	Statistics
Units	h
Related FW	3.1.0
Description	This is maintenance countdown timer #3. The timer is located in setpoints (group Engine protect) as well as in values (group Statistics). Adjust the timer to the requested maintenance interval. It will be then decremented while the gen-set is running. The alarm *WrnServiceTime* is issued as soon as the timer counts down to zero.

Value: Service time 4

Group	Statistics
Units	h
Related FW	3.1.0
Description	This is maintenance countdown timer #4. The timer is located in setpoints (group Engine protect) as well as in values (group Statistics). Adjust the timer to the requested maintenance interval. It will be then decremented while the gen-set is running. The alarm *WrnServiceTime* is issued as soon as the timer counts down to zero.

Value: TotalDownTime

Group	Statistics
Units	h
Related FW	3.1.0
Description	This counter counts while the controller is in "not ready" state, i.e. it can not be started. The reason of the "not ready" state may be either some 2nd level alarm or the controller switched in OFF mode. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: DnTimeReqToRun

Group	Statistics
Units	h
Related FW	3.1.0
Description	This counter counts while the controller is in "not ready" state (see the value *Total downtime*) and there is a request for the gen-set to run. **NOTE:** The counter can be readjusted/reset from InteliMonitor menu Monitor -> Set statistics.

Value: PulseCounter 1

Group	Statistics
Units	-
Related FW	3.1.0
Description	This is the value of *PulseCounter #1* module. See the binary input *PulseCounter 1*.

Value: PulseCounter 2

Group	Statistics
Units	-
Related FW	3.1.0
Description	This is the value of *PulseCounter #2* module. See the binary input *PulseCounter 2*. **NOTE:** Available in IS-NT only.

Value: PulseCounter 3

Group	Statistics
Units	-
Related FW	3.1.0
Description	This is the value of *PulseCounter #3* module. See the binary input *PulseCounter 3*. **NOTE:** Available in IS-NT only.

Value: PulseCounter 4

Group	Statistics
Units	-
Related FW	3.1.0
Description	This is the value of *PulseCounter #4* module. See the binary input *PulseCounter 4*. **NOTE:** Available in IS-NT only.

Table of binary input functions

Binary input: GCB feedback

Related FW	3.1.0
Description	This input is used for connection of the normally open feedback contact from the generator circuit breaker or contactor. If the input is active, the controller will consider the GCB as closed and vice versa. • If the feedback does not respond to a change of the control output *GCB close/open* within 2s, the alarm *GCB Fail* will be issued. • If the feedback changes it's position unexpectedly without any command given by the control output, the alarm *GCB Fail* will be issued immediately. **NOTE:** This input is obligatory.

Binary input: MCB feedback

Related FW	3.1.0
Description	This input is used for connection of the normally open feedback contact from the mains circuit breaker or contactor. If the input is active, the controller will consider

	the MCB as closed and vice versa. • If the feedback does not respond to a change of the control output [MCB close/open] within 2s, the alarm *MCB Fail* will be issued. • If the feedback indicates the MCB has unexpectedly closed without any command given by the control output, the alarm *MCB Fail* will be issued immediately. • If the feedback indicates the MCB has unexpectedly opened without any command given by the control output, the controller will accept this situation and the following behavior will depend on mains conditions (healthy or failure).

Binary input: Rem Start/Stop

Related FW	3.1.0
Description	Use this input to turn the gen-set on and off in AUT mode. The gen-set will perform the complete start-up procedure up to taking the load automatically when the input is activated and then the complete stop procedure when the input is deativated. **NOTE:** The gen-set may stay running even if the input is deactivated. This will occur if there is another condition for the gen-set to be running like AMF condition etc.

Binary input: Emergency Stop

Related FW	3.1.0
Description	If the input is activated, engine shutdown is immediately performed. However, the controller behavior is slightly different compared to other shutdown alarms: • Outputs *Ignition*, *Ventilation*, *Cooling pump* and *Prelubr pump* are deactivated as well. • This input cannot be overridden with the input *Sd override*. **NOTE:** Because of safety reasons it is recommended to configure this input as *Normally closed* and use a NC switch. **CAUTION!** This is a software function only. It can be extended by a "hard-wired" emergency stop function, which means disconnecting power supply from the controller outputs.

Binary input: Test on load

Related FW	3.1.0
Description	This input is used to force the genset to take over the load in TEST mode. **NOTE:** This logical input can be configured together with the input *Remote TEST* onto one controller terminal and then the "test with load" function can be activated by

	one signal. That means e.g. if a mains supply interruption is expected, the controller can be forced to start, take the load over and disconnect the mains prior to the interruption occurs. Then, after the mains has been restored, the signal is removed and the controller transfers the load back to the mains.

Binary input: REMOTE: Remote off

Related FW	3.1.0
Description	The controller is forced into OFF mode while this input is active and the genset is not running. The controller will return into the previous mode after the input is deactivated. If the genset is running, the mode does not change until it is stopped. Use this input if you need to disable the genset temporarily from any reason (maintenance, control from a higher-level automation system etc..).

Binary input: REMOTE: Remote MAN

Related FW	3.1.0
Description	The controller is forced into MAN mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while MAN mode is forced by this input.

Binary input: REMOTE: Remote AUT/Remote SEM

Related FW	3.1.0
Description	SEM mode is available in IS-NT only! The controller is forced into AUT or SEM mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while AUT mode is forced by this input.

Binary input: REMOTE: Remote TEST

Related FW	3.1.0
Description	The controller is forced into TEST mode while this input is active. This input can be used, among others, for following purposes: • In combination with a timer module for periodic testing of the engine. • In combination with the input *Test on load* for forcing the genset to start and take over the load by one binary signal (manual switch, higher-level automation system etc.)

Binary input: REMOTE: Remote off

Related FW	3.1.0
Description	The controller is forced into OFF mode while this input is active and the genset is

	not running. The controller will return into the previous mode after the input is deactivated. If the genset is running, the mode does not change until it is stopped. Use this input if you need to disable the genset temporarily from any reason (maintenance, control from a higher-level automation system etc..).

Binary input: REMOTE: Remote MAN

Related FW	3.1.0
Description	The controller is forced into MAN mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while MAN mode is forced by this input.

Binary input: REMOTE: Remote AUT/Remote SEM

Related FW	3.1.0
Description	SEM mode is available in IS-NT only! The controller is forced into AUT or SEM mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while AUT mode is forced by this input.

Binary input: REMOTE: Remote TEST

Related FW	3.1.0
Description	The controller is forced into TEST mode while this input is active. This input can be used, among others, for following purposes: • In combination with a timer module for periodic testing of the engine. • In combination with the input *Test on load* for forcing the genset to start and take over the load by one binary signal (manual switch, higher-level automation system etc.)

Binary input: REMOTE: Remote off

Related FW	3.1.0
Description	The controller is forced into OFF mode while this input is active and the genset is not running. The controller will return into the previous mode after the input is deactivated. If the genset is running, the mode does not change until it is stopped. Use this input if you need to disable the genset temporarily from any reason (maintenance, control from a higher-level automation system etc..).

Binary input: REMOTE: Remote MAN

Related FW	3.1.0
Description	The controller is forced into MAN mode while this input is active.

	NOTE: Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while MAN mode is forced by this input.

Binary input: REMOTE: Remote AUT/Remote SEM

Related FW	3.1.0
Description	SEM mode is available in IS-NT only! The controller is forced into AUT or SEM mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while AUT mode is forced by this input.

Binary input: REMOTE: Remote TEST

Related FW	3.1.0
Description	The controller is forced into TEST mode while this input is active. This input can be used, among others, for following purposes: • In combination with a timer module for periodic testing of the engine. • In combination with the input *Test on load* for forcing the genset to start and take over the load by one binary signal (manual switch, higher-level automation system etc.)

Binary input: REMOTE: Remote off

Related FW	3.1.0
Description	The controller is forced into OFF mode while this input is active and the genset is not running. The controller will return into the previous mode after the input is deactivated. If the genset is running, the mode does not change until it is stopped. Use this input if you need to disable the genset temporarily from any reason (maintenance, control from a higher-level automation system etc..).

Binary input: REMOTE: Remote MAN

Related FW	3.1.0
Description	The controller is forced into MAN mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while MAN mode is forced by this input.

Binary input: REMOTE: Remote AUT/Remote SEM

Related FW	3.1.0
Description	SEM mode is available in IS-NT only!

	The controller is forced into AUT or SEM mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while AUT mode is forced by this input.

Binary input: REMOTE: Remote TEST

Related FW	3.1.0
Description	The controller is forced into TEST mode while this input is active. This input can be used, among others, for following purposes: • In combination with a timer module for periodic testing of the engine. • In combination with the input *Test on load* for forcing the genset to start and take over the load by one binary signal (manual switch, higher-level automation system etc.)

Binary input: REMOTE: Remote off

Related FW	3.1.0
Description	The controller is forced into OFF mode while this input is active and the genset is not running. The controller will return into the previous mode after the input is deactivated. If the genset is running, the mode does not change until it is stopped. Use this input if you need to disable the genset temporarily from any reason (maintenance, control from a higher-level automation system etc..).

Binary input: REMOTE: Remote MAN

Related FW	3.1.0
Description	The controller is forced into MAN mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while MAN mode is forced by this input.

Binary input: REMOTE: Remote AUT/Remote SEM

Related FW	3.1.0
Description	SEM mode is available in IS-NT only! The controller is forced into AUT or SEM mode while this input is active. **NOTE:** Programming of firmware and/or configuration is disabled while this input is active, as the programming is allowed in OFF mode only and GenConfig is not able to switch the controller to OFF mode while AUT mode is forced by this input.

Binary input: REMOTE: Remote TEST

Related FW	3.1.0
Description	The controller is forced into TEST mode while this input is active. This input can

	be used, among others, for following purposes: • In combination with a timer module for periodic testing of the engine. • In combination with the input *Test on load* for forcing the genset to start and take over the load by one binary signal (manual switch, higher-level automation system etc.)

Binary input: Oil press

Related FW	3.1.0
Description	This input is to be configured to the physical binary input where engine oil pressure binary sensor is connected. It provides following alarms: • The input **must not** be active at stopped engine. If it is active, the controller issues *Sd Oil press B* alarm. • The input **must** be active at running engine at latest in the moment when the alarm blocking delay *RunOnlyBlkDel1* has elapsed. If it is not active, the controller issues *Sd Oil press B* alarm. **NOTE:** If you use this logical binary input you do not need to configure any other protection onto the respective physical binary input.

Binary input: AccessLock int

Related FW	3.1.0
Description	This input forces the controller **built-in** terminal into monitoring mode. • Setpoints changes are disabled. • Using control buttons on the panel is disabled even if the controller is in MAN mode. • Change of controller mode is disabled. **NOTE:** As the IS-NT and IGS-NT-BB do not have built-in terminal, this input is assigned to the terminal or IntelliVision (display) #1, which is supposed to be directly attached to the controller or mounted close to it.

Binary input: AccessLock ext

Related FW	3.1.0
Description	This input forces all external **remote** terminals into monitoring mode. • Setpoints changes are disabled. • Executing commands is disabled. • Change of controller mode is disabled. An external remote terminal is any device, which reads and/or writes data from/into the controller and is connected to the controller via any other

	communication bus than the dedicated terminal RS485 bus. **NOTE:** An example of such terminal is a PC with InteliMonitor, any kind of remote display connected via CAN2 or a PLC connected to the RS485 and communicating via MODBUS.

Binary input: PrestartBypass

Related FW	3.1.0
Description	Use this input to bypass the prestart phase of the start-up procedure and activate the *Starter* output immediately after start command has been issued. This input is typically used to skip preglowing of the engine when the engine is already warm. A built-in PLC module *Comparator with hysteresis* attached to the engine temperature value can be used to provide the "engine warm" binary signal, which is then internally configured onto this logical binary input.

Binary input: Startblocking

Related FW	3.1.0
Description	Engine start is disabled while this input is active. *NotReady* state is displayed on the controller main screen and the message *Start blocking* is displayed in the Alarmlist. Use this input to disable temporarily the genset to be started e.g. from an higher-level automation device such as PLC. **NOTE:** The genset will not be stopped if the input is activated while the genset is running.

Binary input: Sd override

Related FW	3.1.0
Description	If the input is closed, all 2nd level protections are overriden to allow engine run in an emergency situation, e.g. when the gen-set works as a power supply for fire extinguishing equipment. All protections are displayed in Alarmlist and recorded into history, however the controller leaves the gen-set in operation. If there are any protections still active or not reset in the moment when the input is deactivated, the controller will react to them in a standard way. Following protections are **not** overriden by this input: • Emergency stop • Overspeed • Underspeed (only if *Fuel solenoid* = GAS ENGINE) • Binary and analog protections configured as *Sd override* type. In fact this protection type means "Unoverridable shutdown", i.e. it works the same way as standard shutdown protection, however it can not be overriden

	(blocked) by the *Sd override* input.

Binary input: GCB disable

Related FW	3.1.0
Description	The input is used to disable issuing the GCB closing command. • If the input is active during synchronizing, the controller will keep the genset synchronized without issuing the GCB closing command until the input is deactivated or *Sync timeout* is elapsed. • If the input is active and the GCB button is pressed in MAN mode to close the GCB to dead bus, the GCB will not be closed until the input is deactivated and the GCB button pressed again. • If the input is active and the GCB is to be closed to dead bus automatically, the GCB will not be closed until the input is deactivated.

Binary input: MCB disable

Related FW	3.1.0
Description	The input is used to disable issuing the MCB closing command. • If the input is active during synchronizing, the controller will keep the loaded genset synchronized with the mains without issuing the MCB closing command until the input is deactivated or *Sync timeout* is elapsed. • If the input is active and the MCB button is pressed in MAN mode to close the MCB to dead bus, the MCB will not be closed until the input is deactivated and the MCB button pressed again. • If the input is active and the MCB is to be closed to dead bus automatically, the MCB will not be closed until the input is deactivated.

Binary input: GCB fdb neg

Related FW	3.1.0
Description	This input is used for connection of the **normally closed** feedback contact from the generator circuit breaker or contactor. This input is optional and if it is configured, it must be always in inverse position to the normally open input *GCB feedback*. Maximal allowed time the both inputs are in the same position is 500ms, after this time the alarm *GCB Fail* is issued.

Binary input: MCB fdb neg

Related FW	3.1.0
Description	This input is used for connection of the **normally closed** feedback contact from the mains circuit breaker or contactor. This input is optional and if it is configured, it must be always in inverse position to the normally open input *MCB feedback*. Maximal allowed time the both inputs are in the same position is 500ms, after this time the alarm *MCB Fail* is issued.

Binary input: Emerg. manual

Related FW	3.1.0
Description	This input is designed to allow the gen-set to be controlled externally, not by the controller. This feature is especially designed for marine gen-sets, which are supposed to be started manually as the controller has no power supply before the gen-set is started. It may be also useful in case of testing the gen-set or in case of a failure, which does not allow the gen-set to be controlled by the controller, but the gen-set itself is stays operational. This function is also used in case of redundancy to disable redundant controller. The controller behaves following way: • Shows the text *EmergMan* in the engine status on the main screen. • Stops all functions regarding the gen-set control, deactivates all outputs related to it. The complete list of effected logical binary outputs is at the bottom. • *Stop Fail* alarm is not beeing evaluated and stop solenoid is not activated if nonzero speed is detected. • Voltage, current, power and other electric measurements are active. • When the input is deactivated, the controller takes control over the gen-set according to the situation in which the gen-set was in the moment of deactivation. I.e. the gen-set remains running loaded if it was running and GCB was closed in the moment the input was deactivated. **NOTE:** For successful recovery from a running state when the input is deactivated it is recommended to use pulse-type control outputs instead of continous-type. E.g. *Stop Solenoid* for fuel supply control and *GCB ON coil*, *GCB OFF coil* for breaker control. Logical Binary Outputs that are deactivated (directly or indirectly) when *Emerg. manual* is active: Starter Fuel solenoid Prestart Cooling pump CB close/open (GCB and MCB) CB ON coil (GCB and MCB) CB OFF coil (GCB and MCB) CB UV coil (GCB and MCB) Stop solenoid Stop pulse Speed up Speed dn AVR up AVR dn Ignition Ventilation Idle/Nominal Prelubr pump In synchronism ECU PwrRelay

	Ready for load Stand-by ready Operational Ready Not Ready CranckProcedure Starting Idle run Running ForwardSynchro ReverseSynchro Warming Soft load Loaded Soft unld Cooling Stopping Crancking PeakShaveAct

Binary input: ManualLdRecon

Related FW	3.1.0
Description	This input is used for manual reconnection of the last disconnected part of the load, if the load has dropped below the setpoint *Ld recon level*. This input works only if automatic reconnection is disabled, i.e. the setpoint *AutoLd recon* is set to DISABLED.

Binary input: FaultResButton

Related FW	3.1.0
Description	This input is used for an external FAULT RESET button mounted on the switchboard. The function of the input is identical as function of the fault reset button on the controller front panel. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: HornResButton

Related FW	3.1.0
Description	This input is used for an external HORN RESET button mounted on the switchboard. The function of the input is identical as function of the horn reset button on the controller front panel. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: StopButton

Related FW	3.1.0
Description	This input is used for an external STOP button mounted on the switchboard. The function of the input is identical as function of the stop button on the controller front panel. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: StartButton

Related FW	3.1.0
Description	This input is used for an external START button mounted on the switchboard. The function of the input is identical as function of the start button on the controller front panel. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: GCBButton

Related FW	3.1.0
Description	This input is used for an external GCB button mounted on the switchboard. The function of the input is identical as function of the GCB button on the controller front panel. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: MCBButton

Related FW	3.1.0
Description	This input is used for an external MCB button mounted on the switchboard. The function of the input is identical as function of the MCB button on the controller front panel. The input is enabled only if the setpoint *Local Button* is set to position EXTBUTTONS or BOTH.

Binary input: ECUComFailBlck

Related FW	3.1.0
Description	The input disables issuing of the ECU communication failure alarm and all other alarms related to values that are beeing read from the ECU.

Binary input: PulseCounter 1

Related FW	3.1.0
Description	This is the input of the *PulseCounter #1* module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint *ConvCoefPulse1*, the counter value *PulseCounter 1* (in the group *Statistic*) is increased by 1 and input pulses conter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory. The *PulseCounter* modules are intended e.g. for connecting external energy or fuel meters with pulse outputs. **NOTE:** Minimal pulse width as well as minimal pause between two succesive pulses is 100ms. **NOTE:** The counter value can be reset in the InteliMonitor statistics window.

Binary input: PulseCounter 2

Related FW	3.1.0
Description	This is the input of the *PulseCounter #2* module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint *ConvCoefPulse2*, the counter value *PulseCounter 2* (in the group *Statistic*) is increased by 1 and input pulses conter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory. The *PulseCounter* modules are intended e.g. for connecting external energy or fuel meters with pulse outputs. **NOTE:** Minimal pulse width as well as minimal pause between two succesive pulses is 100ms. **NOTE:** The counter value can be reset in the InteliMonitor statistics window. **NOTE:** Available in IS-NT only.

Binary input: PulseCounter 3

Related FW	3.1.0
Description	This is the input of the *PulseCounter #3* module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint *ConvCoefPulse3*, the counter value *PulseCounter 3* (in the group *Statistic*) is increased by 1 and input pulses conter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory. The *PulseCounter* modules are intended e.g. for connecting external energy or fuel meters with pulse outputs. **NOTE:**

	Minimal pulse width as well as minimal pause between two succesive pulses is 100ms. **NOTE:** The counter value can be reset in the InteliMonitor statistics window. **NOTE:** Available in IS-NT only.

Binary input: PulseCounter 4

Related FW	3.1.0
Description	This is the input of the *PulseCounter #4* module. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint *ConvCoefPulse4*, the counter value *PulseCounter 4* (in the group *Statistic*) is increased by 1 and input pulses conter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory. The *PulseCounter* modules are intended e.g. for connecting external energy or fuel meters with pulse outputs. **NOTE:** Minimal pulse width as well as minimal pause between two succesive pulses is 100ms. **NOTE:** The counter value can be reset in the InteliMonitor statistics window. **NOTE:** Available in IS-NT only.

Binary input: Timer block 1

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #1*. **NOTE:** See also the setpoint *TimerChannel 1* and output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 2

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #2*. **NOTE:** See also the setpoint *TimerChannel 2* and output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 3

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #3*. **NOTE:** See also the setpoint *TimerChannel 3* and output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 4

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #4*. **NOTE:** See also the setpoint *TimerChannel 4* and output *TimerAct 1-4*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 5

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #5*. **NOTE:** See also the setpoint *TimerChannel 5* and output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 6

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #6*. **NOTE:** See also the setpoint *TimerChannel 6* and output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 7

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #7*. **NOTE:** See also the setpoint *TimerChannel 7* and output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 8

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #8*. **NOTE:** See also the setpoint *TimerChannel 8* and output *TimerAct 5-8*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 9

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #9*. **NOTE:** See also the setpoint *TimerChannel 9* and output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 10

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #10*. **NOTE:** See also the setpoint *TimerChannel 10* and output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 11

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #11*.

	NOTE: See also the setpoint *TimerChannel 11* and output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 12

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #12*. **NOTE:** See also the setpoint *TimerChannel 12* and output *TimerAct 9-12*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 13

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #13*. **NOTE:** See also the setpoint *TimerChannel 13* and output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 14

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #14*. **NOTE:** See also the setpoint *TimerChannel 14* and output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 15

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #15*. **NOTE:** See also the setpoint *TimerChannel 15* and output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: Timer block 16

Related FW	3.1.0
Description	This input is used to disable temporarily the output from the *Timer channel #16*. **NOTE:** See also the setpoint *TimerChannel 16* and output *TimerAct 13-16*. **NOTE:** See the chapter Timers for more details about timers.

Binary input: ExtValue1 up

Related FW	3.1.0
Description	For IS-NT only. While this input is active the value of *ExtValue 1* is contiously beeing increased at the rate of *ExtValue1 rate* until it reaches *ExtValue1HiLim*. **NOTE:** If this input is used (configured), the *ExtValue 1* can't be written remotely from a remote terminal using the command *ExtValue 1*.

Binary input: ExtValue1 down

Related FW	3.1.0
Description	IS-NT specific function While this input is active the value of *ExtValue 1* is contiously beeing decreased at the rate of *ExtValue1 rate* until it reaches *ExtValue1LoLim*. **NOTE:** If this input is used (configured), the *ExtValue 1* can't be written remotely from a remote terminal using the command *ExtValue 1*.

Binary input: ExtValue2 up

Related FW	3.1.0
Description	For IS-NT only. While this input is active the value of *ExtValue 2* is contiously beeing increased at the rate of *ExtValue2 rate* until it reaches *ExtValue2HiLim*. **NOTE:** If this input is used (configured), the *ExtValue 2* can't be written remotely from a remote terminal using the command *ExtValue 2*.

Binary input: ExtValue2 down

Related FW	3.1.0
Description	IS-NT specific function While this input is active the value of *ExtValue 2* is contiously beeing decreased at the rate of *ExtValue2 rate* until it reaches *ExtValue2LoLim*. **NOTE:** If this input is used (configured), the *ExtValue 2* can't be written remotely from a remote terminal using the command *ExtValue 2*.

Binary input: ExtValue3 up

Related FW	3.1.0
Description	For IS-NT only. While this input is active the value of *ExtValue 3* is contiously beeing increased at the rate of *ExtValue3 rate* until it reaches *ExtValue3HiLim*. **NOTE:** If this input is used (configured), the *ExtValue 3* can't be written remotely from a remote terminal using the command *ExtValue 3*.

Binary input: ExtValue3 down

Related FW	3.1.0
Description	IS-NT specific function While this input is active the value of *ExtValue 3* is contiously beeing decreased at the rate of *ExtValue3 rate* until it reaches *ExtValue3LoLim*. **NOTE:** If this input is used (configured), the *ExtValue 3* can't be written remotely from a remote terminal using the command *ExtValue 3*.

Binary input: ExtValue4 up

Related FW	3.1.0
Description	For IS-NT only. While this input is active the value of *ExtValue 4* is contiously beeing increased at the rate of *ExtValue4 rate* until it reaches *ExtValue4HiLim*. **NOTE:** If this input is used (configured), the *ExtValue 4* can't be written remotely from a remote terminal using the command *ExtValue 4*.

Binary input: ExtValue4 down

Related FW	3.1.0
Description	IS-NT specific function While this input is active the value of *ExtValue 4* is contiously beeing decreased at the rate of *ExtValue4 rate* until it reaches *ExtValue4LoLim*. **NOTE:** If this input is used (configured), the *ExtValue 4* can't be written remotely from a remote terminal using the command *ExtValue 4*.

Binary input: ExtValue1reset

Related FW	3.1.0
Description	The *ExtValue 1* is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint *ExtValue1deflt*. While the reset input is active: • The value does not respond to up and down inputs. • The value does not accept new data that are written remotely from a remote terminal using the *ExtValue* command. **NOTE:** Configuring of the reset input does not block writing the ExtValue remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.

Binary input: ExtValue2reset

Related FW	3.1.0
Description	The *ExtValue 2* is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint *ExtValue2deflt*. While the reset input is active: • The value does not respond to up and down inputs. • The value does not accept new data that are written remotely from a remote terminal using the *ExtValue* command. **NOTE:** Configuring of the reset input does not block writing the ExtValue remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.

Binary input: ExtValue3reset

Related FW	3.1.0

Description	The *ExtValue 3* is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint *ExtValue3deflt*. While the reset input is active: • The value does not respond to up and down inputs. • The value does not accept new data that are written remotely from a remote terminal using the *ExtValue* command. **NOTE:** Configuring of the reset input does not block writing the ExtValue remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.

Binary input: ExtValue4reset

Related FW	3.1.0
Description	The *ExtValue 4* is reset to it's default value when this input is activated and held there until the input is deactivated. The default value is given by the setpoint *ExtValue4deflt*. While the reset input is active: • The value does not respond to up and down inputs. • The value does not accept new data that are written remotely from a remote terminal using the *ExtValue* command. **NOTE:** Configuring of the reset input does not block writing the ExtValue remotely, in comparison to the up and down inputs, which does. However, if the reset input is active, the remotely written data are not accepted.

Binary input: RunIndication 1

Related FW	3.1.0
Description	This input is one of three inputs used for indication, that the engine is running, and has following functions: • If the input is active when the engine is expected to be stopped, then the *Stop fail* alarm is issued and start is blocked. • If the input becomes active while cranking, the engine is considered as started and the start-up procedure continues to the next phase (idle). **NOTE:** Learn more in the separate chapter Starting sequence.

Binary input: RunIndication 2

Related FW	3.1.0

Description	This input is one of three inputs used for indication, that the engine is running, and has following functions: • If the input is active when the engine is expected to be stopped, then the *Stop fail* alarm is issued and start is blocked. • If the input becomes active while cranking, the engine is considered as started and the start-up procedure continues to the next phase (idle). **NOTE:** Learn more in the separate chapter Starting sequence.

Binary input: RunIndication 3

Related FW	3.1.0
Description	This input is one of three inputs used for indication, that the engine is running, and has following functions: • If the input is active when the engine is expected to be stopped, then the *Stop fail* alarm is issued and start is blocked. • If the input becomes active while cranking, the engine is considered as started and the start-up procedure continues to the next phase (idle). **NOTE:** Learn more in the separate chapter Starting sequence.

Binary input: IssueActCallC1

Related FW	3.1.0
Description	This input forces the controller to issue an active call/e-mail/SMS via the channel #1. Type of the channel is to be adjusted by the setpoint *AcallCH1-Type*. This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return: 1. Select a binary signal in the controller, which indicates, that the particular situation occured, about which you want to be informed remotely. There are many predefined binary informations provided directly by the controller or use PLC functions to create the desired binary signal. 2. Configure an universal protection block to the binary signal mentioned above and select protection type *AL indication*. 3. Configure the binary signal mentioned above onto the logical binary input *IssueActCallC1*.

Binary input: IssueActCallC2

Related FW	3.1.0
Description	This input forces the controller to issue an active call/e-mail/SMS via the channel #2. Type of the channel is to be adjusted by the setpoint *AcallCH2-Type*. This input can be used to inform a remote user about a specific non-alarm

	situation, e.g. mains failure and/or mains return: 1. Select a binary signal in the controller, which indicates, that the particular situation occured, about which you want to be informed remotely. There are many predefined binary informations provided directly by the controller or use PLC functions to create the desired binary signal. 2. Configure an universal protection block to the binary signal mentioned above and select protection type *AL indication*. 3. Configure the binary signal mentioned above onto the logical binary input *IssueActCallC2*.

Binary input: IssueActCallC3

Related FW	3.1.0
Description	This input forces the controller to issue an active call/e-mail/SMS via the channel #3. Type of the channel is to be adjusted by the setpoint *AcallCH3-Type*. This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return: 1. Select a binary signal in the controller, which indicates, that the particular situation occured, about which you want to be informed remotely. There are many predefined binary informations provided directly by the controller or use PLC functions to create the desired binary signal. 2. Configure an universal protection block to the binary signal mentioned above and select protection type *AL indication*. 3. Configure the binary signal mentioned above onto the logical binary input *IssueActCallC3*.

Binary input: IssueActCallC4

Related FW	3.1.0
Description	This input forces the controller to issue an active call/e-mail/SMS via the channel #4. Type of the channel is to be adjusted by the setpoint *AcallCH4-Type*. This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return: 1. Select a binary signal in the controller, which indicates, that the particular situation occured, about which you want to be informed remotely. There are many predefined binary informations provided directly by the controller or use PLC functions to create the desired binary signal. 2. Configure an universal protection block to the binary signal mentioned above and select protection type *AL indication*. 3. Configure the binary signal mentioned above onto the logical binary input *IssueActCallC4*.

Binary input: IssueActCallC5

Related FW	3.1.0
Description	This input forces the controller to issue an active call/e-mail/SMS via the channel

	#5. Type of the channel is to be adjusted by the setpoint *AcallCH4-Addr*. This input can be used to inform a remote user about a specific non-alarm situation, e.g. mains failure and/or mains return: 1. Select a binary signal in the controller, which indicates, that the particular situation occured, about which you want to be informed remotely. There are many predefined binary informations provided directly by the controller or use PLC functions to create the desired binary signal. 2. Configure an universal protection block to the binary signal mentioned above and select protection type *AL indication*. 3. Configure the binary signal mentioned above onto the logical binary input *IssueActCallC5*.

Binary input: AccessLock D#2

Related FW	3.1.0
Description	This input forces the external **local** terminal or IntelliVision (display) #2 into monitoring mode. **NOTE:** Local display means that it is connected to dedicated RS485. There is possibility to connect up to 2 external displays in IG-NT-BB or 1 in IG-NT. It is possible to connect up to 3 external displays in IS-NT-BB and in IS-NT. • Setpoints changes are disabled. • Using control buttons on the panel is disabled even if the controller is in MAN mode. • Change of controller mode is disabled.

Binary input: AccessLock D#3

Related FW	3.1.0
Description	**NOTE:** For IS-NT and IS-NT-BB only. This input forces the external **local** terminal or IntelliVision (display) #3 into monitoring mode. **NOTE:** Local display means that it is connected to dedicated RS485. There is possibility to connect up to 2 external displays in IG-NT-BB or 1 in IG-NT. It is possible to connect up to 3 external displays in IS-NT-BB and in IS-NT. • Setpoints changes are disabled. • Using control buttons on the panel is disabled even if the controller is in MAN mode. • Change of controller mode is disabled.

Binary input: NeutralCB fdb

Related FW	3.1.0
Description	This input is used for connection of the normally open feedback contact from the Neutral contactor. If the input is active, the controller will consider the neutral contactor as closed and vice versa. See also description of the setpoint *#Neutral cont.*.

Binary input: CylDifEvalBlk

Related FW	3.1.0
Description	This input is used to disable temporarily evaluation of the alarms caused by cylinder temperatures deviations. **NOTE:** For IS-NT only.

Binary input: ECU StoppedEng

Related FW	3.1.0
Description	When this input is activated, the genset will be stopped immdiately without unloading and cooling phase, however no alarm will be issued. This input is intended for situations, where the genset is controller by an ECU or other device which also includes engine protections and can stop the engine itself. In such case the controller would issue an *Underspeed* alarm. Connecting this input to an appropriate ECU output, which provides information, that the engine has been stopped by the ECU, prevents the controller from issuing the underspeed alarm.

Binary input: CtrlHBeat sens

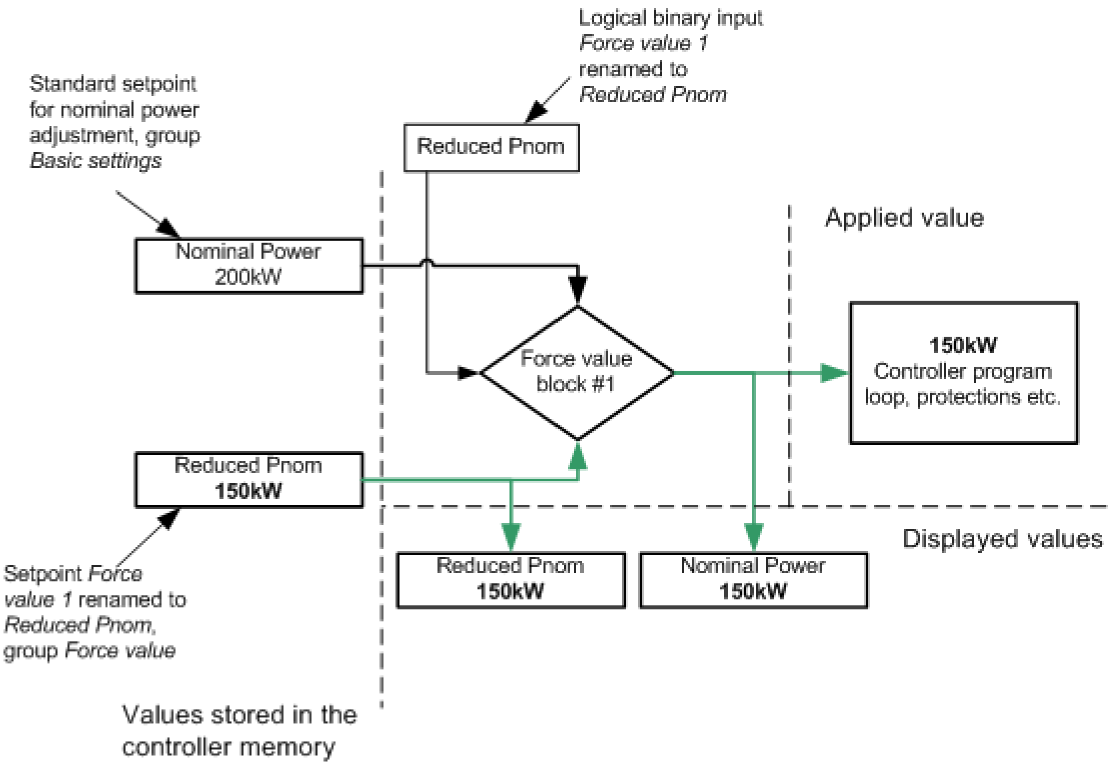
Related FW	3.1.0
Description	This input is used at a redundant controller to sense the "heart beat" from the main controller. The input is to be connected to the output *CtrlHeartBeat* of the main controller. If the redundant controller does not sense the heart beat from the main one, it will activate the binary output *CtrlHBeat FD*, which has to be wired such a way, that it disconnects the dead main controller from the genset, connects the redundant controller instead and activates it. **NOTE:** Learn more about redundancy in separate chapter Redundant controllers.

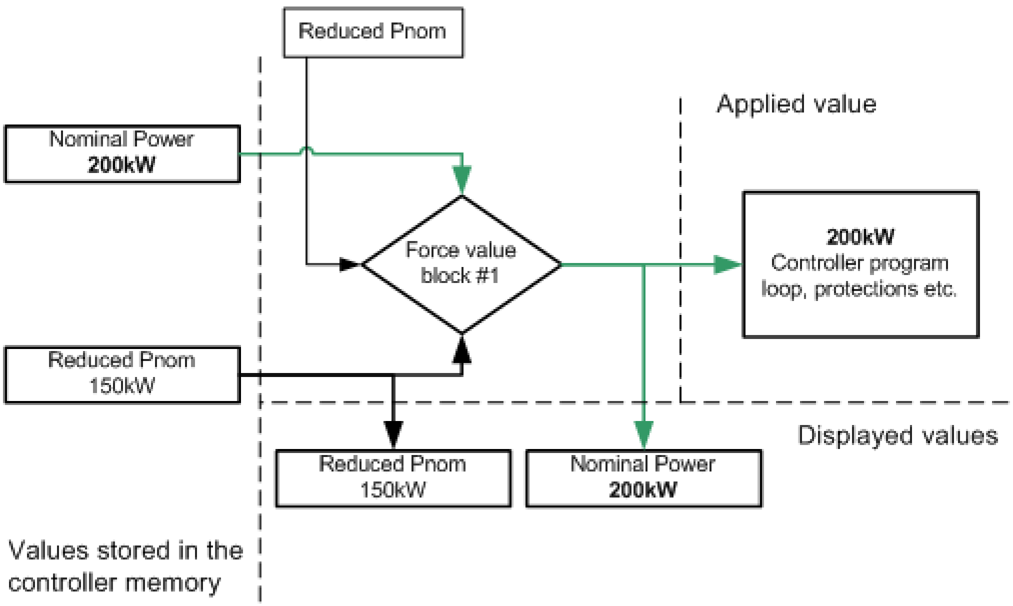
Binary input: Nominal speed

Related FW	3.1.0

Description	Use this input to bypass the idle phase of the start-up procedure. **NOTE:** The input is especially designed for shortening of the start-up procedure when the gen-set is starting to an AMF operation.

Binary input: ForceValueIn 1

Related FW	3.1.0
Description	This input activates the *Force value #1* block. If the input is active, the value of the setpoint, to which the Force value #1 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #1 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/.  EXAMPLE OF AN ACTIVE FORCE VALUE BLOCK



EXAMPLE OF AN INACTIVE FORCE VALUE BLOCK

Binary input: ForceValueIn 2

Related FW	3.1.0
Description	This input activates the *Force value #2* block. If the input is active, the value of the setpoint, to which the Force value #2 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #2 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 3

Related FW	3.1.0
Description	This input activates the *Force value #3* block. If the input is active, the value of the setpoint, to which the Force value #3 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #3 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint).

	NOTE: Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 4

Related FW	3.1.0
Description	This input activates the *Force value #4* block. If the input is active, the value of the setpoint, to which the Force value #4 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #4 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 5

Related FW	3.1.0
Description	This input activates the *Force value #5* block. If the input is active, the value of the setpoint, to which the Force value #5 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #5 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 6

Related FW	3.1.0
Description	This input activates the *Force value #6* block. If the input is active, the value of the

	setpoint, to which the Force value #6 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #6 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 7

Related FW	3.1.0
Description	This input activates the *Force value #7* block. If the input is active, the value of the setpoint, to which the Force value #7 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #7 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 8

Related FW	3.1.0
Description	This input activates the *Force value #8* block. If the input is active, the value of the setpoint, to which the Force value #8 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #8 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:**

	See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn 9

Related FW	3.1.0
Description	This input activates the *Force value #9* block. If the input is active, the value of the setpoint, to which the Force value #9 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #9 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn10

Related FW	3.1.0
Description	This input activates the *Force value #10* block. If the input is active, the value of the setpoint, to which the Force value #10 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #10 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn11

Related FW	3.1.0
Description	This input activates the *Force value #11* block. If the input is active, the value of the setpoint, to which the Force value #11 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #11 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block

	according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn12

Related FW	3.1.0
Description	This input activates the *Force value #12* block. If the input is active, the value of the setpoint, to which the Force value #12 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #12 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn13

Related FW	3.1.0
Description	This input activates the *Force value #13* block. If the input is active, the value of the setpoint, to which the Force value #13 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #13 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn14

Related FW	3.1.0
Description	This input activates the *Force value #14* block. If the input is active, the value of the setpoint, to which the Force value #14 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #14 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn15

Related FW	3.1.0
Description	This input activates the *Force value #15* block. If the input is active, the value of the setpoint, to which the Force value #15 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #15 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:** Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: ForceValueIn16

Related FW	3.1.0
Description	This input activates the *Force value #16* block. If the input is active, the value of the setpoint, to which the Force value #16 block is configured, will be overriden by value of the alternative setpoint assigned to the Force value #16 block. **NOTE:** If there are more than one force value blocks configured onto one setpoint then the highest priority has the block with the lowest index (i.e. the first active block according to the list displayed in GenConfig in the Force value window at the related setpoint). **NOTE:**

	Watch a training video about force value function here: http://www.comap.cz/support/training/training-videos/. **NOTE:** See an example in the description of the binary input *Force value 1*.

Binary input: Force block 1

Related FW	3.1.0
Description	This is one of three binary inputs used for user-defined blocking of protections. If the input is active, all the protections that have *Protection block type* configured as *Force block 1* block type are blocked (i.e. temporarily disabled).

Binary input: Force block 2

Related FW	3.1.0
Description	This is one of three binary inputs used for user-defined blocking of protections. If the input is active, all the protections that have *Protection block type* configured as *Force block 2* block type are blocked (i.e. temporarily disabled).

Binary input: Force block 3

Related FW	3.1.0
Description	This is one of three binary inputs used for user-defined blocking of protections. If the input is active, all the protections that have *Protection block type* configured as *Force block 3* block type are blocked (i.e. temporarily disabled).

Binary input: Lang sel int A

Related FW	3.1.0
Description	This is one of three binary inputs *Lang sel int A*, *Lang sel int B*, *Lang sel int C*, used for selecting language of the **built-in** IG-NT terminal (display). As the IS-NT does not have built-in terminal, this input is assigned to the terminal (display) #1, which is supposed to be directly attached to the controller or mounted close to it. **NOTE:** Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal. ENCODING TABLE

LANGUAGE INDEX	INPUT A	INPUT B	INPUT C
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0

	4	0	0	1
	5	1	0	1
	6	0	1	1
	7	1	1	1

NOTE:
"0" in the table means the input is not active or not configured.

NOTE:
Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.

NOTE:
The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel int B

Related FW	3.1.0
Description	This is one of three binary inputs *Lang sel int A*, *Lang sel int B*, *Lang sel int C*, used for selecting language of the **built-in** IG-NT terminal (display). As the IS-NT does not have built-in terminal, this input is assigned to the terminal (display) #1, which is supposed to be directly attached to the controller or mounted close to it. **NOTE:** Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal. ENCODING TABLE

LANGUAGE INDEX	INPUT A	INPUT B	INPUT C
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

NOTE:
"0" in the table means the input is not active or not configured.

NOTE:

	Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus. **NOTE:** The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used). **CAUTION!** Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel int C

Related FW	3.1.0
Description	This is one of three binary inputs *Lang sel int A*, *Lang sel int B*, *Lang sel int C*, used for selecting language of the **built-in** IG-NT terminal (display). As the IS-NT does not have built-in terminal, this input is assigned to the terminal (display) #1, which is supposed to be directly attached to the controller or mounted close to it. **NOTE:** Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.

ENCODING TABLE

LANGUAGE INDEX	INPUT A	INPUT B	INPUT C
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

NOTE:
"0" in the table means the input is not active or not configured.

NOTE:
Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.

NOTE:
The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#2 A

Related FW	3.1.0
Description	This is one of three binary inputs *Lang sel D#2 A*, *Lang sel D#2 B*, *Lang sel D#2 C*, used for selecting language of the **external** local terminal #2. **NOTE:** Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal. ENCODING TABLE (see table below) **NOTE:** "0" in the table means the input is not active or not configured. **NOTE:** Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus. **NOTE:** The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used). **CAUTION!** Each language change causes the reinitialization of the display. Function of the controller is not influenced.

ENCODING TABLE

LANGUAGE INDEX	INPUT A	INPUT B	INPUT C
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

Binary input: Lang sel D#2 B

Related FW	3.1.0
Description	This is one of three binary inputs *Lang sel D#2 A*, *Lang sel D#2 B*, *Lang sel D#2 C*, used for selecting language of the **external** local terminal #2. **NOTE:** Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal. ENCODING TABLE

LANGUAGE INDEX	INPUT A	INPUT B	INPUT C
0	0	0	0

1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

NOTE:
"0" in the table means the input is not active or not configured.

NOTE:
Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.

NOTE:
The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#2 C

Related FW	3.1.0
Description	This is one of three binary inputs *Lang sel D#2 A*, *Lang sel D#2 B*, *Lang sel D#2 C*, used for selecting language of the **external** local terminal #2.

NOTE:
Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.

ENCODING TABLE

LANGUAGE INDEX	INPUT A	INPUT B	INPUT C
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

NOTE:

	"0" in the table means the input is not active or not configured. **NOTE:** Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus. **NOTE:** The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used). **CAUTION!** Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#3 A

Related FW	3.1.0
Description	This is one of three binary inputs *Lang sel D#3 A*, *Lang sel D#3 B*, *Lang sel D#3 C*, used for selecting language of the **external** local terminal #3. The terminal #3 is available in IS-NT only. **NOTE:** Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.

ENCODING TABLE

LANGUAGE INDEX	INPUT A	INPUT B	INPUT C
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

NOTE:
"0" in the table means the input is not active or not configured.

NOTE:
Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.

NOTE:
The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#3 B

Related FW	3.1.0
Description	This is one of three binary inputs *Lang sel D#3 A*, *Lang sel D#3 B*, *Lang sel D#3 C*, used for selecting language of the **external** local terminal #3. The terminal #3 is available in IS-NT only. **NOTE:** Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.

ENCODING TABLE

LANGUAGE INDEX	INPUT A	INPUT B	INPUT C
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

NOTE:
"0" in the table means the input is not active or not configured.

NOTE:
Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus.

NOTE:
The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used).

CAUTION!
Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: Lang sel D#3 C

Related FW	3.1.0
Description	This is one of three binary inputs *Lang sel D#3 A*, *Lang sel D#3 B*, *Lang sel D#3 C*, used for selecting language of the **external** local terminal #3. The terminal #3 is available in IS-NT only. **NOTE:** Using these inputs for language selection is an option only. If the inputs are not configured, the language can be selected using the menus on the terminal.

	ENCODING TABLE <table><tr><th>LANGUAGE INDEX</th><th>INPUT A</th><th>INPUT B</th><th>INPUT C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td><td>0</td></tr><tr><td>3</td><td>1</td><td>1</td><td>0</td></tr><tr><td>4</td><td>0</td><td>0</td><td>1</td></tr><tr><td>5</td><td>1</td><td>0</td><td>1</td></tr><tr><td>6</td><td>0</td><td>1</td><td>1</td></tr><tr><td>7</td><td>1</td><td>1</td><td>1</td></tr></table> **NOTE:** "0" in the table means the input is not active or not configured. **NOTE:** Language index 0 selects the default language of the terminal, i.e. the language, which is adjusted in the terminal using it's menus. **NOTE:** The reaction on changes of these inputs is delayed about 1 sec to ensure the new combination is valid (e.g. if a rotary selector switch is used). **CAUTION!** Each language change causes the reinitialization of the display. Function of the controller is not influenced.

Binary input: User mask 1

Related FW	3.1.0
Description	This input allows user to activate chosen function in ScreenEditor (tool for GenConfig) for particular screen instrument. User may choose from the following functions: <table><tr><th>NONE</th><th>SHOW</th><th>HIDE</th></tr><tr><td>No action regarding this screen instrument is taken.</td><td>By default the screen instrument is hidden. If any of mask inputs (User mask 1, User mask 2, User mask 3, User mask 4 or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.</td><td>By default the screen instrument is shown. If any of mask inputs (User mask 1, User mask 2, User mask 3, User mask 4 or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.</td></tr></table> E.g. this function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..4 can be used

	to define any custom condition for this "swapping" function.

Binary input: User mask 2

Related FW	3.1.0
Description	This input allows user to activate chosen function in ScreenEditor (tool for GenConfig) for particular screen instrument. User may choose from the following functions: **NONE**: No action regarding this screen instrument is taken. **SHOW**: By default the screen instrument is hidden. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is shown. **HIDE**: By default the screen instrument is shown. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden. E.g. this function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..4 can be used to define any custom condition for this "swapping" function.

NONE	SHOW	HIDE
No action regarding this screen instrument is taken.	By default the screen instrument is hidden. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.	By default the screen instrument is shown. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.

Binary input: User mask 3

Related FW	3.1.0
Description	This input allows user to activate chosen function in ScreenEditor (tool for GenConfig) for particular screen instrument. User may choose from the following functions: E.g. this function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..4 can be used to define any custom condition for this "swapping" function.

NONE	SHOW	HIDE
No action regarding this screen instrument is taken.	By default the screen instrument is hidden. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.	By default the screen instrument is shown. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.

Binary input: User mask 4

Related FW	3.1.0
Description	This input allows user to activate chosen function in ScreenEditor (tool for GenConfig) for particular screen instrument. User may choose from the following functions: <table><tr><th>NONE</th><th>SHOW</th><th>HIDE</th></tr><tr><td>No action regarding this screen instrument is taken.</td><td>By default the screen instrument is hidden. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is shown.</td><td>By default the screen instrument is shown. If any of mask inputs (*User mask 1*, *User mask 2*, *User mask 3*, *User mask 4* or other switches) connected to this particular screen instrument is activated, this screen instrument is hidden.</td></tr></table> E.g. this function can be used to "swap" between two different screen instruments when certain conditions are fulfilled. Logical binary inputs Mask 1..4 can be used to define any custom condition for this "swapping" function.

Binary input: SUS excit blck

Related FW	3.1.0
Description	the LBI SUS excit blck is used forblocking of the excitation of the alternator while the setpoint *ExcitationCtrl* is set to EXTERNAL mode.

Table of analog input functions

Analog input: LdCtrl:AnExBld

Related FW	3.1.0
Description	This functional input is used for requesting the **gen-set baseload** externally by an analog input. The setpoint *Load ctrl PtM* must be set to ANEXT BASELOAD position.

Analog input: LdCtrl:AnExI/E

Related FW	3.1.0
Description	This functional input is used for requesting the **mains import** value externally by an analog input. The setpoint *Load ctrl PtM* must be set to ANEXT IM/EX position.

Analog input: PFCtrl:AnExBPF

Related FW	3.1.0
Description	This functional input is used for requesting the **gen-set cos phi** factor externally

<table>
<tr><td></td><td>by an analog input. The setpoint PF ctrl PtM must be set to ANEXT BASEPF position.

The analog value is transformed to the requested cos phi factor following way:

<table>
<tr><th>ANALOG VALUE</th><th>COS PHI FACTOR</th></tr>
<tr><td><60</td><td>0.6L</td></tr>
<tr><td>60 .. 100</td><td>0.6L .. 1.00</td></tr>
<tr><td>101 .. 120</td><td>0.99C .. 0.80C</td></tr>
</table>
</td></tr>
</table>

Analog input: PFCtrl:AnExI/E

<table>
<tr><td>Related FW</td><td>3.1.0</td></tr>
<tr><td>Description</td><td>This functional input is used for requesting the mains cos phi factor externally by an analog input. The setpoint PF ctrl PtM must be set to ANEXT PF-IM/EX position.

The analog value is transformed to the requested cos phi factor following way:

<table>
<tr><th>ANALOG VALUE</th><th>COS PHI FACTOR</th></tr>
<tr><td><60</td><td>0.6L</td></tr>
<tr><td>60 .. 100</td><td>0.6L .. 1.00</td></tr>
<tr><td>101 .. 120</td><td>0.99C .. 0.80C</td></tr>
</table>
</td></tr>
</table>

Analog input: LdCtrl:I/E-Pm

Related FW	3.1.0
Description	This functional input is used for connecting of an external device, which measures the **active** power imported from the mains. The device is connected to the controller via an analog input (e.g. -20 .. 20mA). The setpoint *I/E-Pm meas* must be set to the ANALOG INPUT position for this case.

Analog input: PFCtrl:I/E-Qm

Related FW	3.1.0
Description	This functional input is used for connecting of an external device, which measures the **reactive** power imported from the mains. The device is connected to the controller via an analog input (e.g. -20 .. 20mA). The setpoint *I/E-Qm meas* must be set to the ANALOG INPUT position for this case.

Analog input: LCD brightness

Related FW	3.1.0

Description	This functional input is used to adjust the backlight intensity of the **IG-NT built-in** terminal (display) by an analog input (e.g. a potentiometer). If this input is configured to a physical analog input or other value, the brightness adjusted by buttons at the terminal is overriden by this analog input.

Analog input: RPM pick-up

Related FW	3.1.0
Description	This functional input is used for reading of the gen-set speed from other source than pickup or generator frequency. This source is typically an ECU unit, which provides the speed at the communication bus. **NOTE:** See also the chapter Engine speed measurement.

Analog input: Oil press

Related FW	3.1.0
Description	This functional input is used as an additional information whether the engine is running or not. If you want to use this additional feature configure this input onto the physical analog input where the oil pressure sensor is connected and adjust the setpoint *Starting POil* to cca 50% of typical engine oil pressure at idle speed. **NOTE:** See also the chapter Running engine detection.

Analog input: Warming temp

Related FW	3.1.0
Description	This functional input is used for *engine warming*. See also the setpoint *Warming load*.

Analog input: Fuel level

Related FW	3.1.0
Description	This logical analog input is used for evaluation of the *Fuel theft* alarm. Learn more in the description of the setpoint *MaxLevelDrop*.

Analog input: PowerDerating1

Related FW	3.1.0
Description	This is the input into the *Power derating* block #1. See details about the function in the chapter Power derating.

Analog input: PowerDerating2

Related FW	3.1.0
Description	This is the input into the *Power derating* block #2. See details about the function in the chapter Power derating.

Analog input: LdCtrl:TByPwr

Related FW	3.1.0
Description	This functional input is used as the temperature input into the load control loop if the loop is switched into "T BY PWR" position. More information is available at the setpoint *Load ctrl PtM*.

Analog input: Cyl temp 1

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #1. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 2

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #2. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 3

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #3. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 4

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #4. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:**

	Available in IS-NT only.

Analog input: Cyl temp 5

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #5. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 6

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #6. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 7

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #7. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 8

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #8. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 9

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #9. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 10

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #10. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 11

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #11. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 12

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #12. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 13

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #13. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 14

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #14. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 15

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #15. Used for computing of values _T Cyl aver_, _T Cyl max_, _T Cyl min_. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 16

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #16. Used for computing of values _T Cyl aver_, _T Cyl max_, _T Cyl min_. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 17

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #17. Used for computing of values _T Cyl aver_, _T Cyl max_, _T Cyl min_. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 18

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #18. Used for computing of values _T Cyl aver_, _T Cyl max_, _T Cyl min_. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 19

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #19. Used for computing of values _T Cyl aver_, _T Cyl max_, _T Cyl min_. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 20

Related FW	3.1.0

Description	Logical analog input for cylinder temperature #20. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 21

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #21. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 22

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #22. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 23

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #23. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 24

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #24. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 25

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #25. Used for computing of values *T*

	Cyl aver, T Cyl max, T Cyl min. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 26

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #26. Used for computing of values T Cyl aver, T Cyl max, T Cyl min. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 27

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #27. Used for computing of values T Cyl aver, T Cyl max, T Cyl min. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 28

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #28. Used for computing of values T Cyl aver, T Cyl max, T Cyl min. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 29

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #29. Used for computing of values T Cyl aver, T Cyl max, T Cyl min. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 30

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #30. Used for computing of values T Cyl aver, T Cyl max, T Cyl min.

	NOTE: Available in IS-NT only.

Analog input: Cyl temp 31

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #31. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cyl temp 32

Related FW	3.1.0
Description	Logical analog input for cylinder temperature #32. Used for computing of values *T Cyl aver*, *T Cyl max*, *T Cyl min*. **NOTE:** Available in IS-NT only.

Analog input: Cold temp 1

Related FW	3.1.0
Description	If there is an additional terminal board between a thermocouple and the IS-AIN8 module and there is a significant temperature difference between this terminal board and the module, it is necessary to measure the temperature at this terminal board and use this temperature for the thermocouple compensation instead of the internal temperature of the module. This analog input is intended for measuement of this thermocouple compensation temperature for the IS-AIN8 module with index #1. **NOTE:** Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.

Analog input: Cold temp 2

Related FW	3.1.0
Description	If there is an additional terminal board between a thermocouple and the IS-AIN8 module and there is a significant temperature difference between this terminal board and the module, it is necessary to measure the temperature at this terminal board and use this temperature for the thermocouple compensation instead of the internal temperature of the module. This analog input is intended for measuement of this thermocouple compensation temperature for the IS-AIN8 module with index #2.

	NOTE: Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.

Analog input: Cold temp 3

Related FW	3.1.0
Description	If there is an additional terminal board between a thermocouple and the IS-AIN8 module and there is a significant temperature difference between this terminal board and the module, it is necessary to measure the temperature at this terminal board and use this temperature for the thermocouple compensation instead of the internal temperature of the module. This analog input is intended for measuement of this thermocouple compensation temperature for the IS-AIN8 module with index #3. **NOTE:** Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.

Analog input: Cold temp 4

Related FW	3.1.0
Description	If there is an additional terminal board between a thermocouple and the IS-AIN8 module and there is a significant temperature difference between this terminal board and the module, it is necessary to measure the temperature at this terminal board and use this temperature for the thermocouple compensation instead of the internal temperature of the module. This analog input is intended for measuement of this thermocouple compensation temperature for the IS-AIN8 module with index #4. **NOTE:** Thermocouples without internal compensation "Thermo(nc)..." must be used for this case.

Table of binary output functions

Binary output: Starter

Related FW	3.1.0
Description	The output is used to energize the starter motor. The output closes at the begining of start sequence after prestart has been completed and opens when the engine is started. **NOTE:** Learn more in the separate chapter Starting sequence.

Binary output: Fuel Solenoid

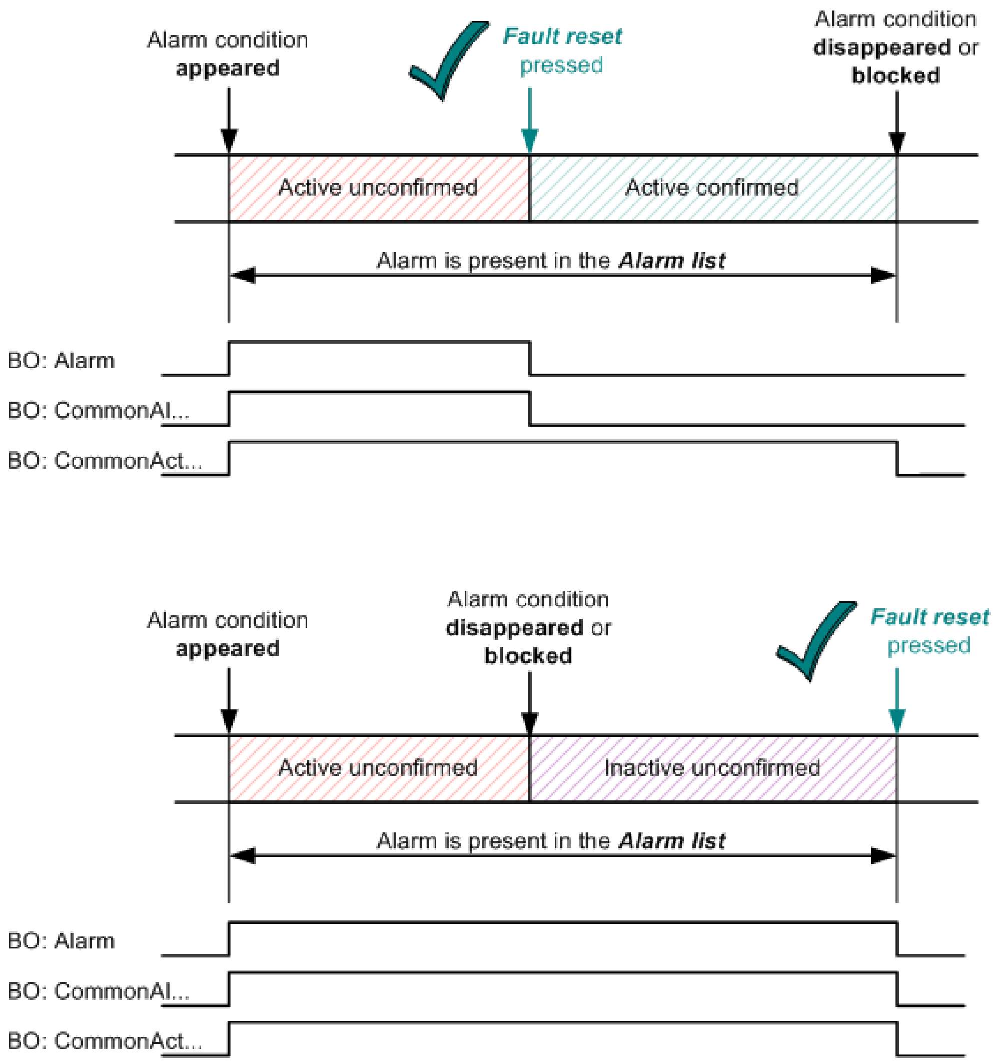
Related FW	3.1.0
Description	This output is used for control of the engine fuel valve. The fuel valve can be either a fuel solenoid of diesel engine or a gas valve of gas engine. The behavior of this output is to be selected by the setpoint *Fuel solenoid*. **NOTE:** Learn more in the separate chapter Starting sequence.

Binary output: Prestart

Related FW	3.1.0
Description	This output can be used for control of any device, which has to be activated just before start, i.e. glow plugs. The output is closed for time period of *Prestart time* prior to activating of the starter motor and remains closed during cranking and also during pause between cranking attempts. **NOTE:** Learn more in the separate chapter Starting sequence.

Binary output: Alarm

Related FW	3.1.0
Description	The output is closed if there is at least one **unconfirmed** alarm in the alarm list. **NOTE:** Some alarm types as e.g. *Off load*, *History record*, *Low power*, *Mains protection* do not require confirmation, they disappear from the alarm list automatically when the alarm condition disappears. That means the *Alarm* output is not activated by alarms of these types.



ALARM STATES AND BEHAVIOR OF RELATED OUTPUTS

Binary output: Horn

Related FW	3.1.0
Description	The output closes together with the output *Alarm*. It opens when the output *Alarm* is opened or *Horn reset* button is pressed or *Horn timeout* has elapsed.

Binary output: CommonAlLev 1

Related FW	3.1.0
Description	This output is active if there is at least one **unconfirmed** 1st-level (yellow) alarm present in the alarm list. See the chapter Alarm management for more information.

Binary output: CommonAlLev 2

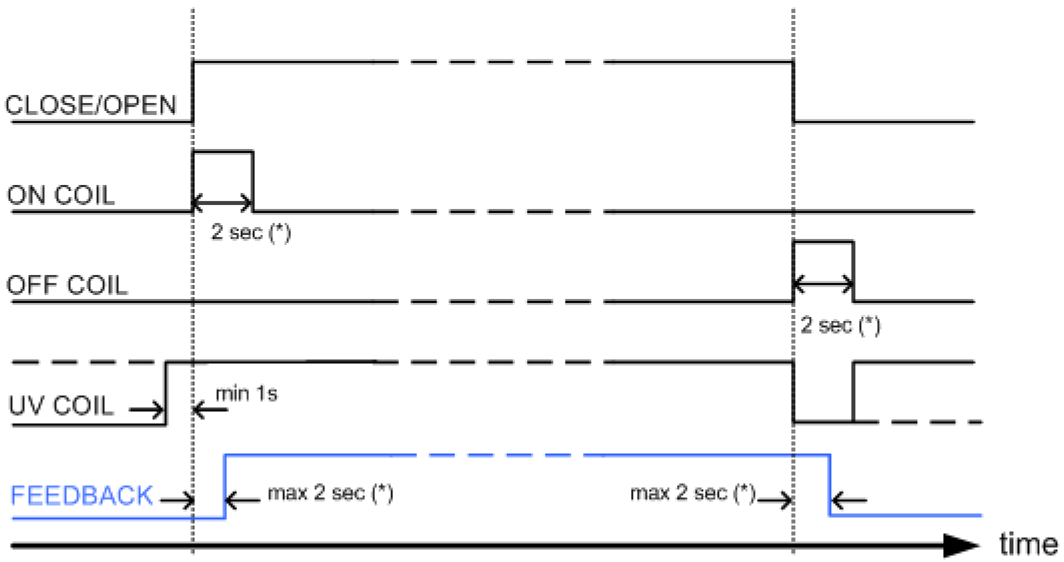
Related FW	3.1.0

Description	This output is active if there is at least one **unconfirmed** 2nd-level (red) alarm present in the alarm list. See the chapter Alarm management for more information.

Binary output: Cooling Pump

Related FW	3.1.0
Description	This output is used for control of an external electric motor-driven cooling pump. The output closes when the gen-set is started (i.e. at the end of the *Starting* period) and opens at the end of the *Aftercooling* period, which takes place after the engine has been fully stopped. Duration of the aftercooling period is adjusted by the setpoint *AfterCool time*. The output opens immediately when *Emergency stop* is activated or if the controller is switched to OFF mode.

Binary output: GCB Close/Open

Related FW	3.1.0
Description	This output is intended for control of the GCB if a **contactor** is used as GCB. The output provides continuous signal while the GCB has to be closed. There are also other outputs availabe for GCB control: • *GCB ON coil* • *GCB OFF coil* • *GCB UV coil*  (*) 5 sec if synchronizing with the particular breaker is disabled. TIMING OF BREAKER CONTROL OUTPUTS

Binary output: GCB ON Coil

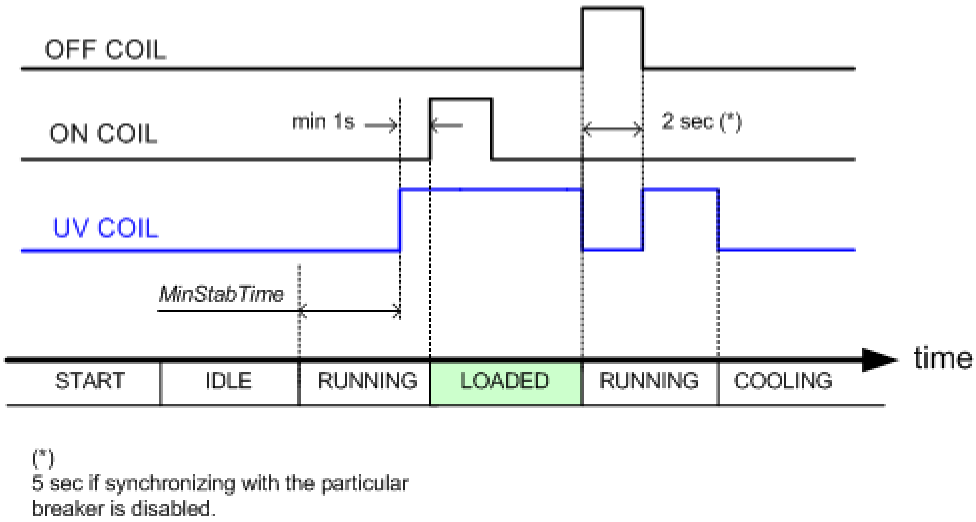
Related FW	3.1.0
Description	This output is intended for closing of the GCB using ON coil if a **circuit breaker** is used as GCB. The output provides 2 sec pulse when the GCB has to close. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5sec. See timing diagram of all available breaker control outputs in the description of the *GCB close/open* output. There are also other outputs availabe for GCB control: • *GCB close/open* • *GCB OFF coil* • *GCB UV coil*

Binary output: GCB OFF Coil

Related FW	3.1.0
Description	This output is intended for opening of the GCB using OFF coil if a **circuit breaker** is used as GCB. The output provides 2 sec pulse when the GCB has to open. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5sec. See timing diagram of all available breaker control outputs in the description of the *GCB close/open* output. There are also other outputs availabe for GCB control: • *GCB close/open* • *GCB ON coil* • *GCB UV coil*

Binary output: GCB UV Coil

Related FW	3.1.0
Description	This output is intended for opening of the GCB using an undervoltage coil if a **circuit breaker** is used as GCB. • The output is closed after the gen-set has been started, *Min stab time* has elapsed and the generator voltage and frequency has got into limits. GCB closing command is blocked for 1 sec after the UV coil has been closed to allow the breaker mechanical system getting ready for closing. • The output is opened for 2 sec when the GCB has to open. If synchronizing is disabled with the particular breaker, the length of the inverse pulse is extended to 5sec. • The output is closed again and remains closed while the generator voltage and frequency are in limits, if the *Running* phase follows after opening of the GCB (e.g. in MAN). • The output remains opened if the *Cooling* phase follows after opening of

	the GCB.  GCB UV COIL OUTPUT TIMING There are also other outputs availabe for GCB control: • *GCB close/open* • *GCB ON coil* • *GCB OFF coil*

Binary output: MCB Close/Open

Related FW	3.1.0
Description	This output is intended for control of the MCB if a **contactor** is used as MCB. The output provides continuous signal while the MCB has to be closed. See timing diagram of all available breaker control outputs in the description of the *GCB close/open* output. **NOTE:** Use *invert* function when configuring the output in GenConfig to obtain **inverted function** of the output, i.e. output is closed while the MCB has to be open. There are also other outputs availabe for MCB control: • *MCB ON coil* • *MCB OFF coil* • *MCB UV coil*

Binary output: MCB ON Coil

Related FW	3.1.0

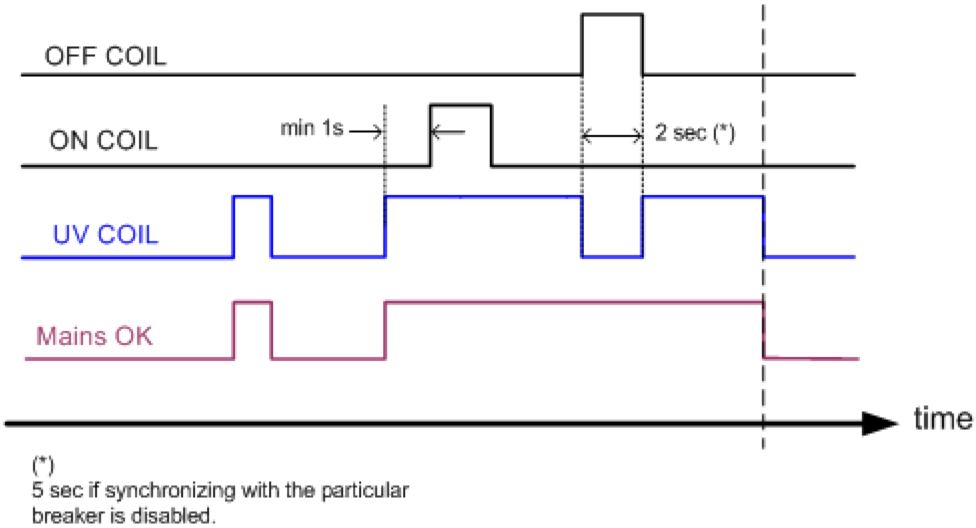
Description	This output is intended for closing of the MCB using ON coil if a **circuit breaker** is used as MCB. The output provides 2 sec pulse when the MCB has to close. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5sec. See timing diagram of all available breaker control outputs in the description of the *GCB close/open* output. There are also other outputs availabe for MCB control: • *MCB close/open* • *MCB OFF coil* • *MCB UV coil*

Binary output: MCB OFF Coil

Related FW	3.1.0
Description	This output is intended for opening of the MCB using OFF coil if a **circuit breaker** is used as MCB. The output provides 2 sec pulse when the MCB has to open. If synchronizing is disabled with the particular breaker, the pulse length is extended to 5sec. See timing diagram of all available breaker control outputs in the description of the *GCB close/open* output. There are also other outputs availabe for MCB control: • *MCB close/open* • *MCB ON coil* • *MCB UV coil*

Binary output: MCB UV Coil

Related FW	3.1.0
Description	This output is intended for opening of the MCB using an undervoltage coil if a **circuit breaker** is used as MCB. • The output is closed while mains values are within limits. MCB closing command is blocked for 1 sec after the UV coil has been closed to allow the breaker mechanical system getting ready for closing. • The output is opened for 2 sec when the MCB has to open. If synchronizing is disabled with the particular breaker, the length of the inverse pulse is extended to 5sec.



MCB UV COIL OUTPUT TIMING

There are also other outputs availabe for GCB control:

- *MCB close/open*
- *MCB ON coil*
- *MCB OFF coil*

Binary output: Stop Solenoid

Related FW	3.1.0
Description	This output is used at diesel engines equipped with fuel valve, which **must be energized to stop the engine**. The output is closed when the engine has to stop, remains closed while the engine is stopping and is opened back if the engine has successfuly stopped and stop time elapsed. For other stopping sequences please refer to Stop sequence chapter. The total time this output is continuously active is never shorter than *Stop time*, i.e. if the gen-set stops quickly, the output may remain closed eventhough all symptoms indicate the engine is stopped. This output is also closed if the engine begins to rotate unexpectedly, i.e. if it is started manually directly on the engine. To allow the engine to be operated manually without intervention from the controller, switch the controller to the *emergency manual* mode using the input *Emerg. manual*. **NOTE:** Learn more about this topic in the separate chapter Stop sequence.

Binary output: Stop Pulse

Related FW	3.1.0

Description	One second pulse is issued at this output when the engine is required to stop (i.e. this pulse does not commence stopping sequence but it is rather an actual command to engine physical stopping). The output is especially intended to be used as stop command for ECU-controlled engines, which support stop command via the communication bus (e.g. J1939).

Binary output: Speed up

Related FW	3.1.0
Description	This output together with the complementary output *Speed dn* are designed for speed and power control at gen-sets where the speed governor does not support analogue control. **NOTE:** The governor is recommended to be configured for droop function when these outputs are used for power control. **NOTE:** The alarm *Wrn SpdRegLim* is disabled when this output is used (configured onto any controller terminal or virtual output).

Binary output: Speed dn

Related FW	3.1.0
Description	This output together with the complementary output *Speed up* are designed for speed and power control at gen-sets where the speed governor does not support analogue control. **NOTE:** The governor is recommended to be configured for droop function when these outputs are used for power control. **NOTE:** The alarm *Wrn SpdRegLim* is disabled when this output is used (configured onto any controller terminal or virtual output).

Binary output: AVR up

Related FW	3.1.0
Description	This output together with the complementary output *AVR dn* are designed for voltage and power factor control at gen-sets where the AVR does not support analogue control. **NOTE:** The AVR is recommended to be configured for droop function when these outputs are used for power factor control. **NOTE:** The alarm *Wrn VoltRegLim* is disabled when this output is used (configured onto any controller terminal or virtual output).

Binary output: AVR dn

Related FW	3.1.0
Description	This output together with the complementary output [*AVR up*]() are designed for voltage and power factor control at gen-sets where the AVR does not support analogue control. **NOTE:** The AVR is recommended to be configured for droop function when these outputs are used for power factor control. **NOTE:** The alarm *Wrn VoltRegLim* is disabled when this output is used (configured onto any controller terminal or virtual output).

Binary output: Vgen <>

Related FW	3.1.0
Description	The output is closed while the *generator over/under voltage* alarm is present in the alarm list.

Binary output: Vmains <>

Related FW	3.1.0
Description	The output is closed while the *mains over/under voltage* alarm is present in the alarm list.

Binary output: Overcurrent

Related FW	3.1.0
Description	The output is closed while there is either the *Generator IDMT Overcurrent* or *Generator Short current* alarms present in the alarm list.

Binary output: VectorShiftTrp

Related FW	3.1.0
Description	The output closes if the *Vector shift* protection gets active and the controller trips the selected breaker. The output stays closed for 3s, then opens again. **NOTE:** See also the output *VectorShiftAct*.

Binary output: VectorShiftAct

Related FW	3.1.0
Description	The output closes if the Vector shift protection gets active. It stays closed for 3s, then opens again. This output is activated even if the selected breaker is actually

	not tripped because of the input *Sd override* is active. **NOTE:** See also the output *VectorShiftTrp*.

Binary output: Common Wrn

Related FW	3.1.0
Description	The output is closed while there is at least one alarm of the *Warning* type present in the alarm list. The alarm can be in any state, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Alarm management for more information.

Binary output: Common Sd

Related FW	3.1.0
Description	The output is closed while there is at least one alarm of the *Shutdown* type present in the alarm list. The alarm can be in any state, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Alarm management for more information.

Binary output: Common SdOvr

Related FW	3.1.0
Description	Common output that closes with 2s delay if any Shutdown override-type protection becomes active. If it is already active and another protection of that type becomes active, the output is deactivated for 2 seconds and then reactivated again to inform on this new alarm.

Binary output: Common Stp

Related FW	3.1.0
Description	The output is closed while there is at least one alarm of the *Slow stop* type present in the alarm list. The alarm can be in any state, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Alarm management for more information.

Binary output: Common Fls

Related FW	3.1.0
Description	The output is closed while there is at least one alarm of the *Sensor fail* type present in the alarm list. The alarm can be in **any state**, i.e. active unconfirmed, active confirmed or inactive unconfirmed.See the chapter Alarm management for more information.

Binary output: Common LoP

Related FW	3.1.0
Description	This IS-NT specific function! The output is closed while there is at least one alarm of the *Low power* type present in the alarm list. See the chapter Alarm management for more information.

Binary output: Common OfL

Related FW	3.1.0
Description	The output is closed while there is at least one alarm of the *Off load* type present in the alarm list. See the chapter Alarm management for more information.

Binary output: Common BOC

Related FW	3.1.0
Description	The output is closed while there is at least one alarm of the *Breaker open&Cool-down* type present in the alarm list. The alarm can be in any state, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Alarm management for more information.

Binary output: Common MP

Related FW	3.1.0
Description	The output is closed while there is at least one alarm of the *Mains protection* type present in the alarm list. See the chapter Alarm management for more information.

Binary output: Common Al

Related FW	3.1.0
Description	The output is closed while there is at least one alarm of the *Alarm only* type present in the alarm list. The alarm can be in any state, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Alarm management for more information.

Binary output: Common Hst

Related FW	3.1.0
Description	The output is closed for 1s when any alarm of *History record* type appears. See the chapter Alarm management for more information.

Binary output: CommonActLev 1

Related FW	3.1.0
Description	The output is closed while there is at least one 1st level (yellow) alarm present in the alarm list. The alarm can be in **any state**, i.e. active unconfirmed, active confirmed or inactive unconfirmed. See the chapter Alarm management for more information.

Binary output: CommonActLev 2

Related FW	3.1.0
Description	The output is closed while there is at least one 2nd level (red) alarm present in the alarm list. The alarm can be in **any state**, i.e. active unconfirmed, active confirmed or inactive unconfirmed.See the chapter Alarm management for more information.

Binary output: Alarm flashing

Related FW	3.1.0
Description	This is the flashing alternative of the output *Alarm*, i.e. the output flashes with period 1s/1s while the output *Alarm* is closed.

Binary output: Horn flashing

Related FW	3.1.0
Description	This is the flashing alternative of the output *Horn*, i.e. the output flashes with period 1s/1s while the output *Horn* is closed.

Binary output: T cyl differ

Related FW	3.1.0
Description	IS-NT specific function! The output is closed while the alarm *cylinder temperature difference* alarm is active.

Binary output: Ignition

Related FW	3.1.0
Description	The output is used for control of an ignition module on gas engines. The output is closed when the engine speed exceeds 30 RPM and opens when the engine is fully stopped regardless of the reason of the stop, i.e. whether it is an operational stop or shutdown stop. The only exception is activation of the input *Emergency stop*, when the ignition output is opened immediately after the input is activated. **NOTE:** Learn more in the separate chapter Starting sequence.

Binary output: Ventilation

Related FW	3.1.0
Description	The output is intended for control of an engine room ventilation fan or engine container ventilation fan. Intended for the engine ventilator control. The output is closed at the beginning of the start procedure together with *Prestart* output and opens together with *Stop Solenoid* after the engine is fully stopped. The output opens immediately when *Emergency stop* is activated or if the controller is switched to OFF mode.

Binary output: Idle/Nominal

Related FW	3.1.0
Description	This output is intended for switching of the speed governor reference from idle to nominal speed and vice versa. The output is opened when the engine is required to run at idle speed and it is closed when the engine is required to run at nominal speed. • The output is opened while the engine is not running and also during start. • The output is closed after the engine has been started when the timer *Idle time* elapses. • The output remains closed while the engine is running. • The output is opened while stopping either at the beginning or at the end of the cooling phase. This is selectable by the setpoint *Cooling speed*. **NOTE:** Some governors do not support speed reference switching.

Binary output: Prelubr pump

Related FW	3.1.0
Description	This output can be used for periodic lubrication of the engine while the engine is not running. The output is periodically closed for *Prelubr time* and then opened for *Prelubr pause*. The output opens immediately when *Emergency stop* is activated or if the controller is switched to OFF mode. **NOTE:** The engine must be equipped with an external electric motor-driven oil pump to allow this function.

Binary output: FltResButnEcho

Related FW	3.1.0
Description	This output provides 1s pulse when: • *Fault reset* button is pressed on the controller front panel or

	• *Fault reset* button is pressed on any of external local/remote terminals or • *fault reset* command is received via communication line or • the input FaultResButton is activated.

Binary output: HrnResButnEcho

Related FW	3.1.0
Description	This output provides 1s pulse when: • *Horn reset* button is pressed on the controller front panel or • *Horn reset* button is pressed on any of external local/remote terminals or • *horn reset* command is received via communication line or • the input HornResButton is activated.

Binary output: StartButnEcho

Related FW	3.1.0
Description	This output provides 1s pulse when: • *Start* button is pressed on the controller front panel or • *Start* button is pressed on any of external local/remote terminals or • *start* command is received via communication line or • the input StartButton is activated.

Binary output: StopButnEcho

Related FW	3.1.0
Description	This output provides 1s pulse when: • *Stop* button is pressed on the controller front panel or • *Stop* button is pressed on any of external local/remote terminals or • *stop* command is received via communication line or • the input StopButton is activated.

Binary output: MCBButnEcho

Related FW	3.1.0
Description	This output provides 1s pulse when:

	• *MCB* button is pressed on the controller front panel or • *MCB* button is pressed on any of external local/remote terminals or • *MCB close/open* command is received via communication line or • the input *MCBButton* is activated.

Binary output: GCBButnEcho

Related FW	3.1.0
Description	This output provides 1s pulse when: • *GCB* button is pressed on the controller front panel or • *GCB* button is pressed on any of external local/remote terminals or • *GCB close/open* command is received via communication line or • the input *GCBButton* is activated.

Binary output: GCB status

Related FW	3.1.0
Description	This output indicates the GCB position, how it is internally considered in the controller. The position is based on *GCB feedback* input and optionally also on the *GCB fdb neg* input. • If only the positive feedback input is used the output mirrors the feedback. • If both feedbacks are used and they match each other the output indicates the GCB position according to the feedbacks. • If both feedbacks are used, however they do not match each other, the output remains in previous position when they matched. The output can be used for indication of the GCB position.

Binary output: MCB status

Related FW	3.1.0
Description	This output indicates the MCB position, how it is internally considered in the controller. The position is based on *MCB feedback* input and optionally also on the *MCB fdb neg* input. • If only the positive feedback input is used the output mirrors the feedback. • If both feedbacks are used and they match each other the output indicates the MCB position according to the feedbacks. • If both feedbacks are used, however they do not match each other, the

	output remains in previous position when they matched. The output can be used for indication of the MCB position.

Binary output: Gen params OK

Related FW	3.1.0
Description	This output indicates that the generator actually provides proper voltage and frequency. The output is closed while the gen-set is running (regardless of whether GCB is closed or not) and **all generator electrical parameters** are in limits. **NOTE:** This output combined with a PLC block *Delay* can be used for switching on/off of some auxiliary devices (e.g. cooling pump), that are supplied directly from generator (before GCB). The delay is reccommended to allow the generator getting stable and avoid unnecessary switching the auxiliary device on and off just after start.

Binary output: MainsParams OK

Related FW	3.1.0
Description	This output indicates that the mains is healthy. The output is closed while **all mains electrical parameters** are in limits.

Binary output: kWh pulse

Related FW	3.1.0
Description	This output generates 100ms pulse always when the internal kWh counter incremented.

Binary output: In synchronism

Related FW	3.1.0
Description	This output is closed **during synchronization** when all synchro conditions have been fulfilled. The output is opened either when: • the synchro conditions are lost **or** • the corresponding breaker has been closed **or** • the sychronizing was interrupted or timed out. Synchro conditions are following: • Phase shift between generator and mains (bus) voltage must be within

	range of ±*Phase window* for period longer than *Dwell time*. • Voltage difference between generator and mains (bus) voltage (in all phases) must be lower or equal to *Voltage window* for period longer than *Dwell time*. The output is intended for manual synchronization. Automatic closing of GCB **must be disabled** for this case. Use the input *GCB disable*.

Binary output: Derating 1 act

Related FW	3.1.0
Description	IS-NT specific funtion! This output is closed when level 1 derating is active. For more information on power derating see chapter Power derating.

Binary output: Derating 2 act

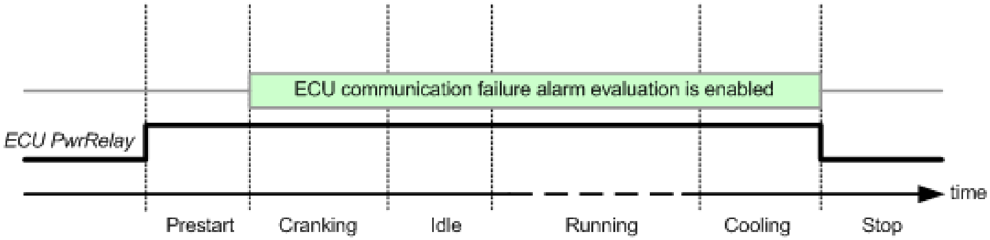
Related FW	3.1.0
Description	IS-NT specific funtion! This output is closed when level 2 derating is active. For more information on power derating see chapter Power derating.

Binary output: Neutral CB C/O

Related FW	3.1.0
Description	This output is intended for control of the neutral contactor. The output provides continuous signal while the neutral contactor has to be closed. Use the input *NeutralCB fdb* for the neutral contactor feedback. Response time of the contactor must be **less than 400ms**. If the contactor does not respond to an open or close command within this time, the alarm *Wrn NCB fail* is issued. **NOTE:** Learn more about neutral contactor in the description of the setpoint *#Neutral cont.*.

Binary output: ECU PwrRelay

Related FW	3.1.0
Description	This output is used for control of the "Keyswitch" ECU input. The output is closed at the beginning of the prestart phase, remains closed while the engine is running, and is opened when the engine has to be stopped. The keyswitch input may be also labeled as "15"

	according to cable numbering convention used in vehicles. • If this input is used (configured), the evaluation of ECU communication fault alarm and other ECU-related alarms is enabled only while the engine is beeing started or is running. The reason is that most of ECUs go to sleep mode and do not communicate while the keyswitch input is deactivated.  ECU ALARMS EVALUATION PERIOD WHEN THE ECU PWRRELAY IS USED **NOTE:** It is recommended to adjust the *Prestart time* to at least 3 sec to allow the ECU to wake-up and begin the communication prior to the ECU communication fault alarm is enabled. • If this input is not configured the evaluation of ECU-related alarms is enabled all the time. **NOTE:** If your ECU does not have the keyswitch input, however you want the ECU-related alarms to be disabled while the engine is not running, configure the output onto a virtual IO module (VPIO). **CAUTION!** This output should not be used for disconnecting of main power supply from the ECU. Disconnecting of the main power supply while the engine is running might cause the ECU will not be able to record eventual trouble codes into it's nonvolatile memory.

Binary output: ECU Comm Error

Related FW	3.1.0
Description	The output is closed while there is an error in the communication with ECU, i.e. while there is the alarm *ECU comm error* present in the alarm list.

Binary output: PeriphCommErr

Related FW	3.1.0
Description	The output is closed while there is an error in the communication with any peripheral unit (e.g. IS-AIN8, IGS-PTM, ...).

Binary output: CtrlHeartBeat

Related FW	3.1.0

Description	The output provides alternating signal with rate 500ms active / 500ms inactive while the controller is **operational**, i.e. it has passed all checks after startup and no failure was detected. If the output does not provide the alternating signal it may indicate following: • controller is switched off **or** • controller is damaged **or** • incorrect/missing firmware and/or application **or** • corrupted setpoints The output is intended for using in wired redundancy systems at the main controller. Learn more about redundancy in separate chapter Redundant controllers.

Binary output: CtrlHBeat FD

Related FW	3.1.0
Description	This output is used at a redundant controller to disconnect the main controller from the gen-set, connect the redundant one instead and activate it. The output is closed: • If the input *CtrlHBeat sens* is configured onto any input terminal and the redundancy controller does not sense the "heart beat" signal from the main controller at that terminal. • If the redundant controller has not received two consequent messages from the main controller. The address of the main controller for the particular redundant one is selected by the the setpoint *Watched Contr* . **NOTE:** Learn more about redundancy in separate chapter Redundant controllers.

Binary output: LdShed stage 1

Related FW	3.1.0
Description	This output is used for control of first load group. This is the group which is disconnected as **first** one when the load shedding function becomes active. Connect **least important** loads to this group. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Binary output: LdShed stage 2

Related FW	3.1.0

Description	This output is used for control of second load group. This group is disconnected as **second** one when the first group is already disconnected and the condition for disconnecting of next group is still fulfiled. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Binary output: LdShed stage 3

Related FW	3.1.0
Description	This output is used for control of third load group. This group is disconnected as **last** one when the first two groups are already disconnected and the condition for disconnecting of next group is still fulfiled. **NOTE:** Learn more about load shedding in the separate chapter Load shedding.

Binary output: TimerAct 1-4

Related FW	3.1.0
Description	This is combined output from timer channels 1-4. The output is closed if at least one of the channels is active. **NOTE:** See the chapter Timers for more details about timers.

Binary output: TimerAct 5-8

Related FW	3.1.0
Description	This is combined output from timer channels 5-8. The output is closed if at least one of the channels is active. **NOTE:** See the chapter Timers for more details about timers.

Binary output: TimerAct 9-12

Related FW	3.1.0
Description	This is combined output from timer channels 9-12. The output is closed if at least one of the channels is active. **NOTE:** See the chapter Timers for more details about timers.

Binary output: TimerAct 13-16

Related FW	3.1.0

Description	This is combined output from timer channels 13-16. The output is closed if at least one of the channels is active. **NOTE:** See the chapter Timers for more details about timers.

Binary output: TimerActiveCom

Related FW	3.1.0
Description	This is combined output from all timer channels. The output is active if at least one timer channel is active.

Binary output: MODES: Off mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in OFF mode (either switched by the mode selector on the front panel or by the input *Remote OFF*).

Binary output: MODES: Man mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in MAN mode (either switched by the mode selector on the front panel or by the input *Remote MAN*).

Binary output: MODES: Sem mode

Related FW	3.1.0
Description	IS-NT specific function! The output is closed while the controller is currently in SEM mode. This output is available in IS-NT controllers only.

Binary output: MODES: Aut mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in AUT mode (either switched by the mode selector on the front panel or by the input *Remote AUT*).

Binary output: MODES: Test mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in TEST mode (either switched by the mode selector on the front panel or by the input *Remote TEST*).

Binary output: MODES: Off mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in OFF mode (either switched by the mode selector on the front panel or by the input *Remote OFF*).

Binary output: MODES: Man mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in MAN mode (either switched by the mode selector on the front panel or by the input *Remote MAN*).

Binary output: MODES: Sem mode

Related FW	3.1.0
Description	IS-NT specific function! The output is closed while the controller is currently in SEM mode. This output is available in IS-NT controllers only.

Binary output: MODES: Aut mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in AUT mode (either switched by the mode selector on the front panel or by the input *Remote AUT*).

Binary output: MODES: Test mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in TEST mode (either switched by the mode selector on the front panel or by the input *Remote TEST*).

Binary output: MODES: Off mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in OFF mode (either switched by the mode selector on the front panel or by the input *Remote OFF*).

Binary output: MODES: Man mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in MAN mode (either switched by the mode selector on the front panel or by the input *Remote MAN*).

Binary output: MODES: Sem mode

Related FW	3.1.0
Description	IS-NT specific function! The output is closed while the controller is currently in SEM mode. This output is available in IS-NT controllers only.

Binary output: MODES: Aut mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in AUT mode (either switched by the mode selector on the front panel or by the input *Remote AUT*).

Binary output: MODES: Test mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in TEST mode (either switched by the mode selector on the front panel or by the input *Remote TEST*).

Binary output: MODES: Off mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in OFF mode (either switched by the mode selector on the front panel or by the input *Remote OFF*).

Binary output: MODES: Man mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in MAN mode (either switched by the mode selector on the front panel or by the input *Remote MAN*).

Binary output: MODES: Sem mode

Related FW	3.1.0
Description	IS-NT specific function! The output is closed while the controller is currently in SEM mode. This output is available in IS-NT controllers only.

Binary output: MODES: Aut mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in AUT mode (either switched by the mode selector on the front panel or by the input *Remote AUT*).

Binary output: MODES: Test mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in TEST mode (either switched by the mode selector on the front panel or by the input *Remote TEST*).

Binary output: MODES: Off mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in OFF mode (either switched by the mode selector on the front panel or by the input *Remote OFF*).

Binary output: MODES: Man mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in MAN mode (either switched by the mode selector on the front panel or by the input *Remote MAN*).

Binary output: MODES: Sem mode

Related FW	3.1.0
Description	IS-NT specific function! The output is closed while the controller is currently in SEM mode. This output is available in IS-NT controllers only.

Binary output: MODES: Aut mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in AUT mode (either switched by the mode selector on the front panel or by the input *Remote AUT*).

Binary output: MODES: Test mode

Related FW	3.1.0
Description	The output is closed while the controller is currently in TEST mode (either switched by the mode selector on the front panel or by the input *Remote TEST*).

Binary output: Ready for Load

Related FW	3.1.0
Description	This output is closed while the gen-set is running, it's voltage and frequency are in limits and the GCB is able to be closed or is already closed.

Binary output: Stand-by ready

Related FW	3.1.0
Description	This output is intended for indication, that the gen-set is ready for standby operation, i.e. for automatic start and taking over the load. The output is closed while: • the genset is not running **and** • the controller is in AUT or SEM mode **and** • there isn't any alarm blocking start of the gen-set **and** • AMF function and island operation are enabled (*Island enable*, *MFStart enable*).

Binary output: Gen-set active

Related FW	3.1.0
Description	The output closes at the beginning of the prestart phase and opens after the gen-set has been fully stopped. If the gen-set fails to start the output opens after the last cranking attempt. **NOTE:** The output also closes if the engine begins to rotate spontaneously.

Binary output: Operational

Related FW	3.1.0
Description	The output is closed when the gen-set is ready for operation or is currently in operation.

Binary output: Ready

Related FW	3.1.0
Description	The output is closed while the gen-set is not in operation at the moment, however it is ready to be put into operation. The output is closed while: • the genset is not running **and** • the controller is not in OFF mode **and** • there isn't any alarm blocking start of the gen-set

Binary output: Not ready

Related FW	3.1.0
Description	The output is closed while the gen-set is not in operation, however it is not ready to be put into operation. The output is closed while: • the genset is not running **and** • the controller is in OFF mode **or** • there is an alarm blocking start of the gen-set.

Binary output: CrankProcedure

Related FW	3.1.0
Description	The output is closed while the engine is cranking and during pauses between crank attemps. The output is opened either when the gen-set is started or failed to start. See the diagram in the descrition of the output *Cranking* for differencies between outputs *CrankProcedure*, *Cranking* and *Starter*.

Binary output: Starting

Related FW	3.1.0
Description	The output is closed at the beginning of the prestart phase and remains closed during prestart, cranking and starting phases. The output is opened either when the gen-set goes to running phase or when it failed to start. See the diagram in the

	descrition of the output *Cranking* for details.

Binary output: Idle run

Related FW	3.1.0
Description	This output is closed while the timer *Idle time* is counting down. This timer begins to count down when the engine is considered as started and the starter motor is deenergized. See also description of the output *Starter*.

Binary output: Running

Related FW	3.1.0
Description	This output is closed at the end of the *Idle* phase when the output *Idle/Nominal* is closed to switch the gen-set to nominal speed. The output is opened when the gen-set goes to cooling phase or performs a shutdown.

Binary output: ForwardSynchro

Related FW	3.1.0
Description	The output is closed during forward synchronizing and opens when the output *GCB status* is activated (= GCB was closed). **NOTE:** The output can be used for control of an external synchronizing module.

Binary output: ReverseSynchro

Related FW	3.1.0
Description	The output is closed during reverse synchronizing (synchronizing of loaded gen-set back to the mains) and opens when the output *MCB status* is activated (= MCB was closed). **NOTE:** The output can be used for external synchronizing module control.

Binary output: Warming

Related FW	3.1.0
Description	The output is closed during warming period. Learn more about warmin in the description of the setpoint *Warming load*.

Binary output: Soft load

Related FW	3.1.0

Description	The output is closed during gen-set soft loading period – i.e. it is closed when the gen-set has been synchronized to the mains/bus and GCB has been closed and opened again when the ramp of the gen-set power reached the required level. **NOTE:** The output is not closed during the warming period.

Binary output: Loaded

Related FW	3.1.0
Description	The output is closed while the gen-set is loaded and the load is beeing regulated according to selected mode (baseload, import/export, power management etc.) or is not beeing regulated in single island operation.

Binary output: Soft unld

Related FW	3.1.0
Description	The output is closed while the gen-set is beeing unloaded before opening GCB.

Binary output: Cooling

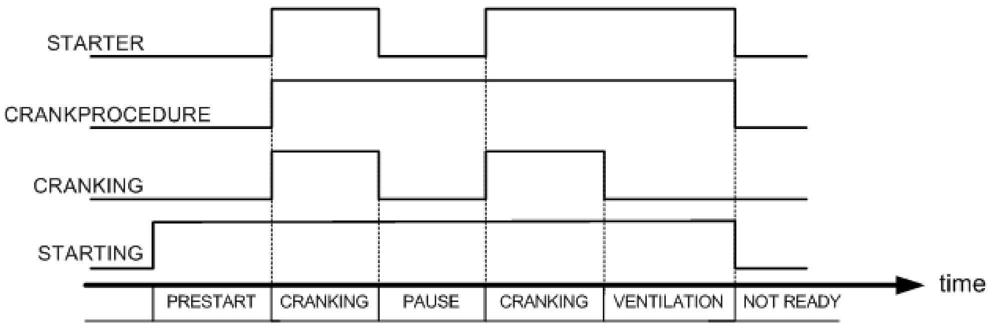
Related FW	3.1.0
Description	The output is closed during the *Cooling* phase, which takes place after GCB has been opened before the engine is stopped.

Binary output: Stopping

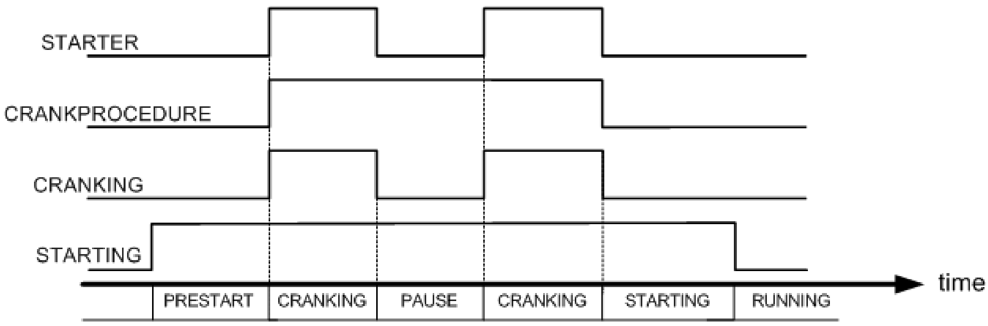
Related FW	3.1.0
Description	The output closes when the command to stop the engine has been issued, i.e. the output *Fuel Solenoid* has been deactivated. It opens when the engine is fully stopped. The output also closes if the engine begins to rotate spontaneously. This output is closed for the whole time of the stopping sequence (regardless of the repeated opening of the *Stop solenoid*). It is deactivated immediately when the engine is considered stopped.

Binary output: Cranking

Related FW	3.1.0
Description	The output is closed while the engine is cranking. See the following diagrams for differencies between outputs *CrankProcedure*, *Cranking* and *Starter*. The diagrams show situation for gas engine and two crank attempts.



CRANKING OUTPUTS BEHAVIOR - SUCCESSFUL START



CRANKING OUTPUTS BEHAVIOR - UNSUCCESSFUL START

Binary output: Logical 0

Related FW	3.1.0
Description	This output is always opened. It may be used in functions (e.g. ECU outputs or PLC modules inputs) where a binary value is required, however it has to be continously inactive.

Binary output: Logical 1

Related FW	3.1.0
Description	This output is always closed. It may be used in functions (e.g. ECU outputs or PLC modules inputs) where continuously active binary value is required.

Binary output: Bin selector 1

Related FW	3.1.0
Description	Output is closed or opened according to the setpoint *Bin selector 1*. **NOTE:** The output is intended for ECU-controlled engines to switch on/off some particular ECU function by a controller setpoint if the function can be controlled by a binary value over the J1939 bus.

Binary output: Bin selector 2

Related FW	3.1.0
Description	Output is closed or opened according to the setpoint *Bin selector 2*. **NOTE:** The output is intended for ECU-controlled engines to switch on/off some particular ECU function by a controller setpoint if the function can be controlled by a binary value over the J1939 bus.

Binary output: Bin selector 3

Related FW	3.1.0
Description	Output is closed or opened according to the setpoint *Bin selector 3*. **NOTE:** The output is intended for ECU-controlled engines to switch on/off some particular ECU function by a controller setpoint if the function can be controlled by a binary value over the J1939 bus.

Binary output: Bin selector 4

Related FW	3.1.0
Description	Output is closed or opened according to the setpoint *Bin selector 4*. **NOTE:** The output is intended for ECU-controlled engines to switch on/off some particular ECU function by a controller setpoint if the function can be controlled by a binary value over the J1939 bus.

Binary output: WrongPhSeq

Related FW	3.1.0
Description	Binary output WrongPhSeq is active when at least one of the following conditions is fulfilled: Generator/Mains/Bus phase is inverted or wrong generator/mains/bus phase sequence or opposed generator/mains/bus phase sequence is detected.

Binary output: PeakShaveAct

Related FW	3.1.0
Description	Binary output is active when the gen-set is running (in SPtM application) or gen-set group is activated by InteliMains due to Peak Shaving or Peak kVA Shaving (dependence on parameters *PeakLevelStart*, *PeakLevelStop*, *PeakAutS/S del*, *Peak kVA Start*, *Peak kVA Stop*, *PeakKVAS/S del* in ProcessControl group).

Binary output: User Button 1

Related FW	3.1.0

Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately. **ON**: Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed. **OFF**: Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed. **ON/OFF**: Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state). **PULSE ON**: Pressing the button issues log. binary output User Button X to close for time given by setpoint *UserBtn pulse*. **NOTE:** Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.

Binary output: User Button 2

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately. **ON**: Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed. **OFF**: Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed. **ON/OFF**: Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state). **PULSE ON**: Pressing the button issues log. binary output User Button X to close for time given by setpoint *UserBtn pulse*. **NOTE:** Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.

Binary output: User Button 3

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).
PULSE ON	Pressing the button issues log. binary output User Button X to close for time given by setpoint *UserBtn pulse*. **NOTE:** Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.

Binary output: User Button 4

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).
PULSE ON	Pressing the button issues log. binary output User Button X to close for time given by setpoint *UserBtn pulse*.

	NOTE: Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.

Binary output: User Button 5

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).
PULSE ON	Pressing the button issues log. binary output User Button X to close for time given by setpoint *UserBtn pulse*. **NOTE:** Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.

Binary output: User Button 6

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.

	ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).
	PULSE ON	Pressing the button issues log. binary output User Button X to close for time given by setpoint *UserBtn pulse*. **NOTE:** Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.

Binary output: User button 7

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

ON	Pressing the button changes the state of log. binary output User button X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of log. binary output User button X to opened. When the output is opened and the button is pressed state is not changed.
ON/OFF	Pressing the button changes the state of log. binary output User button X to opened or closed depending on previous state (it is changed to the opposite state).
PULSE ON	Pressing the button issues log. binary output User Button X to close for time given by setpoint *UserBtn pulse*. **NOTE:** Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.

Binary output: User Button 8

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

ON	Pressing the button changes the state of log. binary output User

		Button X to closed. When the output is closed and the button is pressed state is not changed.
	OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.
	ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).
	PULSE ON	Pressing the button issues log. binary output User Button X to close for time given by setpoint *UserBtn pulse*. **NOTE:** Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.

Binary output: User Button 9

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).
PULSE ON	Pressing the button issues log. binary output User Button X to close for time given by setpoint *UserBtn pulse*. **NOTE:** Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.

Binary output: User Button 10

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related

<table>
<tr><td></td><td>
button.
It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.
<table>
<tr><td>ON</td><td>Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.</td></tr>
<tr><td>OFF</td><td>Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.</td></tr>
<tr><td>ON/OFF</td><td>Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).</td></tr>
<tr><td>PULSE ON</td><td>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse.
NOTE:
Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</td></tr>
</table>
</td></tr>
</table>

Binary output: User Button 11

<table>
<tr><td>Related FW</td><td>3.1.0</td></tr>
<tr><td>Description</td><td>
This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button.
It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.
<table>
<tr><td>ON</td><td>Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.</td></tr>
<tr><td>OFF</td><td>Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.</td></tr>
<tr><td>ON/OFF</td><td>Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).</td></tr>
<tr><td>PULSE ON</td><td>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse.
NOTE:
Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</td></tr>
</table>
</td></tr>
</table>

Binary output: User Button 12

<table>
<tr><td>Related FW</td><td>3.1.0</td></tr>
<tr><td>Description</td><td>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button.

It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

<table>
<tr><td>ON</td><td>Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.</td></tr>
<tr><td>OFF</td><td>Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.</td></tr>
<tr><td>ON/OFF</td><td>Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).</td></tr>
<tr><td>PULSE ON</td><td>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse.
NOTE:
Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</td></tr>
</table>
</td></tr>
</table>

Binary output: User Button 13

<table>
<tr><td>Related FW</td><td>3.1.0</td></tr>
<tr><td>Description</td><td>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button.

It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

<table>
<tr><td>ON</td><td>Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.</td></tr>
<tr><td>OFF</td><td>Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.</td></tr>
<tr><td>ON/OFF</td><td>Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).</td></tr>
<tr><td>PULSE ON</td><td>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse.
NOTE:
Repeated pressing of button during the closed period causes</td></tr>
</table>
</td></tr>
</table>

	issuing another puls to be generated from the moment of button pushing.

Binary output: User Button 14

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.
ON/OFF	Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).
PULSE ON	Pressing the button issues log. binary output User Button X to close for time given by setpoint *UserBtn pulse*. **NOTE:** Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.

Binary output: User Button 15

Related FW	3.1.0
Description	This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button. It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

ON	Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.
OFF	Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.
ON/OFF	Pressing the button changes the state of log. binary output User

<table>
<tr><td></td><td>
<table>
<tr><td></td><td>Button X to opened or closed depending on previous state (it is changed to the opposite state).</td></tr>
<tr><td>PULSE ON</td><td>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse.
NOTE:
Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</td></tr>
</table>
</td></tr>
</table>

Binary output: User Button 16

<table>
<tr><td>Related FW</td><td>3.1.0</td></tr>
<tr><td>Description</td><td>This output can be specified for example on buttons on IV-5/8 or in SCADA diagram in InteliMonitor. Its state depends on function assigned to the related button.

It is possible to lock UserButton commands in configuration to specific user level. Buttons 1-8 and 9-16 are locked separately.

<table>
<tr><td>ON</td><td>Pressing the button changes the state of log. binary output User Button X to closed. When the output is closed and the button is pressed state is not changed.</td></tr>
<tr><td>OFF</td><td>Pressing the button changes the state of log. binary output User Button X to opened. When the output is opened and the button is pressed state is not changed.</td></tr>
<tr><td>ON/OFF</td><td>Pressing the button changes the state of log. binary output User Button X to opened or closed depending on previous state (it is changed to the opposite state).</td></tr>
<tr><td>PULSE ON</td><td>Pressing the button issues log. binary output User Button X to close for time given by setpoint UserBtn pulse.
NOTE:
Repeated pressing of button during the closed period causes issuing another puls to be generated from the moment of button pushing.</td></tr>
</table>
</td></tr>
</table>

Binary output: ROCOF Act

Related FW	3.1.0
Description	The output closes if the Vector shift protection gets active. It stays closed for 3s, then opens again. This output is activated even if the selected breaker is actually not tripped because of the input *Sd override* is active. **NOTE:** See also the output *ROCOF Trp*.

Binary output: ROCOF Trp

Related FW	3.1.0
Description	The output closes if the ROCOF protection gets active and the controller trips the selected breaker. The output stays closed for 3s, then opens again. **NOTE:** See also the output *ROCOF Act*.

Binary output: Initialized

Related FW	3.1.0
Description	This LBO indicates that the controller finished the reboot after the restart. It can be used in internal PLC for blocking some binary inputs to avoid the hazards after restart of the controller.

Binary output: Start Blocked

Related FW	3.1.0
Description	In some conditions given by non-sense setings of setpoints Island enabled, ParallelEnable, Synchro enable in Process control group is this LBO closed and start of engine is blocked. The start is blocked and LBO start Blocked is closed when LBI Startblocking is active as well.

Binary output: ReadyToExcite

Related FW	3.1.0
Description	If RPM of gen-set achieves RPM window in *RPM win TO* and stays there more than 1 second, the Logical Binaly output ReadytoExcite is activated. (delay 1s is fixed). The LBO ReadyToExcite is deactivated after SUS sequence.

Binary output: SUS excitation

Related FW	3.1.0
Description	Logic binary output for activation/deactivation of excitation. This LBO SUS excitation is activated/deactivated based on condition *#SUS min power* and LBO *ReadyToExcite*. We recommend use this binary output for connecting/disconnecting power supply of AVR. In case of deactivating signal VoltRegOutput for IG-AVRi module - you don’t “switch off” excitation of generator (AVR has power supply and in case of no signal from IG-AVRi – the generator is excited to nominal value – it is set in AVR). In case of standard start sequence LBO SUSexcitation is actived (standard start sequence works correctly with wiring bellow).

Binary output: RemoteControl1

Related FW	3.1.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl2

Related FW	3.1.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl3

Related FW	3.1.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl4

Related FW	3.1.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl5

Related FW	3.1.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl6

Related FW	3.1.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl7

Related FW	3.1.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Binary output: RemoteControl8

Related FW	3.1.0
Description	This is a general purpose output, which can be closed and opened remotely, e.g. from InteliMonitor using the "Remote switches" tool or via MODBUS using the register #46361 and command #26. **NOTE:** See the *Remote switches* chapter in the InteliMonitor help for details about how to control the output from InteliMonitor and the Modbus chapter in the latest communication guide for information about control the output using Modbus.

Alarm output: Not lubricated

Related FW	3.1.0
Description	The output is closed while there is the message *Not lubricated* present in the alarm list, i.e. while the first lubrication cycle haven't been completed yet. The first cycle occurs when the controller is switched on, when it is switched from OFF mode to another mode or when the input *Emergency stop* is released and confirmed. **NOTE:** If the setpoint *Prelubr time* is set to 0 (OFF), the prelubrication function is switched off.

Alarm output: CAN2 bus empty

Related FW	3.1.0
Description	The output is closed while there is the alarm *CAN2 bus empty* present in the alarm list, i.e. if the controller doesn't detect any other controller on the CAN2 bus. This alarm can be disabled by the setpoint *CAN2emptDetect*.

Alarm output: ECU

Related FW	3.1.0
Description	The output is closed while there is the *ECU* alarm present in the alarm list, i.e. if an ECU unit is configured and it does not communicate with the controller althought it is required to communicate.

Alarm output: SHBinCfgErr

Related FW	3.1.0
Description	The output is closed while there is the *SHBinCfgErr* alarm present in the alarm list, i.e. if there is **more than one controller** on the CAN2 bus, which has configured the SHBOUT peripherial module **with the same index**.

Alarm output: SHAinCfgErr

Related FW	3.1.0
Description	The output is closed while there is the *SHAinCfgErr* alarm present in the alarm list, i.e. if there is **more than one controller** on the CAN2 bus, which has configured the SHAIN peripherial module **with the same index**.

Alarm output: ECUDiagBlocked

Related FW	3.1.0
Description	The output is active when receiving of diagnostic messages from the ECU is disabled (*ECU diag* = DISABLED).

Alarm output: WrongConfig

Related FW	3.1.0
Description	This output is closed while there is the *WrongConfig* alarm present in the alarm list. The wrong configuration is indicated if the controller configuration contains a PLC program, which exceeds limits of the current controller hardware. Typically this situation can occur when a miniCHP archive is used in a controller without mCHP dongle inserted.

Alarm output: Dongle incomp

Related FW	3.1.0
Description	This output is closed while there is the *Dongle incomp* alarm present in the alarm list. The incompatible dongle is indicated when a function is switched on, which requires dongle, however the dongle is not inserted or does not contain the appropriate feature. Typical situations are: • Power management is enabled and there is not any dongle with "PMS" feature inserted in the controller. • The controller is in situation, when the load sharing should beeing performed, however there is not any dongle with "LS" feature inserted in the controller.

Alarm output: Emergency stop

Related FW	3.1.0
Description	This output is closed while the *Emergency stop* alarm is present in the alarm list. The emergency stop alarm is activated by the input *Emergency stop*.

Alarm output: WrnServiceT1+2

Related FW	3.1.0
Description	This output is closed while the *WrnServiceT1+2* alarm is present in the alarm list. This alarm occurs when the counter *Service time 1* or *Service time 2* has reached zero value. Both timers must be reset to a nonzero value to get rid of this alarm.

Alarm output: WrnServiceT3+4

Related FW	3.1.0
Description	This output is closed while the *WrnServiceT3+4* alarm is present in the alarm list. This alarm occurs when the counter *Service time 3* or *Service time 4* has reached zero value. Both timers must be reset to a nonzero value to get rid of this alarm.

Alarm output: Overspeed

Related FW	3.1.0
Description	This output is closed while the *Overspeed* alarm is present in the alarm list.

Alarm output: Underspeed

Related FW	3.1.0
Description	This output is closed while the *Underspeed* alarm is present in the alarm list.

Alarm output: Start fail

Related FW	3.1.0
Description	This output is closed while the *Start fail* alarm is present in the alarm list. See the diagram in the description of the *Starter* output for information when the start fail alarm is indicated.

Alarm output: Sd Stop fail

Related FW	3.1.0
Description	This output is closed while the *Sd Stop fail* alarm is present in the alarm list. This alarm appears when the gen-set indicates that it is rotating although it has to be stopped. This situation can occur: • when the gen-set starts to rotate spontaneously (from the controller point of view) or • when the gen-set does not stop after the stop command has been issued. See the timing diagram in the description of the output *Stop Solenoid*.

Alarm output: ChrgAlternFail

Related FW	3.1.0
Description	This output is closed while the *ChrgAlternFail* alarm is present in the alarm list. This alarm appears when the voltage at the controller D+ terminal drops below 90% of the controller supply voltage for more than 2s. **NOTE:** Function of the D+ terminal is selected by the setpoint *D+ Function*.

Alarm output: Pickup fail

Related FW	3.1.0

Description	This output is closed while the *ChrgAlternFail* alarm is present in the alarm list. This alarm appears when the engine is running (there is at least one "running symptom" active), however zero speed is detected. **NOTE:** Pickup fail can be indicated even if the speed is actually measured from the generator frequency. The "running symptoms" are listed in the description of the output *Starter*.

Alarm output: Sd ExtBattFlat

Related FW	3.1.0
Description	This output is closed while the *Sd Battery flat* alarm is present in the alarm list. This alarm appears when reset of the controller occurs while the gen-set is actually cranking. Such a situation is considered as a reset caused by a drop of the supply voltage due to starter motor current when the gen-set starting battery is in bad condition.

Alarm output: Stp GCB fail

Related FW	3.1.0
Description	This output is closed while the *GCB fail* alarm is present in the alarm list.

Alarm output: Wrn MCB fail

Related FW	3.1.0
Description	This output is closed while the *MCB fail* alarm is present in the alarm list.

Alarm output: BOC NCB fail

Related FW	3.1.0
Description	This output is closed while the *NCB fail* alarm (neutral circuit breaker) is present in the alarm list.

Alarm output: Stp Sync fail

Related FW	3.1.0
Description	This output is closed while the *Stp Sync fail* alarm is present in the alarm list, i.e. if the last synchronization process was not successful and ended by timeout.

Alarm output: WrnRSync fail

Related FW	3.1.0

Description	This output is closed while the *WrnRSync fail* alarm is present in the alarm list, i.e. if the last reverse synchronization process was not successful and ended by timeout.

Alarm output: WrnSpdRegLim

Related FW	3.1.0
Description	This output is closed while the *WrnSpdRegLimit* alarm is present in the alarm list, i.e. while the analog output for speed governor is near minimum or maximum position (out of the range *SpeedGovLowLim* + 0.2V to *SpeedGovHiLim* - 0.2V for more than 2s). **NOTE:** This alarm is disabled when speed governing via binary outputs *Speed up* and *Speed dn* is used (i.e. at least one of these outputs is configured onto a physical or virtual output terminal).

Alarm output: WrnVoltRegLim

Related FW	3.1.0
Description	This output is closed while the *WrnVoltRegLim* alarm is present in the alarm list, i.e. while the analog output for AVR is near minimum or maximum position (out of the range 2% to 98% for more than 2s). **NOTE:** This alarm is disabled when AVR control via binary outputs *AVR up* and *AVR dn* is used (i.e. at least one of these outputs is configured onto a physical or virtual output terminal).

Alarm output: WrnTestOnLdFail

Related FW	3.1.0
Description	This output is closed while the *WrnTestOnLdFail* alarm is present in the alarm list. This alarm indicates that the *Test on load* function has failed, i.e. the controller is in TEST mode, the input *Test on load* is closed, however, when the gen-set has been synchronized to the mains and load ramp has been finished there is still nonzero import from the mains, because the load is higher than the gen-set capacity.

Alarm output: Sd Oil press B

Related FW	3.1.0
Description	This output is closed while the *Sd Oil press B* alarm is present in the alarm list, i.e. while there is a mismatch between gen-set state (running/stopped) and position of the input *Oil press*.

Alarm output: OfL StartBlck

Related FW	3.1.0
Description	This output is closed while message *OfL StartBlck* is present in the alarm list. The message indicates that the setpoints *Island enable*, *ParallelEnable* and *Synchro enable* are adjusted in such a way, that the genset is not allowed to operate in current conditions, for example if mains breaker is opened and however island operation is disabled.

Alarm output: Start blocking

Related FW	3.1.0
Description	The output is closed while there is the message *Start blocking* in the alarm list, i.e. while the input *Startblocking* is closed.

Alarm output: Fuel theft

Related FW	3.1.0
Description	This output is closed while the *Fuel theft* alarm is present in the alarm list. This alarm occurs when the fuel level value measured at the analog input *Fuel level* drops faster than is the limit adjusted by setpoint *MaxFuelDrop*.

Alarm output: PLC State 1

Related FW	3.1.0
Description	The output is closed while the alarm generated by the PLC block *Force prot 1* is present in the alarm list. **NOTE:** The actual text, which appears in the alarm list, can be changed in GenConfig.

Alarm output: PLC State 2

Related FW	3.1.0
Description	The output is closed while the alarm generated by the PLC block *Force prot 2* is present in the alarm list. **NOTE:** The actual text, which appears in the alarm list, can be changed in GenConfig.

Alarm output: PLC State 3

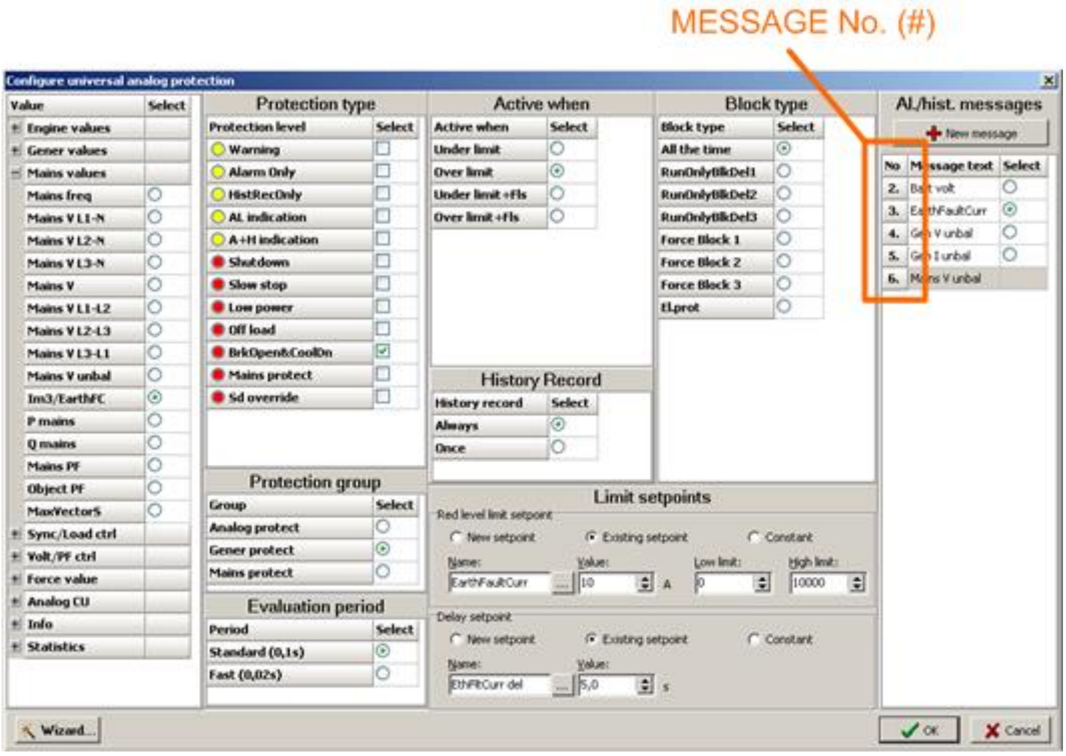
Related FW	3.1.0
Description	The output is closed while the alarm generated by the PLC block *Force prot 3* is present in the alarm list. **NOTE:**

	The actual text, which appears in the alarm list, can be changed in GenConfig.

Alarm output: PLC State 4

Related FW	3.1.0
Description	The output is closed while the alarm generated by the PLC block *Force prot 4* is present in the alarm list. **NOTE:** The actual text, which appears in the alarm list, can be changed in GenConfig.

Alarm output: UnivState 1

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #1** is used, is present in the alarm list. **NOTE:** The actual text of the message depends on configuration.  HOW TO FIND OUT THE MESSAGE NUMBER

Alarm output: UnivState 2

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*,

	where the **Message #2** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 3

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #3** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 4

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #4** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 5

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #5** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 6

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #6** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 7

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #7** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 8

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #8** is used, is present in the alarm list. See the *UnivState 1*

	for picture how to find the message number.

Alarm output: UnivState 9

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #9** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 10

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #10** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 11

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #11** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 12

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #12** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 13

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #13** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 14

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #14** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.

Alarm output: UnivState 15

Related FW	3.1.0
Description	The output is closed while the alarm generated by the *Universal analog protection*, where the **Message #15** is used, is present in the alarm list. See the *UnivState 1* for picture how to find the message number.