InteliGen 500

Controller for parallel gen-set applications

SW version 1.6.0

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Global Guide

Table of contents

back to Table of contents

1 Document information

back to Table of contents

1.1 Clarification of Notation

Note: *This type of paragraph calls the reader's attention to a notice or related theme.*

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

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

1.2 About this Global Guide

This manual contains important instructions for InteliGen 500 family controllers which must be followed during installation and maintenance of the controllers.

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

This manual is dedicated for:

- Operators of Gen-sets
- Gen-set control panel builders
- Anyone who is involved with the installation, operation and maintenance of the Gen-set

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

General security recommendations and set of measures

1. AccessCode

• Change the AccessCode BEFORE the device is connected to a network.

• Use a secure AccessCode – ideally a random string of 8 characters containing lowercase, uppercase letters and digits.

• For each device use a different AccessCode.

2. Password

• Change the password BEFORE the device enters a regular operation.

• Do not leave displays or PC tools unattended if an user, especially administrator, is logged in.

3. Controller Web interface

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

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

4. MODBUS/TCP

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

• Avoid exposing the port TCP/502 to the public Internet.

5. SNMP

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

• Avoid exposing the port UDP/161 to the public Internet.

Used Open Source Software: mBed-TLS

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

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

Used Font: zpix-pixel-font

WEBLINK to the license conditions: https://github.com/SolidZORO/zpix-pixel-font

1.4 General warnings

1.4.1 Remote control and programming

Controller can be controlled remotely. In the event that maintenance of a Gen-set needs to be done, or the controller must be programmed, check the following points to ensure that the engine cannot be started or any other parts of the system cannot be affected.

Make sure:

- Disconnect remote control
- Disconnect binary outputs

1.4.2 SW and HW versions compatibility

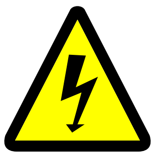
Be certain to use the proper combination of SW and HW versions.

1.4.3 Dangerous voltage

Under no circumstances should you touch the terminals for voltage and current measurement!

Always connect grounding terminals!

Under no circumstances should you disconnect controller CT terminals!



1.4.4 Adjusting the setpoints

All parameters are adjusted to their typical values. However the setpoints must be checked and adjusted to their real values before the first use of the Gen-set.

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

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

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

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

1.5 Functions and protections

Support of functions and protections as defined by ANSI (American National Standards Institute):

Description	ANSI code	Description	ANSI code
Master unit	1	**Voltage unbalance**	47
Stopping device	5	**Incomplete sequence relay**	48
Multi-function device	11	**Overcurrent**	50/50TD
Overspeed	12	**Earth fault****	50G
Underspeed	14	**Breaker failure**	50BF
Speed & frequency matching Device	15	**Overcurrent IDMT**	51
Starting-to-running transition contactor	19	**Overvoltage**	59
Synchronizing-check	25	**Aux Over Voltage**	59X
Thermal relay	26	**Pressure switch**	63
Undervoltage	27	**Liquid level switch**	71
Aux Battery Under Voltage	27X	**Alarm relay*****	74
Annunciator	30	**Vector shift**	78
Overload (real power)	32P	**Reclosing relay**	79
Reverse power	32R	**Overfrequency**	81O
Master sequence device	34	**Underfrequency**	81U
Excitation loss	40	**ROCOF**	81R
Unit sequence starting *	44	**Auto selective control/transfer**	83
Current unbalance	46		

*MINT **Extension module EM-BIO8-EFCP required *** extension module IGL-RA15 required

1.6 Certifications and standards

- EN 61000-6-2
- EN 61000-6-4
- EN 61010-1
- EN 60068-2-1 (-20 °C/16 h)
- EN 60068-2-2 (70 °C/16 h)
- EN 60068-2-6 (2÷25 Hz / ±1,6 mm; 25÷100 Hz / 4.0 g)
- EN 60068-2-27 (a=500 m/s^2; T=6 ms)
- EN 60068-2-30:2005 25/55°C, RH 95%, 48hours
- EN 60529 (front panel IP65, back side IP20)
- UL 6200

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1.7 Document history

Revision number	Related sw. version	Date	Author
9	1.6.0	3.12.2021	Michal Slavata
8	1.4.1	22.3.2021	Petr Chvojka
7	1.4.0	5.11.2020	Vladimír Zubák
6	1.2.1	26.11.2019	Vladimír Zubák
5	1.2.0	16.10.2019	Vladimír Zubák

Revision number	Related sw. version	Date	Author
4	1.1.0	12.9.2019	Vladimír Zubák
3	1.0.0	20.5.2019	Jan Donát
2	1.0.0	4.4.2019	Martin Klíma
1	1.0.0	13.3.2019	Vladimír Zubák

1.8 Symbols in this manual

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

back to Document information

2 System overview

back to Table of contents

2.1 General description

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

2.1.1 The key features of InteliGen 500

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

2.2 True RMS measurement

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

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

2.3 Configurability and monitoring

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

2.3.1 Supported configuration and monitoring tools

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

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

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

2.3.2 Configuration parts

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

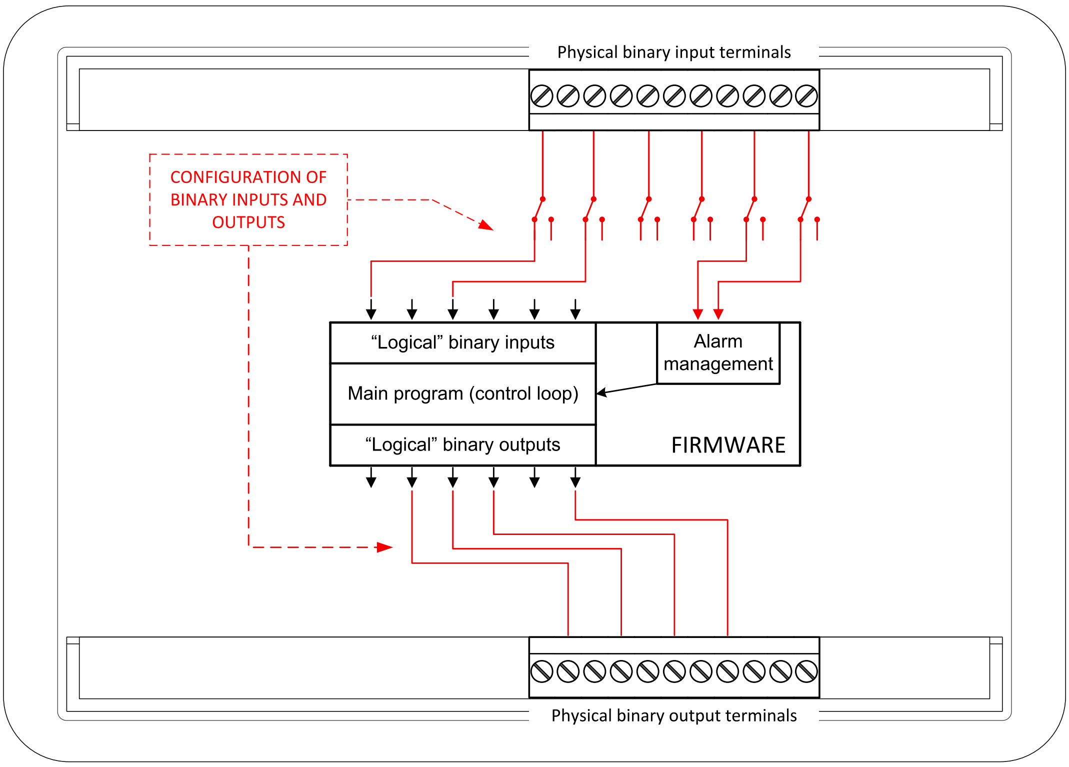


Image 2.1 Principle of binary inputs and outputs configuration

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

Once the configuration is modified, it can be saved to a file for later usage with another controller or for backup purposes. The file is called archive and has the file extension .aig3. An archive contains a full image of the controller at the time of saving (if the controller is online for the PC) except the firmware. Besides configuration it also contains current adjustment of all setpoints, all measured values, a copy of the history log and a copy of the alarm list.

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

2.4 PC Tools

2.4.1 InteliConfig

Configuration and monitoring tool for InteliConfig controllers. See more in InteliConfig global guide.

This tool provides the following functions:

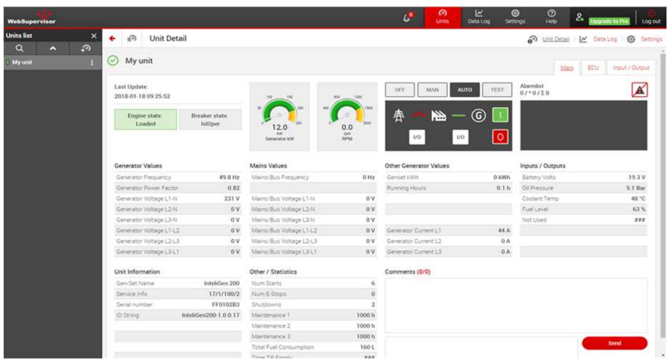
- Direct or internet communication with the controller
- Offline or online controller configuration
- Controller firmware upgrade
- Reading/writing/adjustment of setpoints
- Reading of measured values
- Browsing of controller history records
- Exporting data into a XLS file
- Controller language translation

2.4.2 WebSupervisor

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

This tool provides the following functions:

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



WebSupervisor available at: www.websupervisor.net

Demo account:

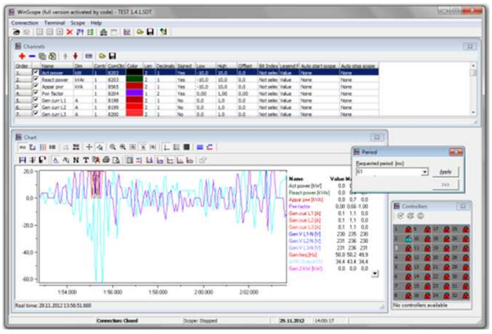
- Login: comaptest
- Password: ComAp123

2.4.3 WinScope

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

This tool provides the following functions:

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



2.5 Plug-in Modules

2.5.1 CM-4G-GPS

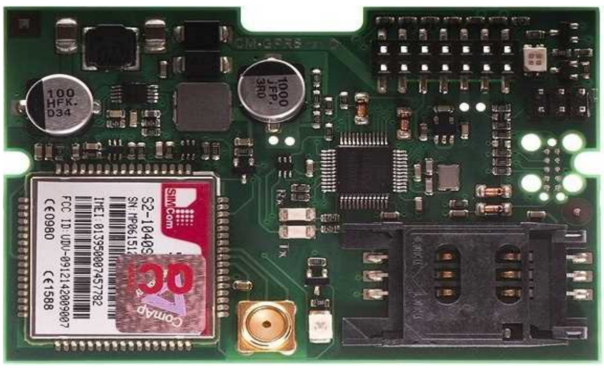
GSM/4G module

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

2.5.2 CM-GPRS

GSM/GPRS Internet module

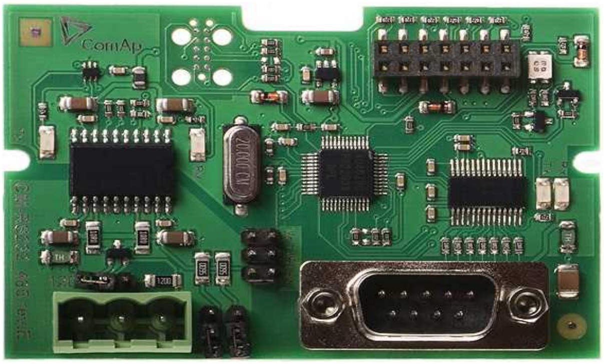
- Wireless integrated solution
- Quick and easy installation
- Support of WebSupervisor
- Instant alarm SMS notification
- System control over SMS
- Quad Band GPRS/EDGE modem, 850/900/1800/1900 MHz
- GPRS multi-slot class 10
- TCP/IP communication over GPRS



2.5.3 CM-RS232-485

Communication module with two communication ports.

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

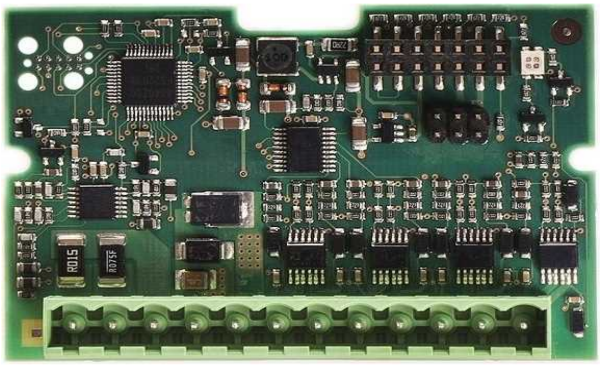


2.5.4 EM-BIO8-EFCP

Hybrid current input and binary input/output extension module.

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

Note: *This protection is active ONLY when Engine is running.*



2.6 CAN modules

2.6.1 Inteli AIN8

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

Supported sensors:

- Resistor 3-wire input
  - Common resistor: 0-250 Ω, 0-2400 Ω, 0-10 kΩ
  - Temperature sensor: Pt100, Pt1000, Ni100, Ni1000
- Current (active or passive sensors)
  - ±20 mA, 0-20 mA, 4-20 mA
- Voltage
  - ±1 V, 0-2.4 V, 0-5 V, 0-10 V
  - Lambda probes
  - Thermocouples are not supported (the measuring loop was designed for lambda probes, which caused non-support of thermocouples)

Impulse/RPM sensor:

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

2.6.2 Inteli AIN8TC

8 Analog Channels Module. The unit offers flexibility to configure 8 thermocouple inputs.

- 8 analog input channels for measuring temperature by thermocouples

2.6.3 Inteli IO8/8

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

Configuration 8/8

- 8 Binary inputs (options: pull up or pull down logic)
- 8 Binary outputs (options: Low side switch (LSS) or High side switch (HSS))
- 2 Analog outputs (options: voltage (0-10 V), current (0-20 mA) and PWM (5 V, adjustable frequency 200 Hz-2.4 kHz))

Configuration 16/0

- 16 Binary inputs (options: pull up or pull down logic)
- 0 Binary outputs
- 2 Analog outputs (options: voltage (0-10 V), current (0-20 mA) and PWM (5 V, adjustable frequency 200 Hz-2.4 kHz))

2.6.4 Inteli AIO9/1

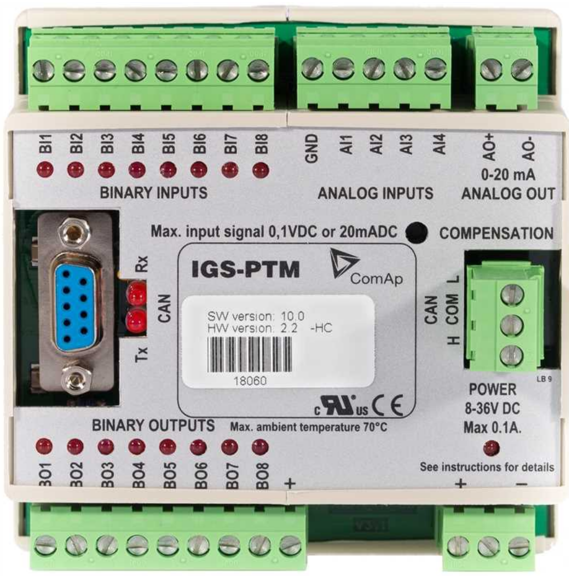
9 Analog Inputs and 1 Analog Output Module

- 4× differential voltage inputs for measurement in range of 0 – 65 V or -65 – 0 V
- 4× shielded, galvanically separated ±75 mV inputs
- Resistance analog input 0-2500 Ω
- One analog output

2.6.5 IGS-PTM

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

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



2.6.6 IGL-RA15

Remote annunciator.

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

back to System overview

3 Applications overview

back to Table of contents

3.1 SPtM

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

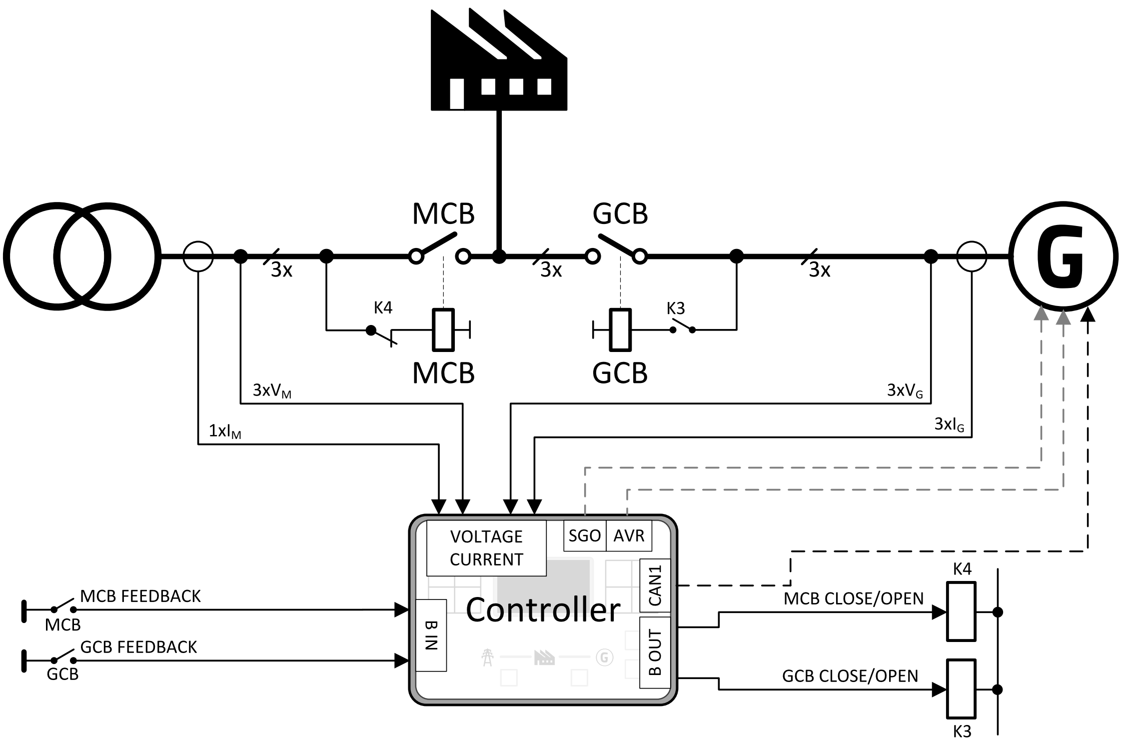


Image 3.1 Single parallel to mains application

3.2 MINT

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

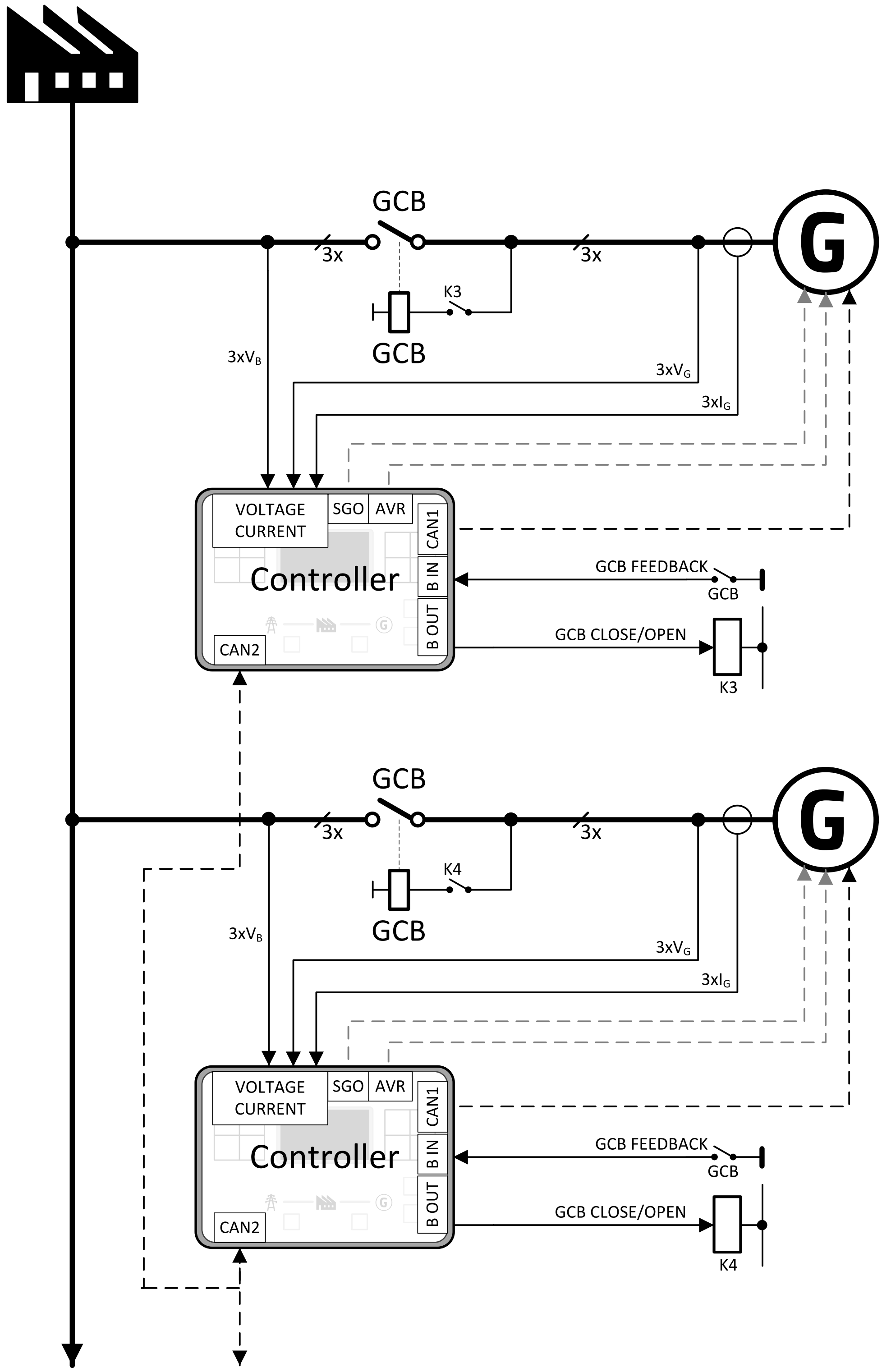


Image 3.2 Multiple island-parallel application without mains

back to Applications overview

4 Installation and wiring

back to Table of contents

4.1 Package content

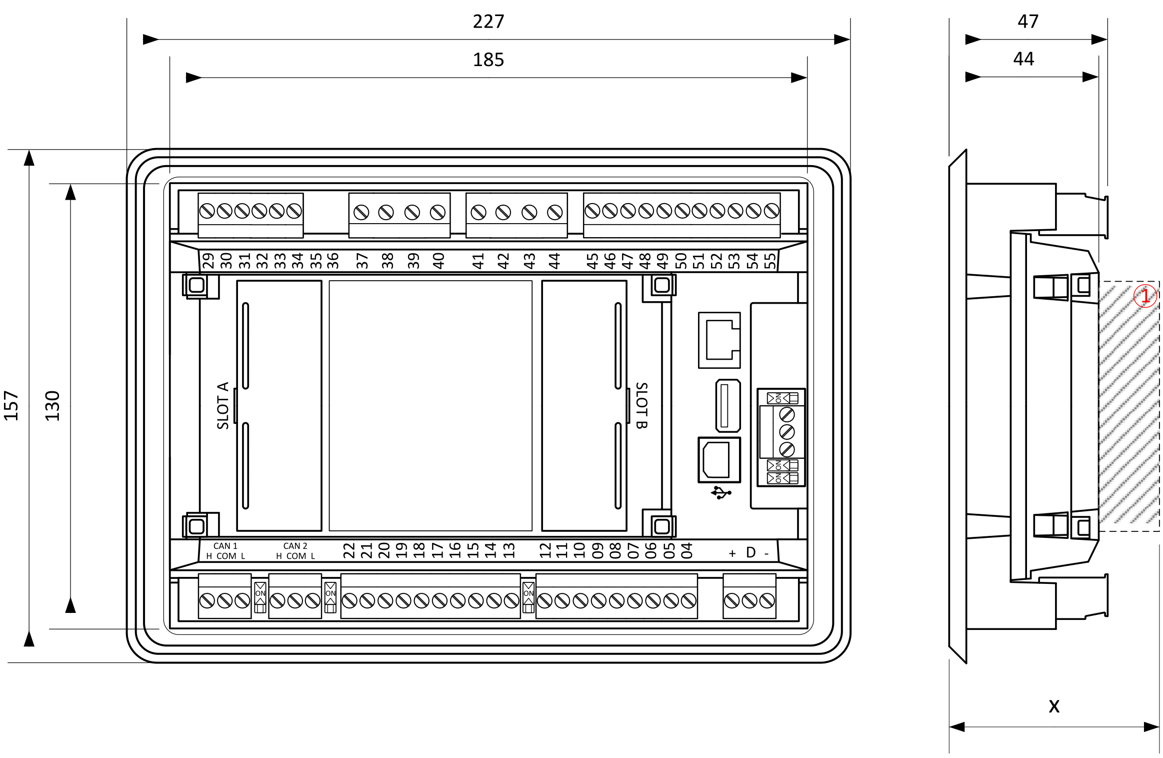
The package contains:

- Controller
- Mounting holders
- Terminal blocks

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

4.2 Controller installation

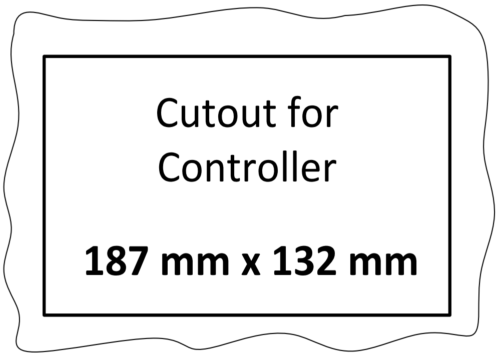
4.2.1 Dimensions



① Plug-in module

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

Note: *Dimensions are in millimeters.*

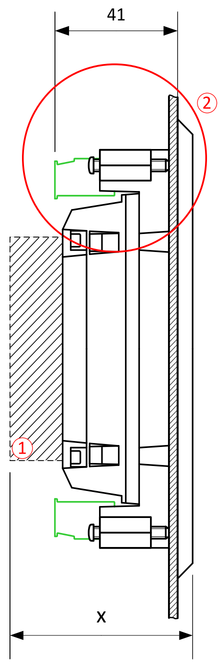


Note: *Cutout is in millimeters.*

4.2.2 Mounting

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

Panel door mounting



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

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

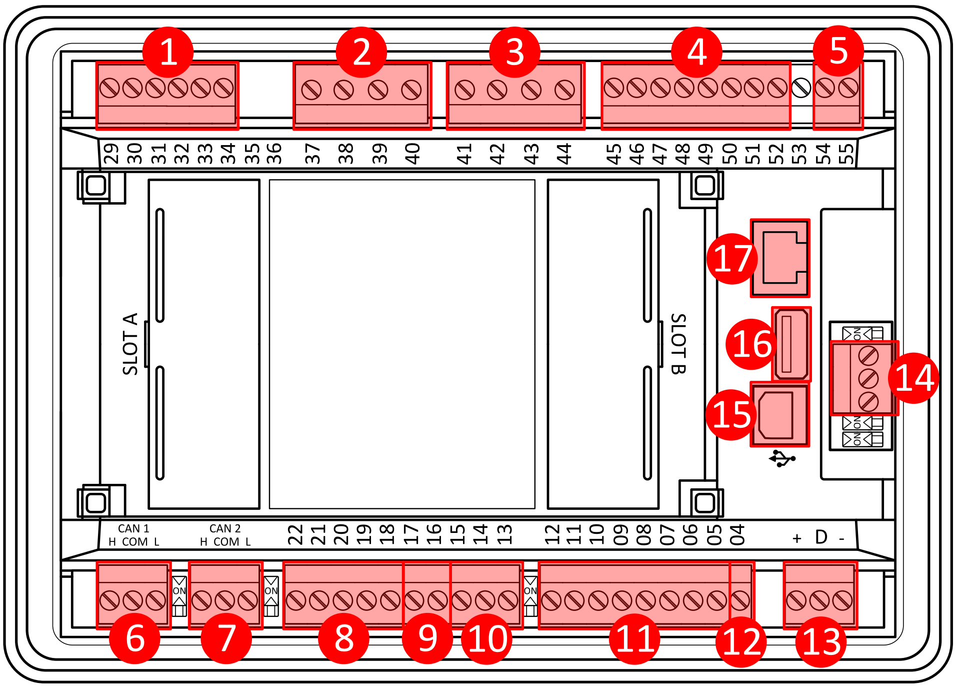
Note: *The accessibility of live parts through openings in the enclosure, reliable retention of guards or barriers for prevention of risk of electric shock, etc., shall be considered in the end product evaluation.*

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

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

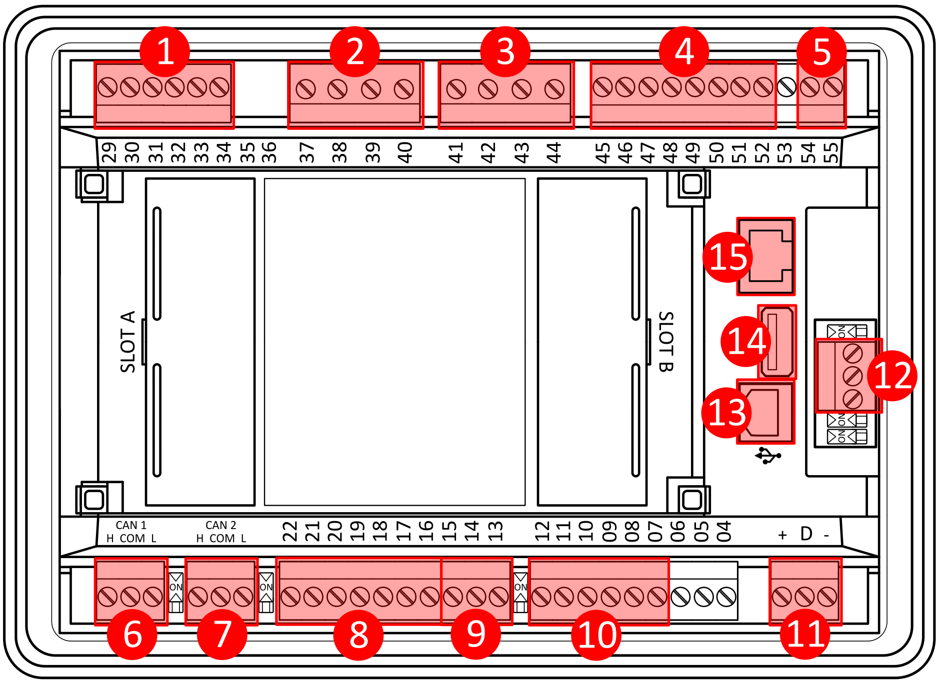
4.3 Terminal Diagram

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



⑦ CAN2		**⑨ RPM**		**⑪ BINARY OUTPUTS**		**⑬ POWER SUPPLY, D+**	
T23	L	T16	RPM GND	T05	BOUT1	T01	BATT -
T24	COM	T17	RPM IN	T06	BOUT2	T02	D+
T25	H	**⑩ SPEED GOVERNOR INTERFACE**		T07	BOUT3	T03	BATT +
⑧ ANALOG INPUTS		T13	COM	T08	BOUT4	**⑭ RS485**	
T18	A COM	T14	VOUT	T09	BOUT5	T56	B
T19	A01	T15	PWM	T10	BOUT6	T57	COM
T20	A02			T11	BOUT7	T58	A
T21	A03			T12	BOUT8	**⑮ USB**	
T22	A04			**⑫ E-STOP**		**⑯ USB HOST**	
				T04		**⑰ ETHERNET**	

4.4 Recommended wiring



1	Current inputs	28 - 36	**Current measurement wiring (page 29)**
2	Mains/Bus voltage inputs	37 - 40	**Voltage measurement MINT (page 40)** **Voltage measurement SPtM (page 33)**
3	Bus voltage inputs	41 - 44	**Voltage measurement MINT (page 40)** **Voltage measurement SPtM (page 33)**
4	Binary inputs	45 - 52	**Binary inputs (page 48)**
5	AVR	54 - 55	**AVR Interface (page 57)**
6	CAN1	H, COM, L	**CAN bus and RS485 wiring (page 52)**
7	CAN2	H, COM, L	**CAN bus and RS485 wiring (page 52)**
8	Analog inputs	18 - 22	**Analog inputs (page 51)**
9	Speed governor	13 - 15	**Speed governor interface (page 57)**
10	Binary outputs	07 - 12	**Binary Outputs (page 49)**
11	Power supply	"+" D "-"	**Power supply (page 27)**
12	RS485	A, COM, B	**CAN bus and RS485 wiring (page 52)**

13	USB	USB B	**USB (page 57)**
14	USB HOST	USB A	**USB HOST (page 57)**
15	Ethernet	RJ45	**Ethernet (page 57)**

4.4.1 General

To ensure proper function:

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

<table>
<tr><th colspan="2">Tightening torque, allowable wire size and type, for the Field-Wiring Terminals:</th></tr>
<tr><td colspan="2">For Mains(Bus) Voltage, Generator Voltage and Current terminals</td></tr>
<tr><td rowspan="2"></td><td>Specified tightening torque is 0.56 Nm (5.0 In-lbs)</td></tr>
<tr><td>use only diameter 0.5 - 2.0 mm (12 - 26 AWG) conductor, rated for 90 °C minimum.</td></tr>
<tr><td colspan="2">For other controller field wiring terminals</td></tr>
<tr><td rowspan="3">
</td><td>Specified tightening torque 0.79 nm (7.0 In-lb)</td></tr>
<tr><td>Use only diameter 0.5 - 2.0 mm (12 - 26 AWG) conductor, rated for 75 °C minimum.</td></tr>
<tr><td>Use copper conductors only</td></tr>
</table>

4.4.2 Grounding

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

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

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

4.4.3 Power supply

To ensure proper function:

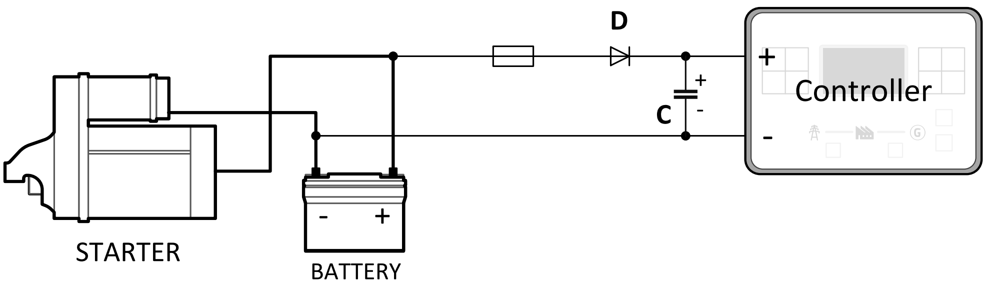
- Use power supply cable min. 1.5 mm^2

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

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

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

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



Note: *Recommended fusing is 4 A fuse.*

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

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

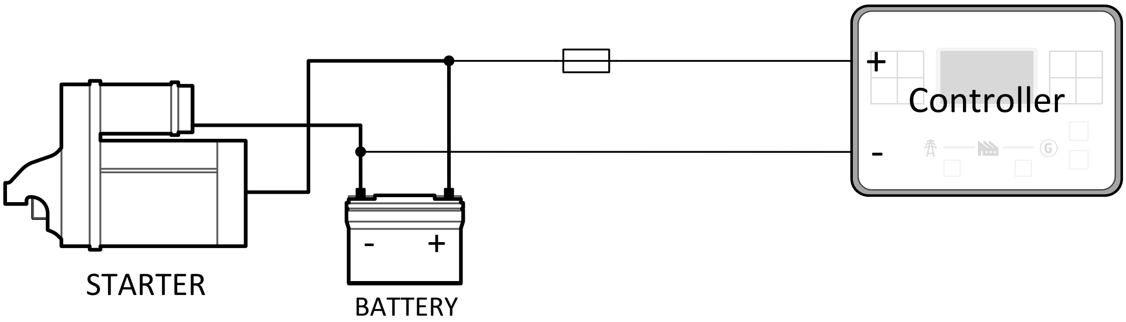
Note: *Suitable conductor protection shall be provided in accordance with NFPA 70, Article 240.*

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

Note: *It is also possible to further support the controller by connecting the external capacitor and separating diode. The capacitor size depends on required time. It shall be approximately thousands of μF. The capacitor size should be 5 000 μF to withstand 150 ms voltage dip under following conditions: Voltage before dip is 12 V, after 150 ms the voltage recovers to min. allowed voltage, i.e. 8 V. Diode should be able to withstand at least 1 kV.*

Power supply fusing

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



Note: *Recommended fusing is 4 A fuse.*

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

Example: Maximal consumption of binary outputs can be 22 A

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

4.4.4 Measurement wiring

Use 1.5 mm^2 cables for voltage connection and 2.5 mm^2 for current transformers connection. Adjust **Connection type (page 264)**, **Gen Nominal Voltage Ph-N (page 267)**, **Gen Nominal Voltage Ph-Ph (page 267)**, **Nominal Current (page 262)**, **Gen VT Ratio (page 270)**, **Mains/Bus VT Ratio (page 271)** and **CT Ratio (page 262)** to appropriate setpoints in the Basic Settings group.

IMPORTANT: Risk of personal injury due to electric shock when manipulating voltage terminals under voltage. Be sure the terminals are not under voltage before touching them.
Do not open the secondary circuit of current transformers when the primary circuit is closed. Open the primary circuit first.

Mains measurement wiring

Connect CT according to following drawings.

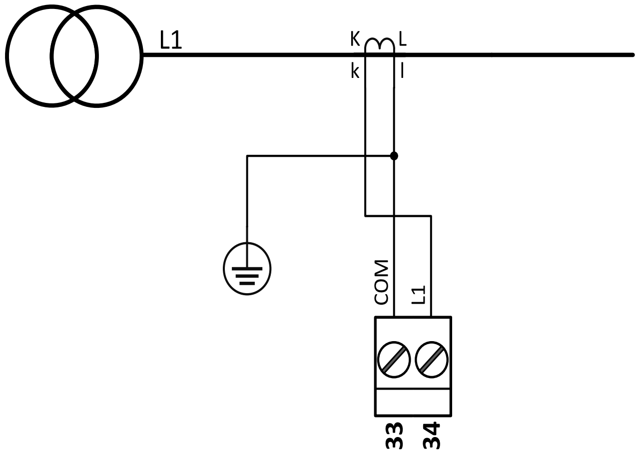


Image 4.1 Mains measurement wiring

Current measurement wiring

The number of CT's is automatically selected based on selected value of setpoint **Connection type (page 264)** [3Ph4Wire / High Leg D / 3Ph3Wire / Split Ph / Mono Ph].

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

To ensure proper function:

- Use cables of 2.5 mm^2
- Use transformers to 5 A
- Connect CT according to following drawings:

3 phase application

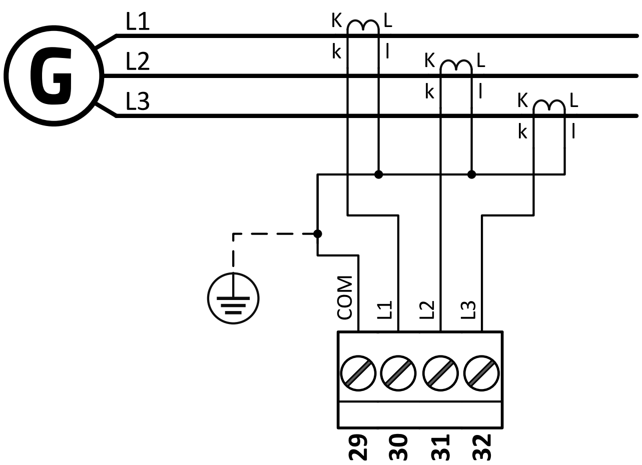


Image 4.2 3 phase application

> **IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "–" terminal is maximally ±2 V. To do so ground properly both terminals.**

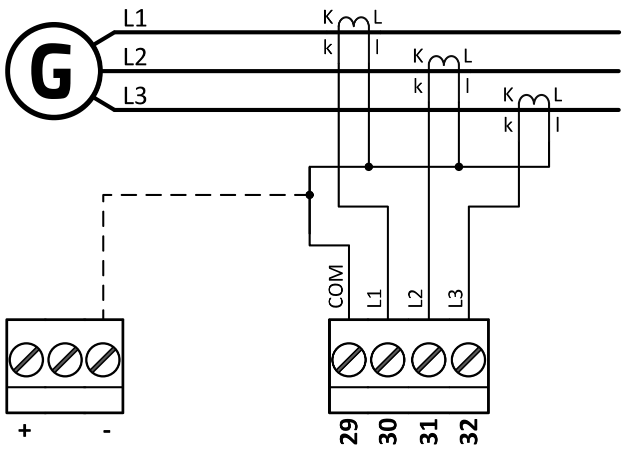


Image 4.3 3 phase application

IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "–" terminal is maximally ±2 V. To do so interconnect these two terminals.

Note: *This wiring is recommended for Indian market.*

Split phase application (Connection Type = SplPhL1L2)

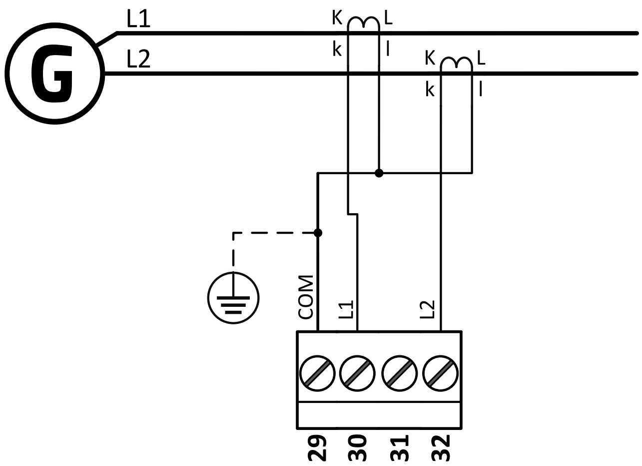


Image 4.4 Split phase application SplPhL1L2

IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "–" terminal is maximally ±2 V. To do so ground properly both terminals.

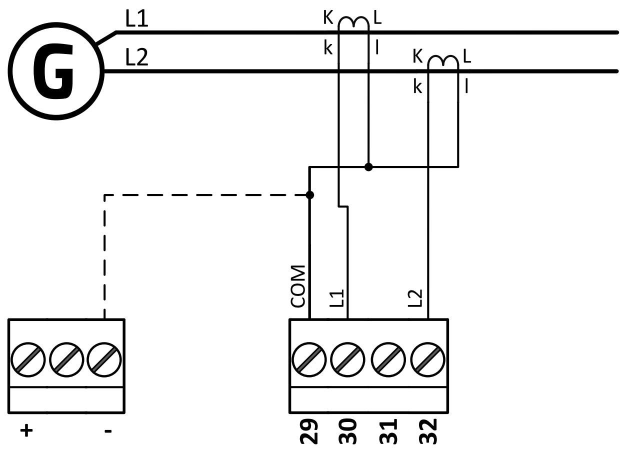


Image 4.5 Split phase application SplPhL1L2

IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "–" terminal is maximally ±2 V. To do so interconnect these two terminals.

Note: *This wiring is recommended for Indian market.*

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

Split phase application (Connection Type = SplPhL1L3)

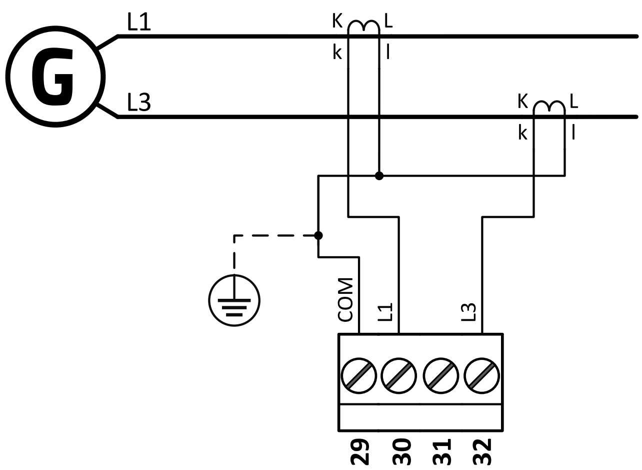


Image 4.6 Split phase application SplPhL1L3

IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "–" terminal is maximally ±2 V. To do so ground properly both terminals.

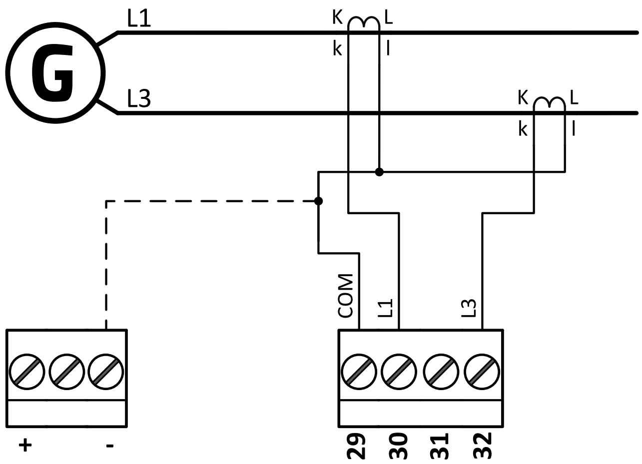


Image 4.7 Split phase application SplPhL1L3

IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "–" terminal is maximally ±2 V. To do so interconnect these two terminals.

Note: *This wiring is recommended for Indian market.*

Mono phase application

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

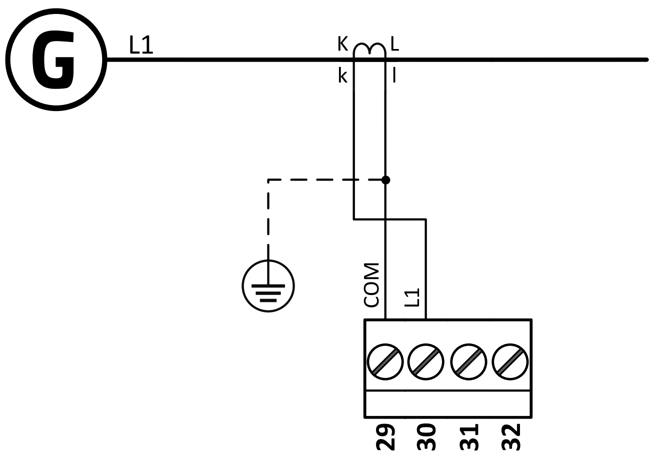


Image 4.8 Mono phase application

IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "–" terminal is maximally ±2 V. To do so ground properly both terminals.

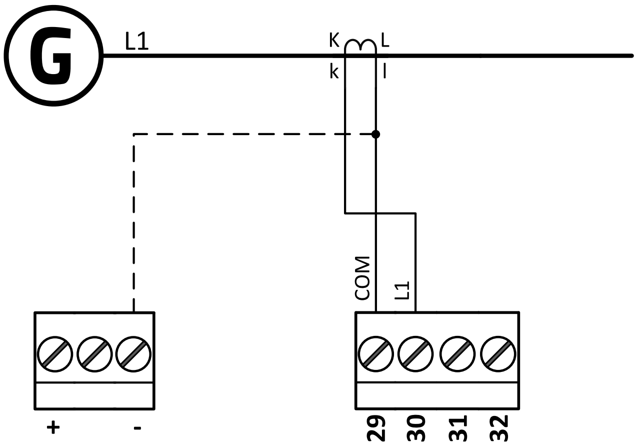


Image 4.9 Mono phase application

IMPORTANT: It is necessary to ensure that potential difference between current COM terminal and power supply "–" terminal is maximally ±2 V. To do so interconnect these two terminals.

Note: *This wiring is recommended for Indian market.*

Voltage measurement SPtM

There are 4 voltage measurement Connection Type (setpoint **Connection type (page 264)** [3Ph4Wire / High Leg D / 3Ph3Wire / Split PhL1L2 / Split PhL1L3/ Mono Ph]) options, every type matches to corresponding generator connection type.

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

The generator protections are evaluated from different voltages base d on **Connection type (page 264)** setting:

- 3Ph 4W – Ph-Ph voltage, Ph-N voltage
- 3Ph 3W – Ph-Ph voltage
- SplPhL1L2 – Ph-N voltage
- SplPhL1L3 – Ph-N voltage
- Mono Ph – Ph-N voltage

ConnectionType: 3 Phase 4 Wires

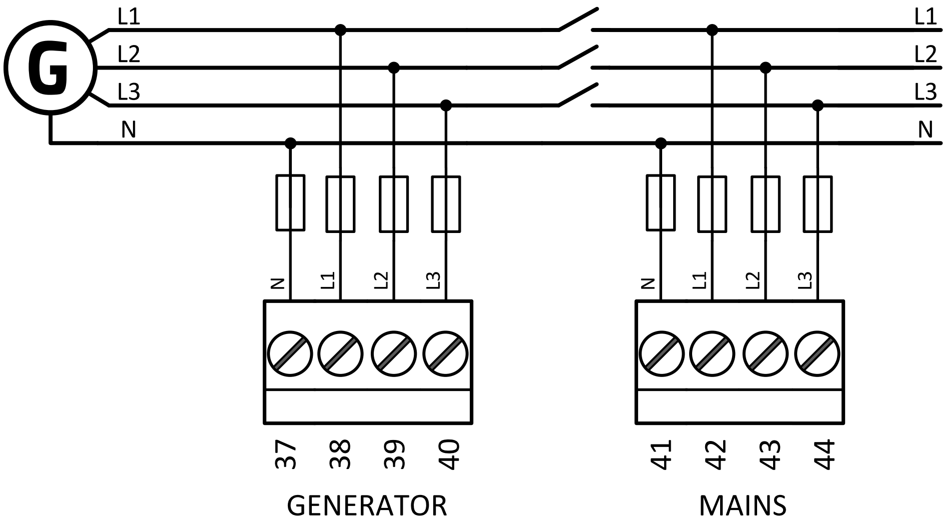


Image 4.10 3 phase application with neutral

Note: *Fuse on "N" wire is not obligatory but recommended.*

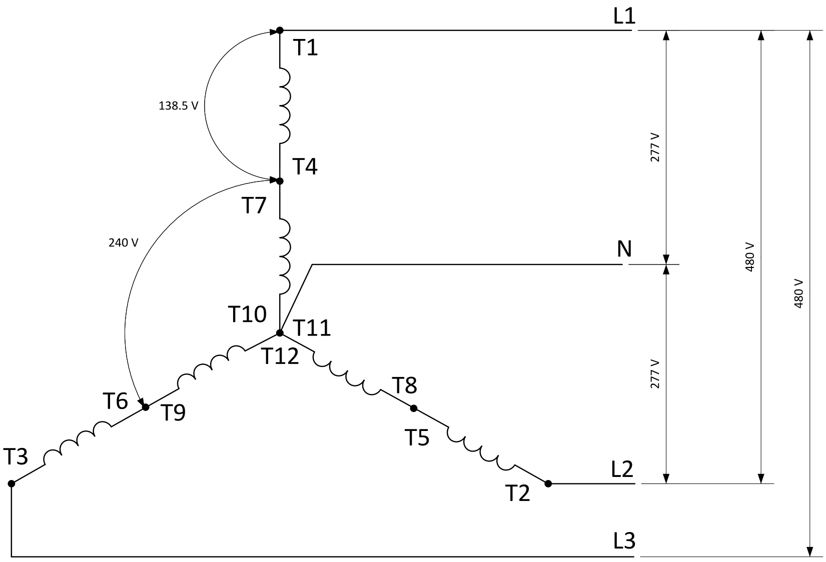


Image 4.11 Typical 3 Phase 4 Wires generator wiring, also known as 3ph High Y

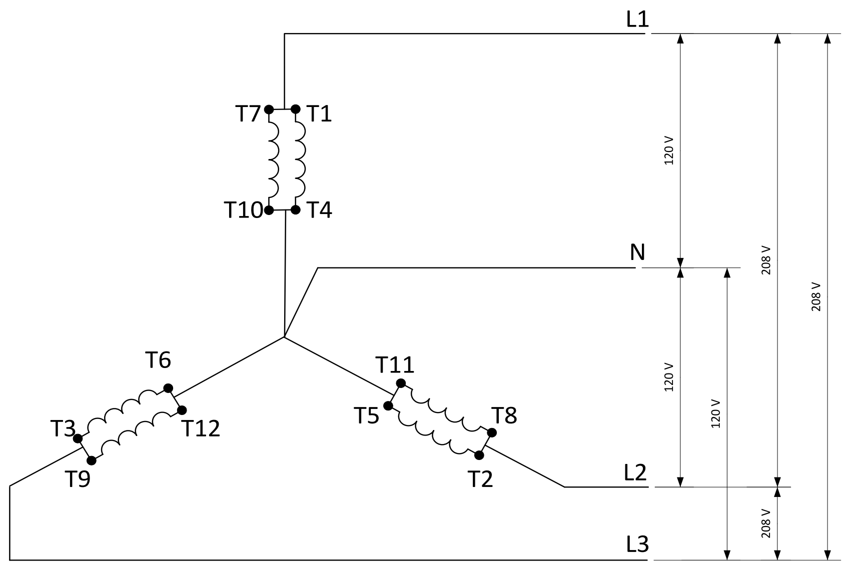


Image 4.12 3 Phase 4 Wires generator wiring, also known as 3ph Low Y

ConnectionType: High Leg D

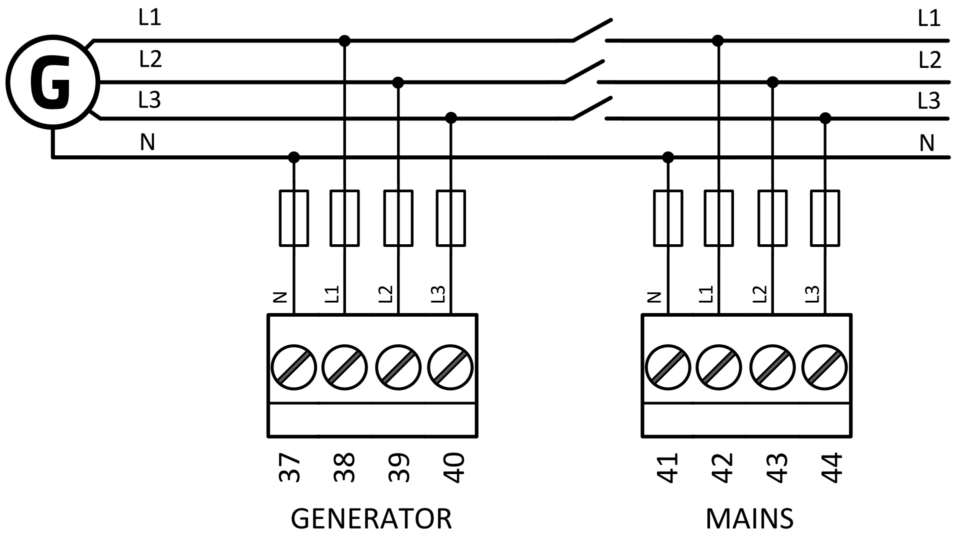


Image 4.13 High Leg Delta application

Note: *Fuse on "N" wire is not obligatory but recommended.*

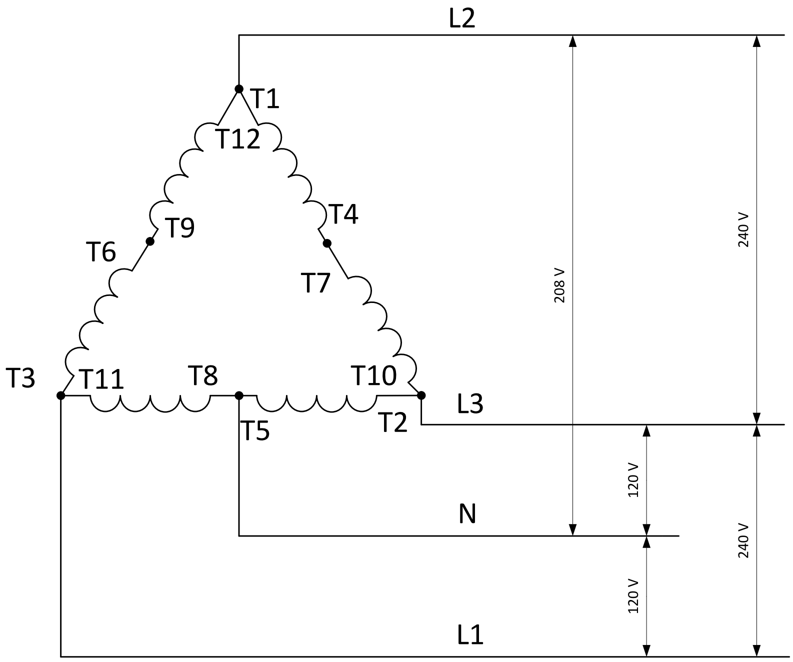


Table 4.1 Typical High Leg D generator wiring

ConnectionType: 3 Phase 3 Wires

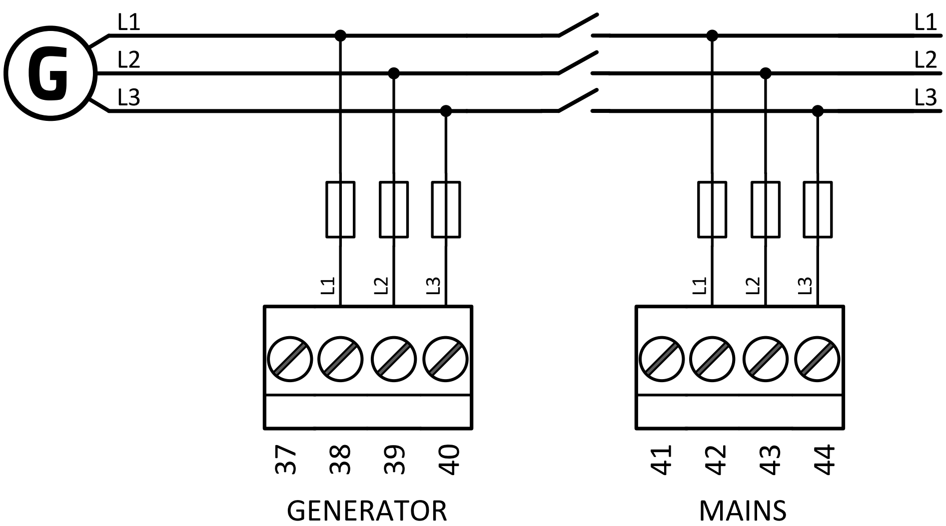


Image 4.14 3 phase application without neutral

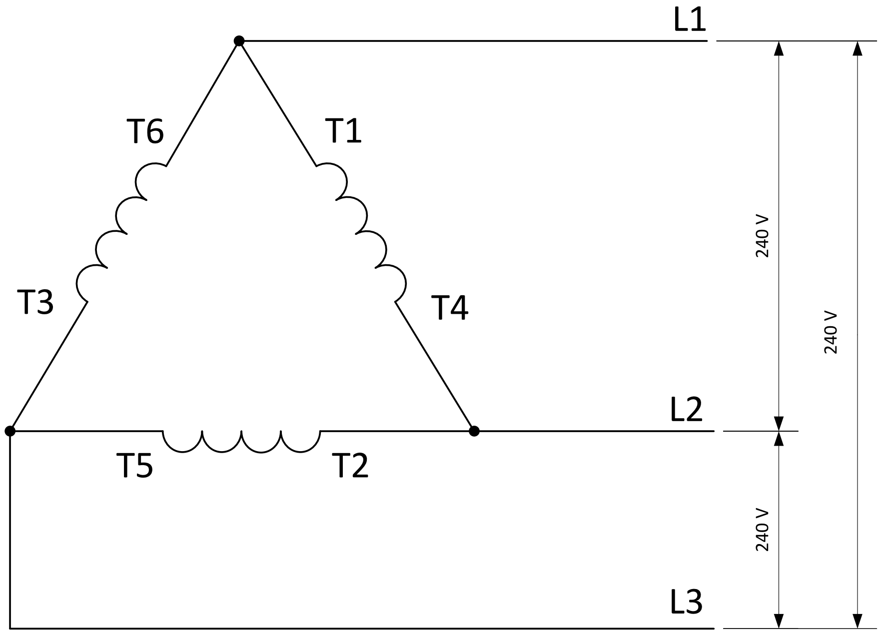


Image 4.15 Typical 3 Phase 3 Wires generator wiring

ConnectionType: SplPhL1L3

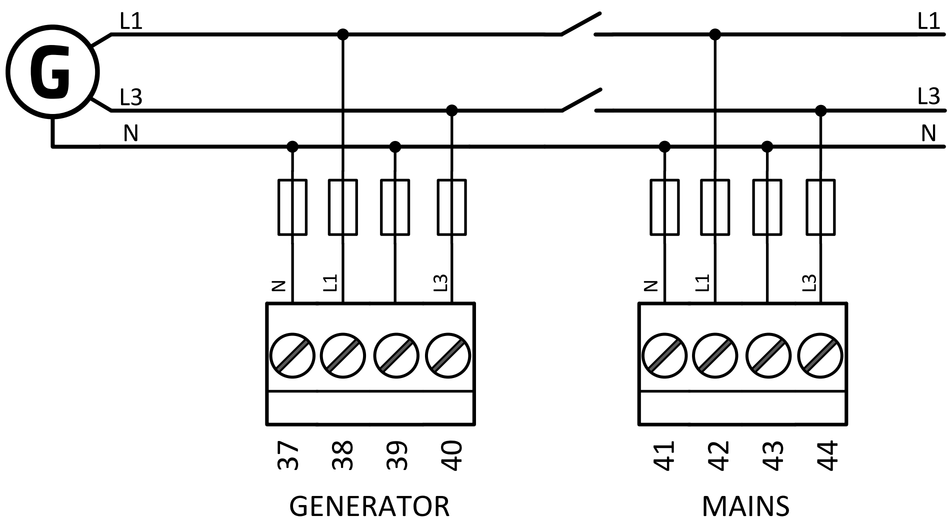


Image 4.16 Split phase application (SplPhL1L3)

Note: *Fuse on "N" wire is not obligatory but recommended.*

ConnectionType: SplPhL1L2

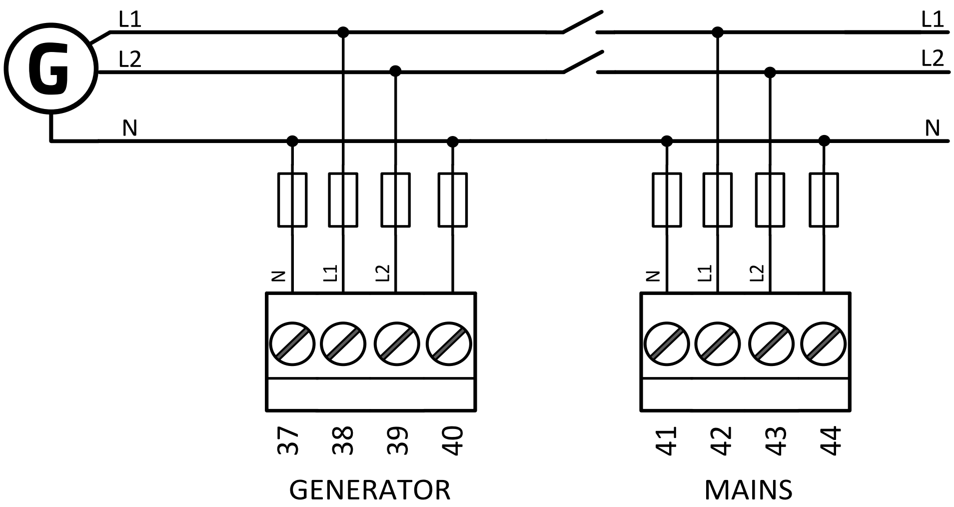
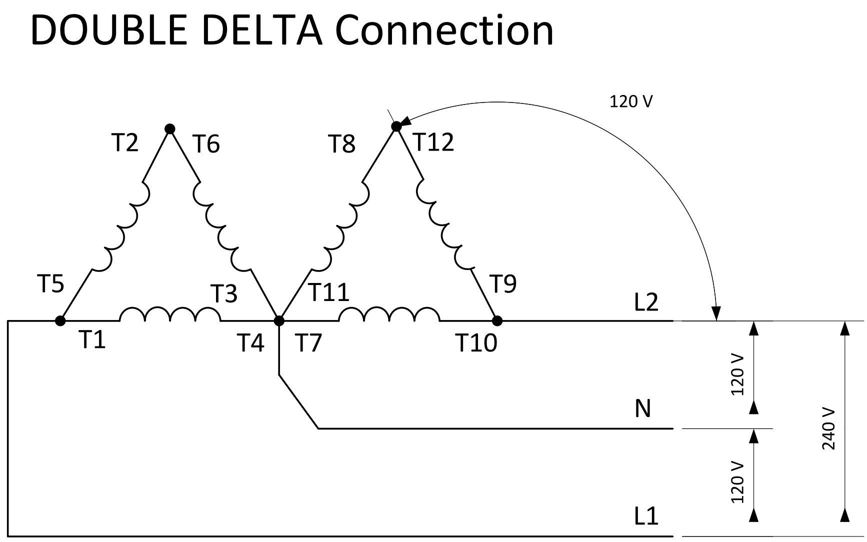


Image 4.17 Split phase application (SplPhL1L2)

Note: *Fuse on "N" wire is not obligatory but recommended.*



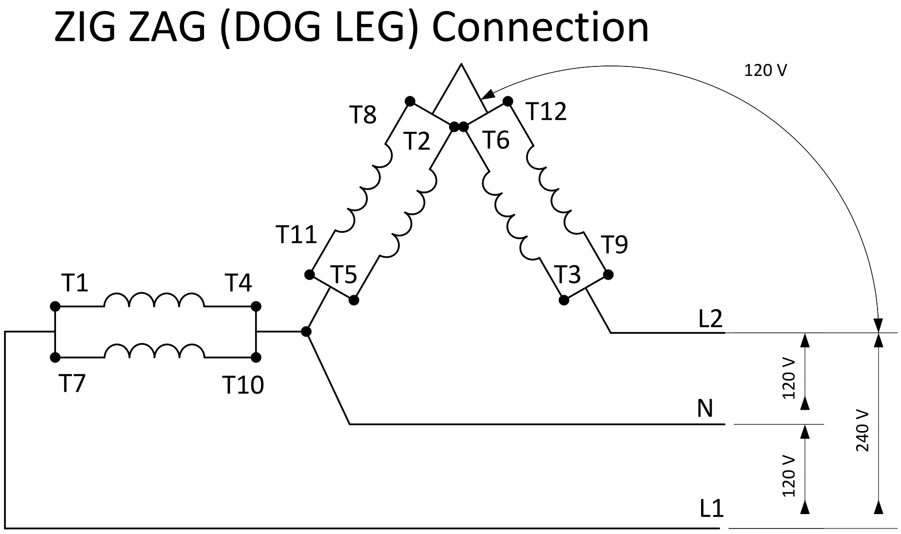


Image 4.18 Typical Split Phase generator wiring

ConnectionType: Mono Phase

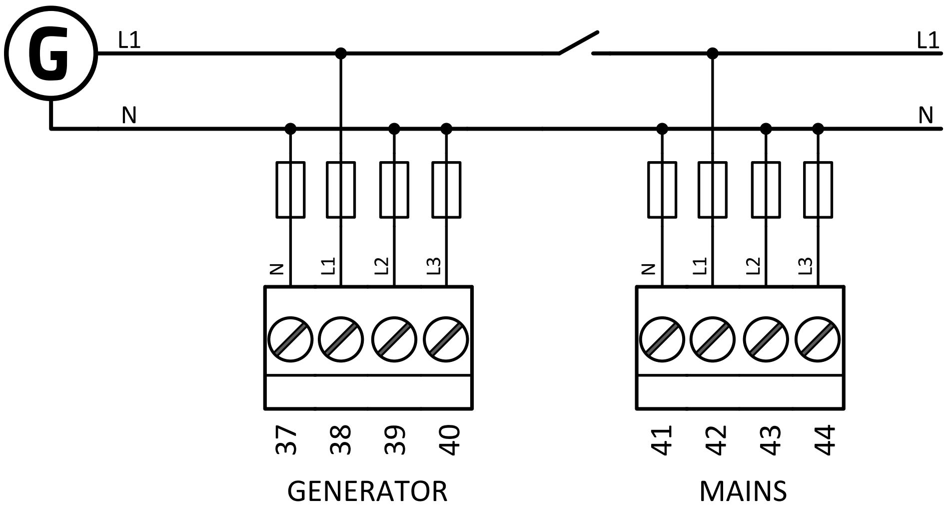


Image 4.19 Mono phase application

Note: *Fuse on "N" wire is not obligatory but recommended.*

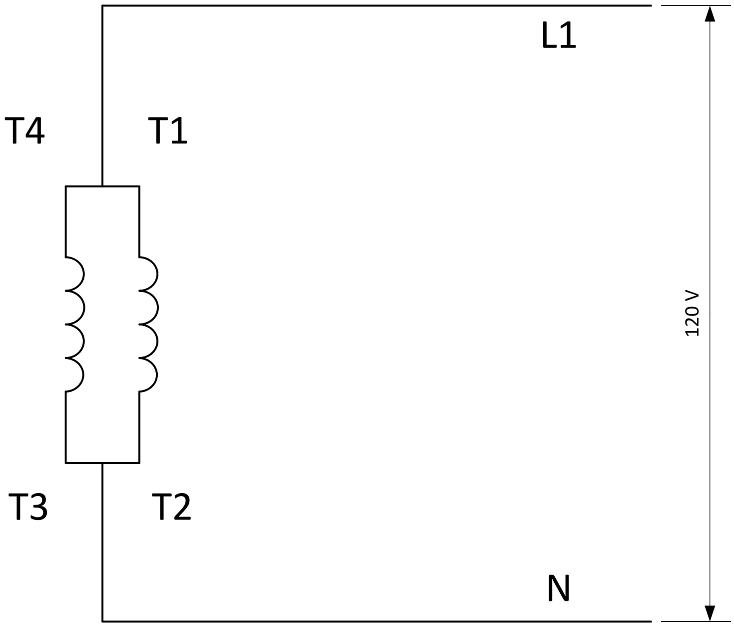


Image 4.20 Typical Mono Phase generator wiring

Voltage measurement MINT

There are 4 voltage measurement Connection Type (setpoint **Connection type (page 264)** [3Ph4Wire / High Leg D / 3Ph3Wire / Split PhL1L2 / Split PhL1L3 / Mono Ph]) options, every type matches to corresponding generator connection type.

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

The generator protections are evaluated from different voltages based on **Connection type (page 264)** setting:

- 3Ph 4W – Ph-Ph voltage, Ph-N voltage
- 3Ph 3W – Ph-Ph voltage
- SplPhL1L2 – Ph-N voltage
- SplPhL1L3 – Ph-N voltage
- Mono Ph – Ph-N voltage

ConnectionType: 3 Phase 4 Wires

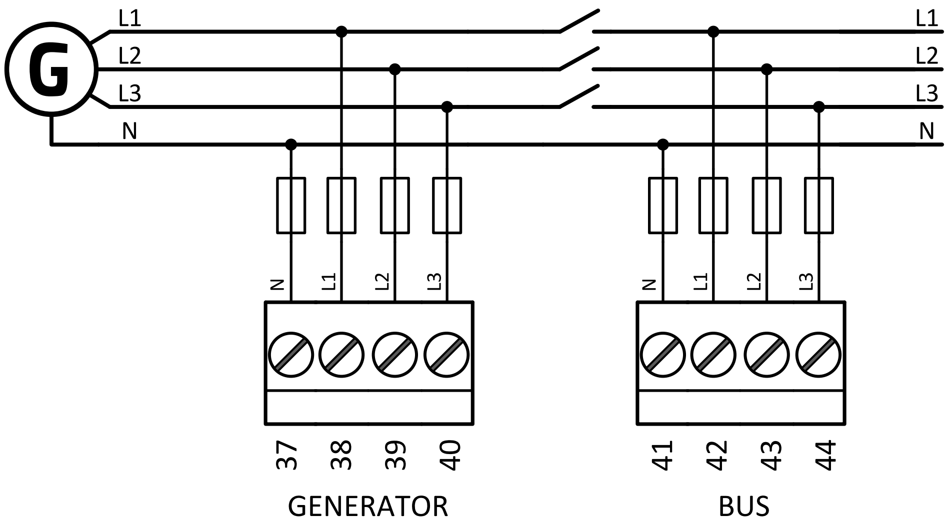


Image 4.21 3 phase application with neutral

Note: *Fuse on "N" wire is not obligatory but recommended.*

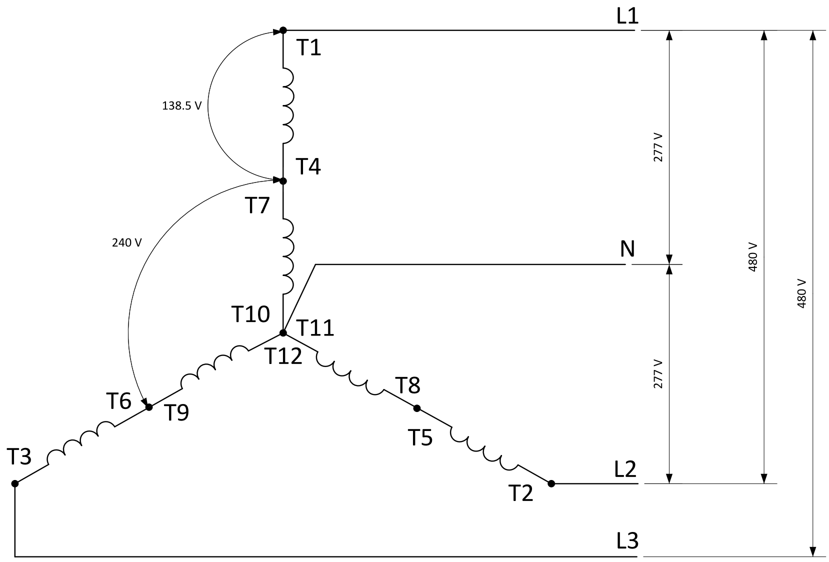


Image 4.22 Typical 3 Phase 4 Wires generator wiring, also known as 3ph High Y

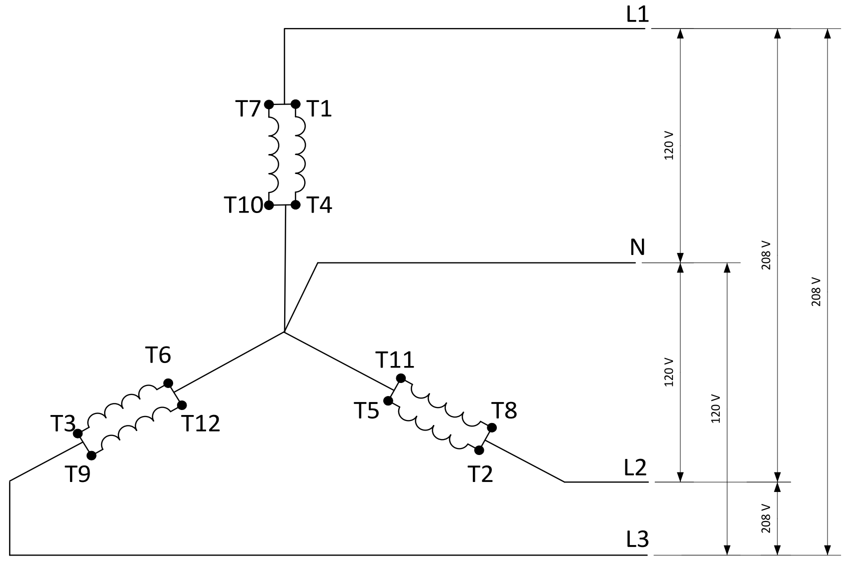


Image 4.23 3 Phase 4 Wires generator wiring, also known as 3ph Low Y

ConnectionType: High Leg D

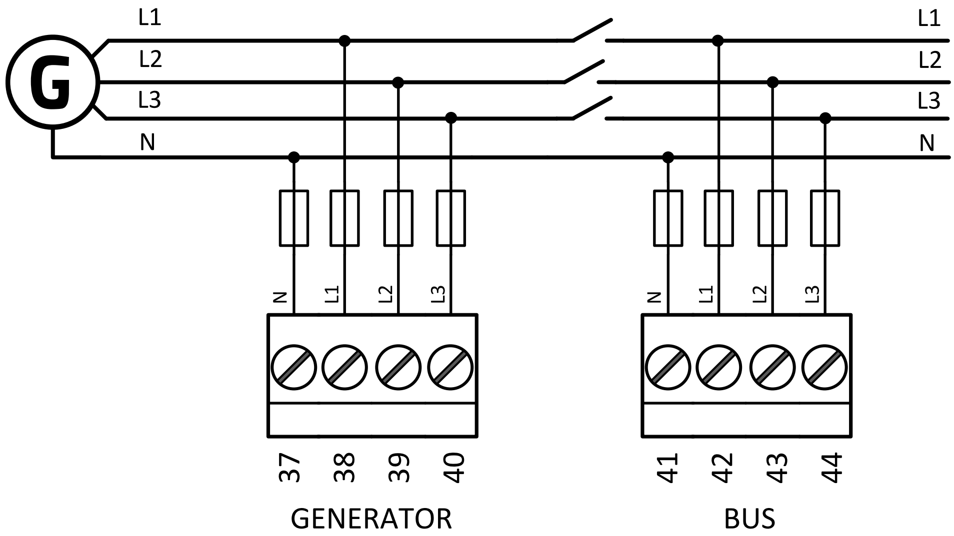


Image 4.24 High Leg Delta application

Note: *Fuse on "N" wire is not obligatory but recommended.*

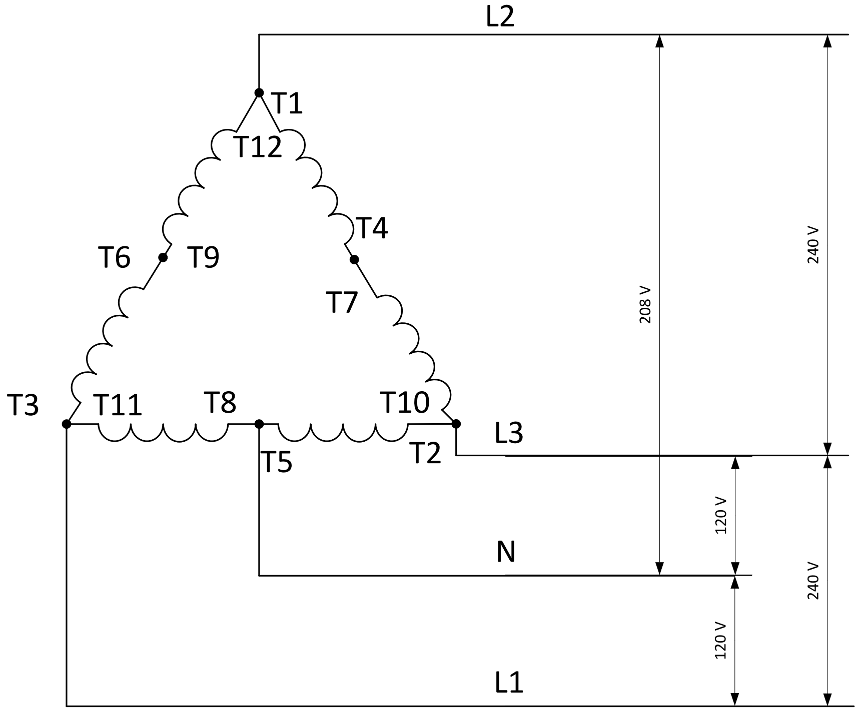


Image 4.25 Typical High Leg D generator wiring

ConnectionType: 3 Phase 3 Wires

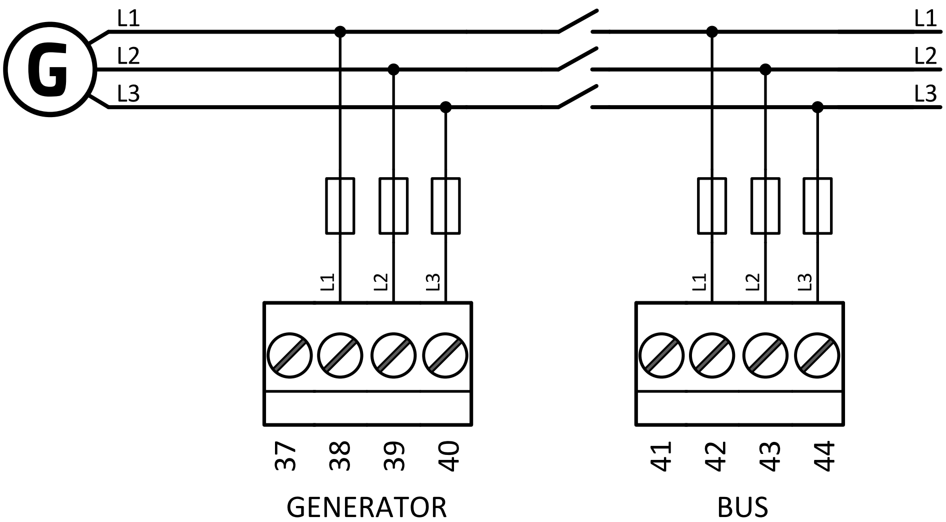


Image 4.26 3 phase application without neutral

Note: *Fuse on "N" wire is not obligatory but recommended.*

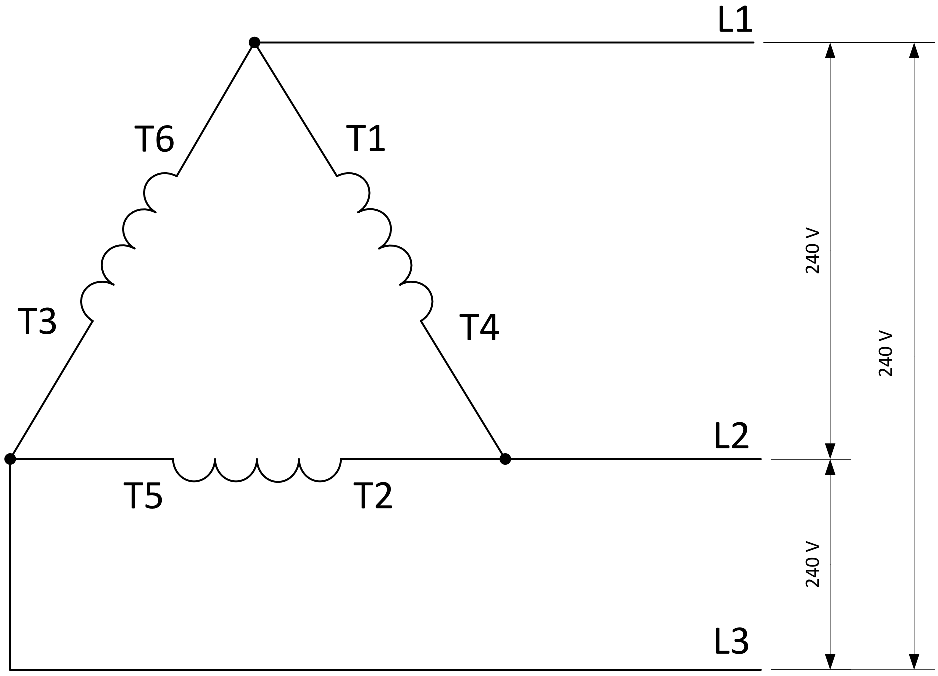


Image 4.27 Typical 3 Phase 3 Wires generator wiring

ConnectionType: SplPhL1L3

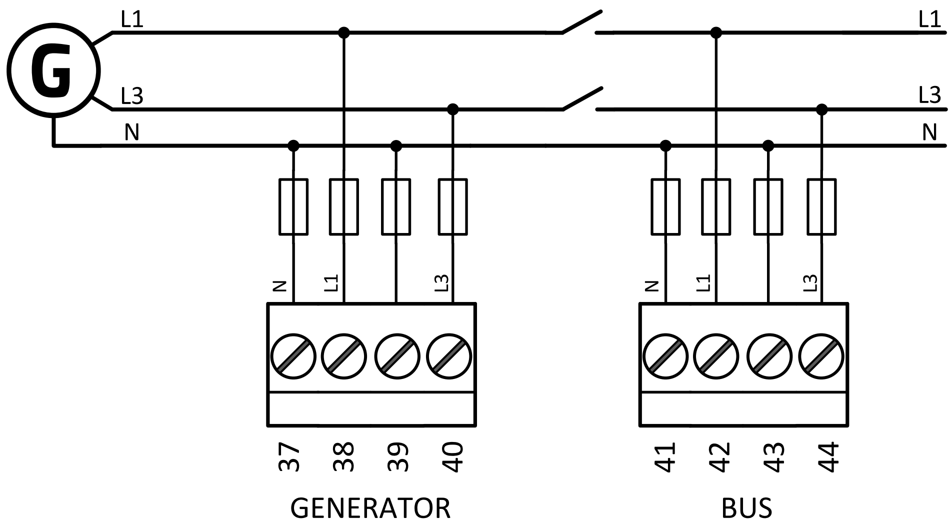


Image 4.28 Split phase application (SplPhL1L3)

Note: *Fuse on "N" wire is not obligatory but recommended.*

ConnectionType: SplPhL1L2

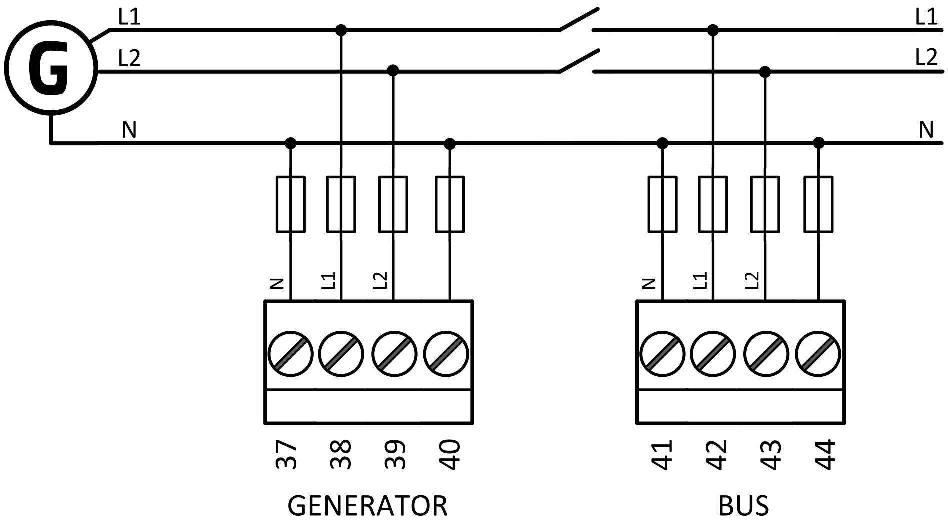
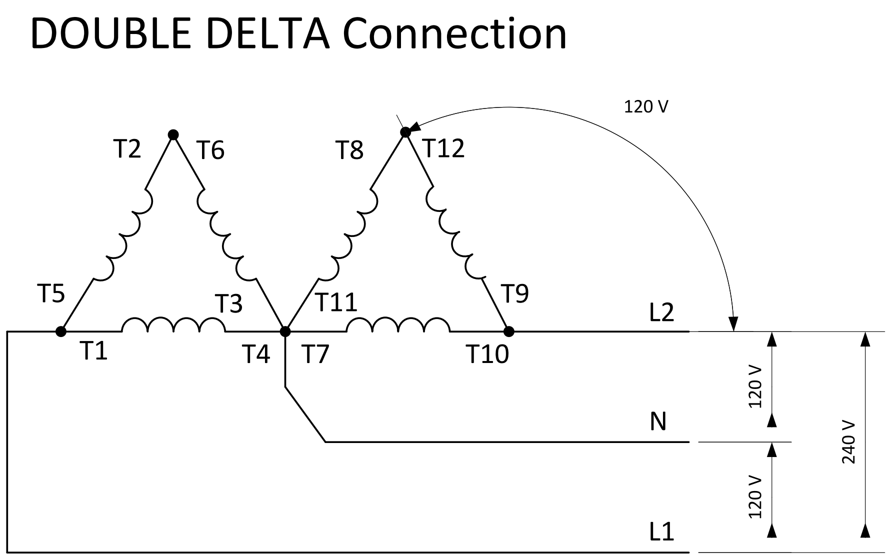


Image 4.29 Split phase application (SplPhL1L2)

Note: *Fuse on "N" wire is not obligatory but recommended.*



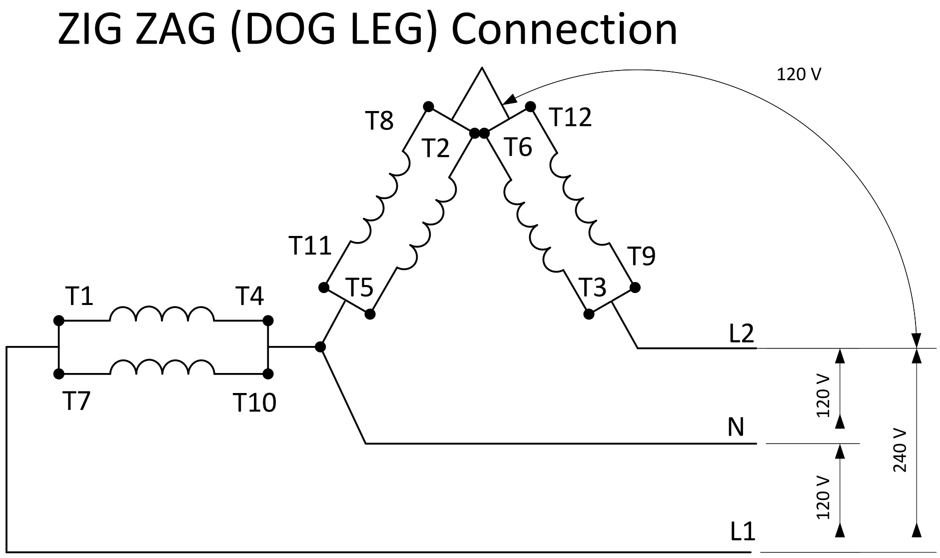


Image 4.30 Typical Split Phase generator wiring

ConnectionType: Mono Phase

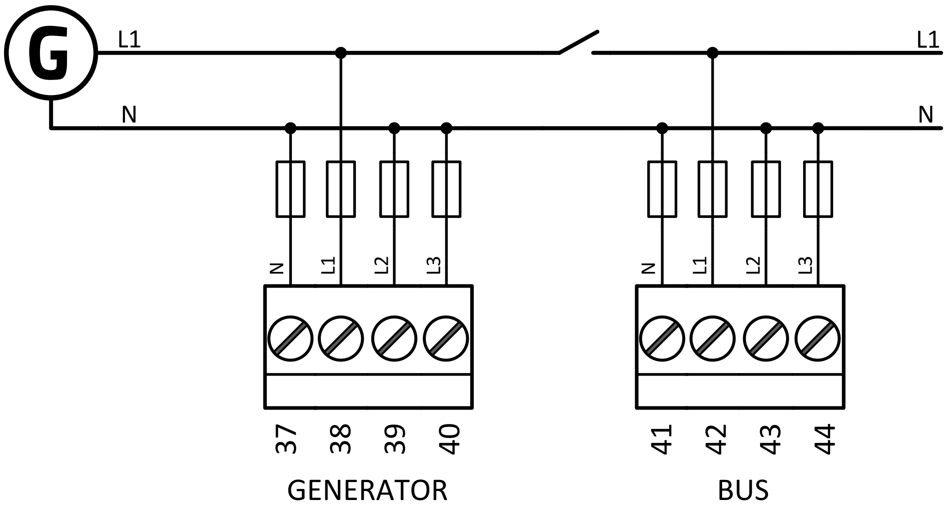


Image 4.31 Mono phase application

Note: *Fuse on "N" wire is not obligatory but recommended.*

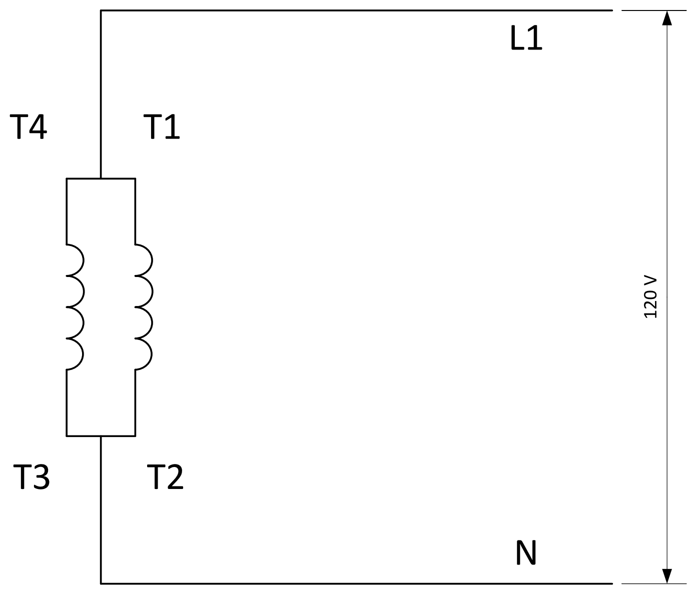


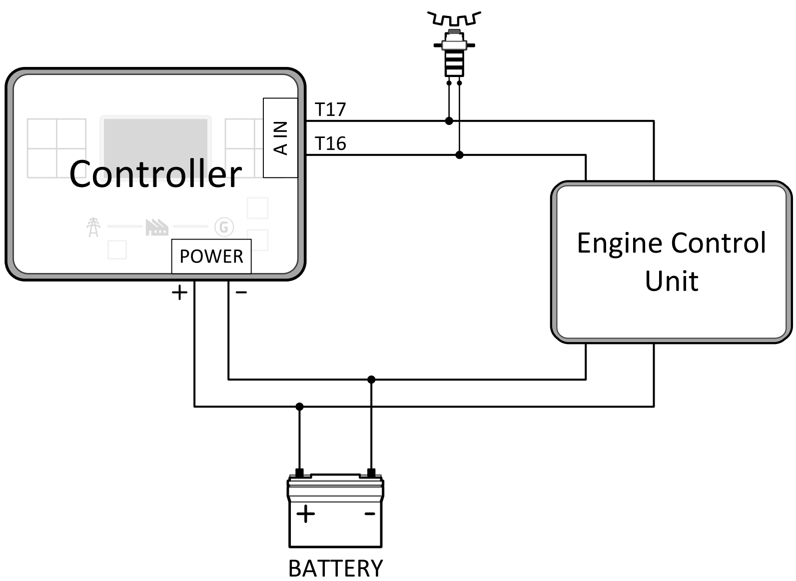
Image 4.32 Typical Mono Phase generator wiring

4.4.5 Magnetic pick-up

A magnetic speed sensor (pickup) is the most common method of engine speed measurement. To use this method, mount the pickup opposite the engine flywheel, connect the cable to the controller as shown on the picture below and adjust the setpoint **Gear Teeth (page 272)** according to the number of teeth on the flywheel.

For the details about the pick-up input parameters **see Technical data on page 236**

IMPORTANT: To ensure proper function use a shielded cable.



If engine will not start:

- Check ground connection from pick-up to controllers, if the problem continues, disconnect ground connection from one of them.

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

4.4.6 Binary inputs

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

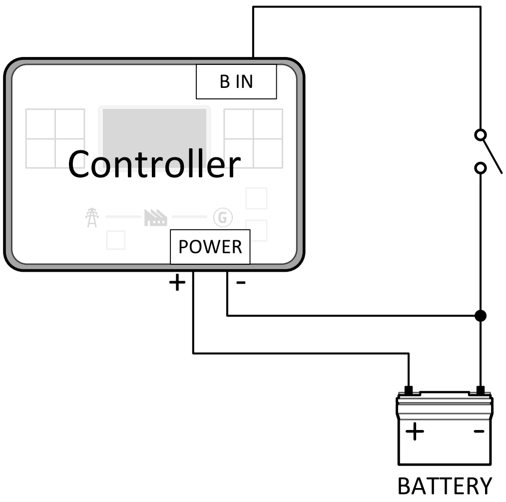


Image 4.33 Wiring binary inputs

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

4.4.7 Binary Outputs

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

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

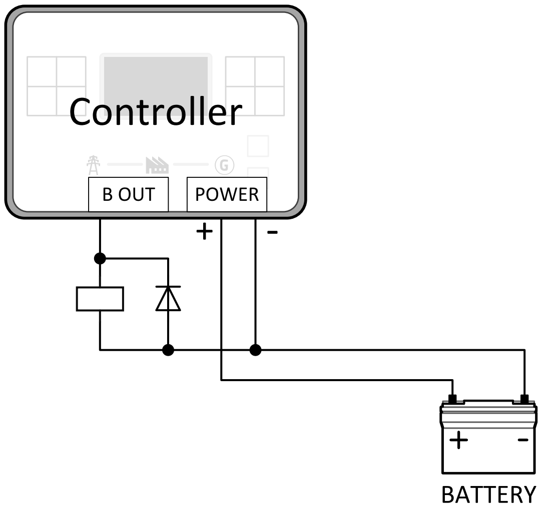


Image 4.34 Binary outputs wiring

Note: *Every single low current binary output can provide up to 0.5 A of steady current.*

4.4.8 Emergency stop

E-Stop has dedicated terminal T04. Power supply of binary output 1 (terminals 5) and binary output 2 (terminals 6) is internally connected (in controller) to E-Stop terminal. It means higher security and faster disconnection of these outputs. More information about E-Stop functions **see E-Stop on page 205**.

Note: *This function has the same behavior as binary input* ***EMERGENCY STOP (PAGE 718)****.*

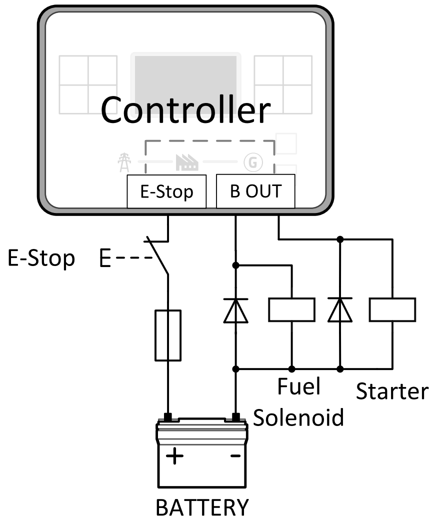


Image 4.35 E-Stop wiring

Note: *Recommended fusing is 1.2 A fuse.*

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

Note: *For proper functionality of E-Stop, the terminal T04 must be always wired. Terminal can be connected to battery+ or to terminal T03 (BATT+)*

LBI **EMERGENCY STOP (PAGE 718)** can be configured on any physical input. There are 2 ways how to make a wiring:

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

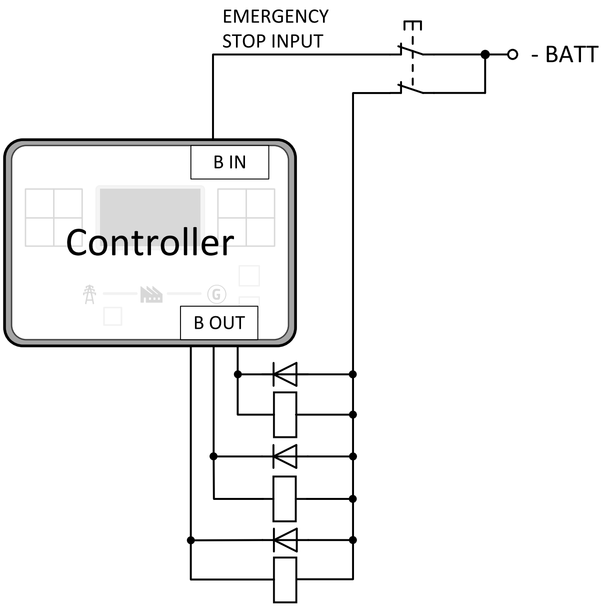


Image 4.36 Hard-wired emergency stop

4.4.9 Analog inputs

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

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

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

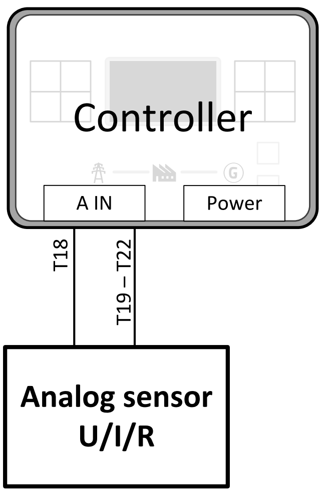


Image 4.37 Wiring of analog sensor

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

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

Analog as binary or tristate inputs

Analog inputs can be used also as binary or tri-state, i.e. for contact sensors without or with circuit check. The threshold level is 750 Ω. In the case of tri-state, values lower than 10 Ω and values over 2400 Ω are evaluated as sensor failure (short or open circuit).

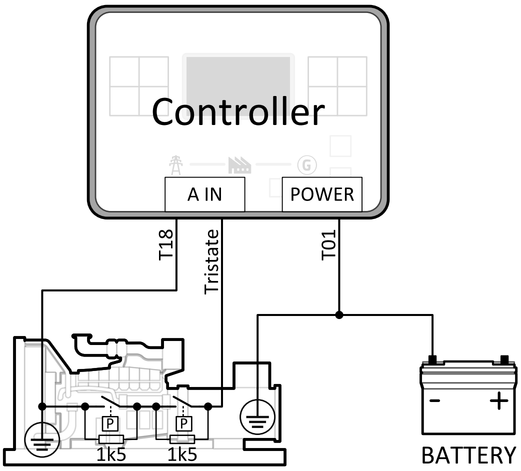


Image 4.38 Analog inputs as tristate

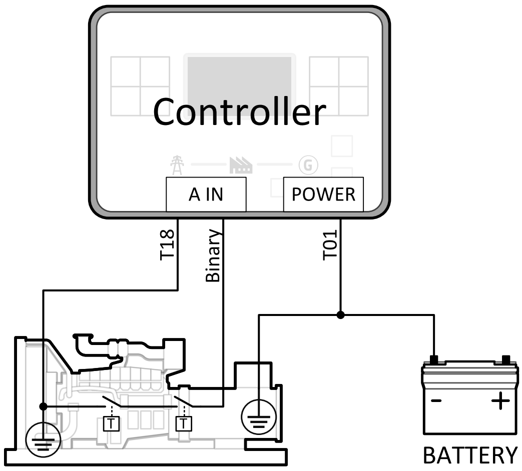


Image 4.39 Analog inputs as binary

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

Note: *Tristate and binary sensors are not suitable for Analog Switch functions.*

4.4.10 CAN bus and RS485 wiring

CAN bus wiring

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

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

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

Cable type	Shielded twisted pair
Impedance	120 Ω
Propagation velocity	≥ 75 % (delay ≤ 4.4 ns/m)
Wire crosscut	≥ 0.25 mm^2
Attenuation (@1MHz)	≤ 2 dB / 100 m

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

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

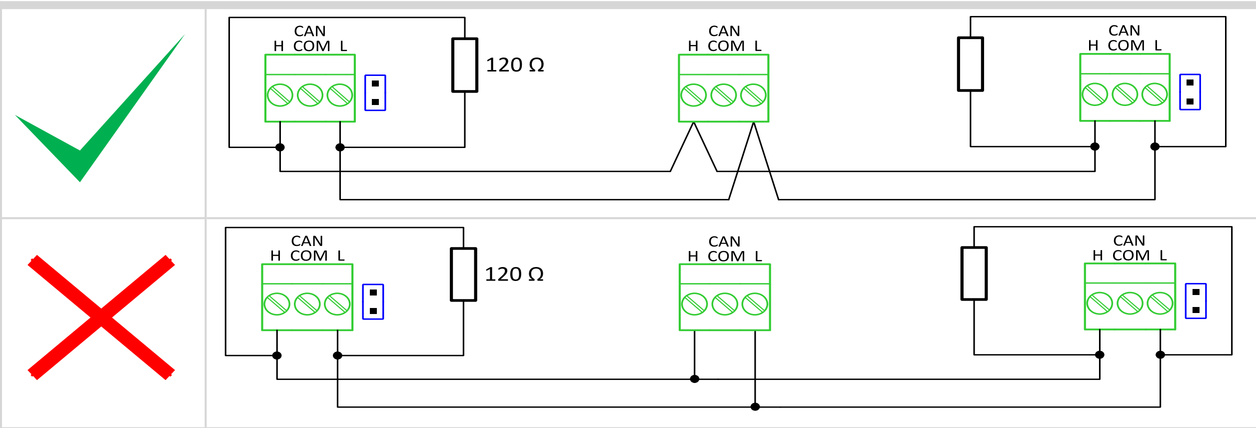


Image 4.40 CAN bus topology

- For shorter distances (connection within one building)

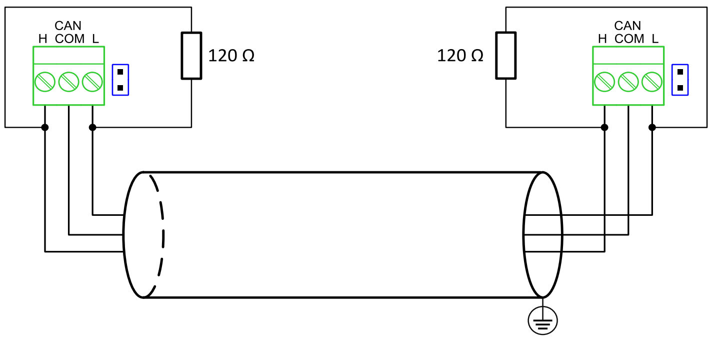


Image 4.41 CAN bus wiring for shorter distances

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

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

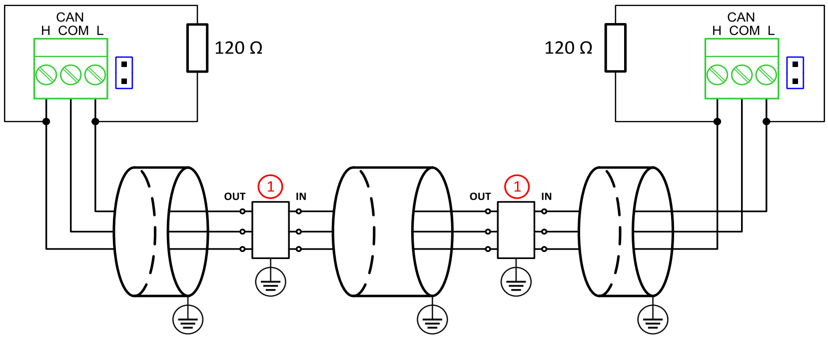


Image 4.42 CAN bus wiring for longer distances

① Recommended PT5-HF-12DC-ST[1]

RS485 wiring

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

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

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

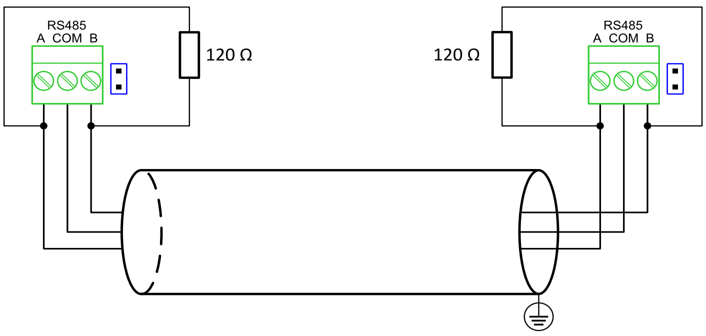


Image 4.43 RS485 wiring for shorter distances

[1]Protections recommended: Phoenix Contact (http://www.phoenixcontact.com): PT 5-HF-12DC-ST with PT2x2-BE (base element) or Saltek (http://www.saltek.cz): DM-012/2 R DJ
[2]Recommended data cables: BELDEN (http://www.belden.com) – for shorter distances: 3105A Paired – EIA Industrial RS-485 PLTC/CM (1x2 conductors); for longer distances: 3106A Paired – EIA Industrial RS-485 PLTC/CM (1x2+1 conductors)

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

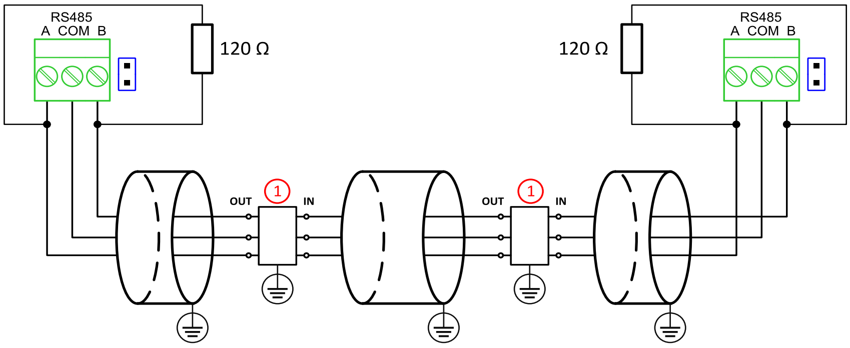


Image 4.44 RS485 wiring for longer distances

① Recommended PT5HF-5DC-ST[1]

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

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

On board RS485 description

Balancing resistors

The transmission bus into the RS485 port enters an indeterminate state when it is not being transmitted to. This indeterminate state can cause the receivers to receive invalid data bits from the noise picked up on the cable. To prevent these data bits, force the transmission line into a known state. By installing two 620Ω balancing resistors at one node on the transmission line, a voltage divider is created that forces the voltage between the differential pair to be less than 200 mV, which is the threshold for the receiver. Install these resistors on only one node. The figure below shows a transmission line using bias resistors. Balancing resistors are placed directly on the PCB of controller. Use the jumpers PULL UP/PULL DOWN to connect the balancing resistors.

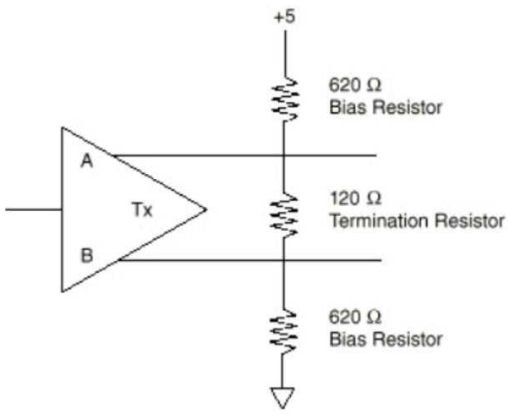


Image 4.45 Balancing resistors

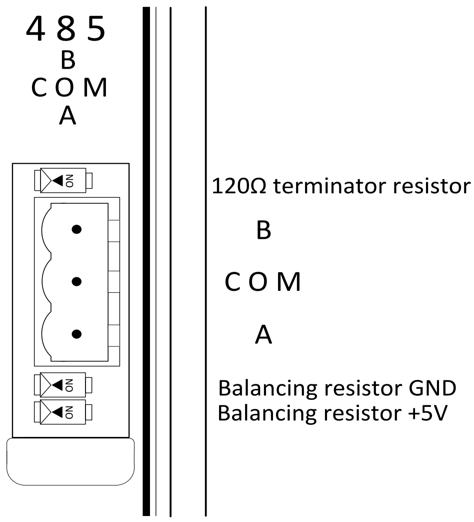


Image 4.46 RS485 on board

4.4.11 USB

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

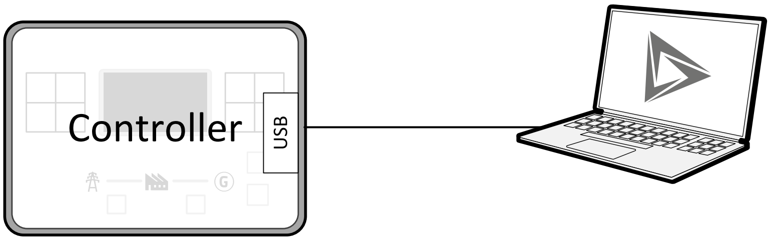


Image 4.47 USB connection

4.4.12 USB HOST

USB Flash Drive can be connected into USB A connector.

Note:** For more information* ***see USB host on page 201*.*

4.4.13 Ethernet

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

4.4.14 AVR Interface

The output from the controller work in the following mode:

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

Please **see Voltage control outputs on page 158** for more information about set-up of controller's AVR.

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

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

4.4.15 Speed governor interface

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

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

- Output ripple: 30 mV max. at 50 % of pwm.
- Galvanic insulation: NO
- 5 V PWM mode
  - PWM amplitude: 5 V.
  - PWM frequency: 500 to 2900 Hz defined by setpoint **Speed Governor PWM Rate (page 390)**
  - Maximum load current: 20 mA both sourcing and sinking.
  - PWM Resolution: 14 bit.
  - Galvanic insulation: NO

Please **see Speed control outputs on page 156** for more information about set-up of controller's Speed governor.

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

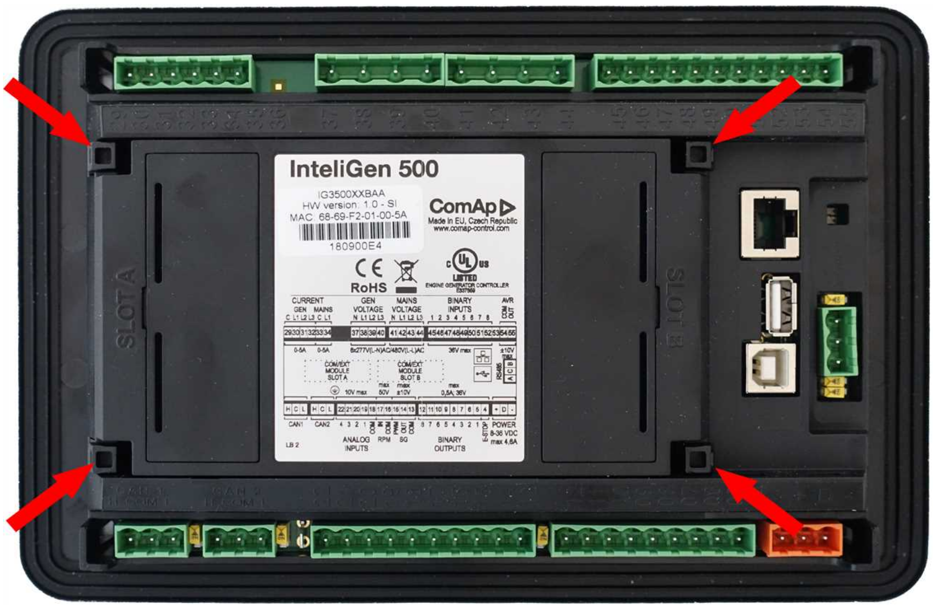
> **IMPORTANT: Read carefully specific Speed governor instructions before connecting to controller.**

4.5 Plug-in module installation

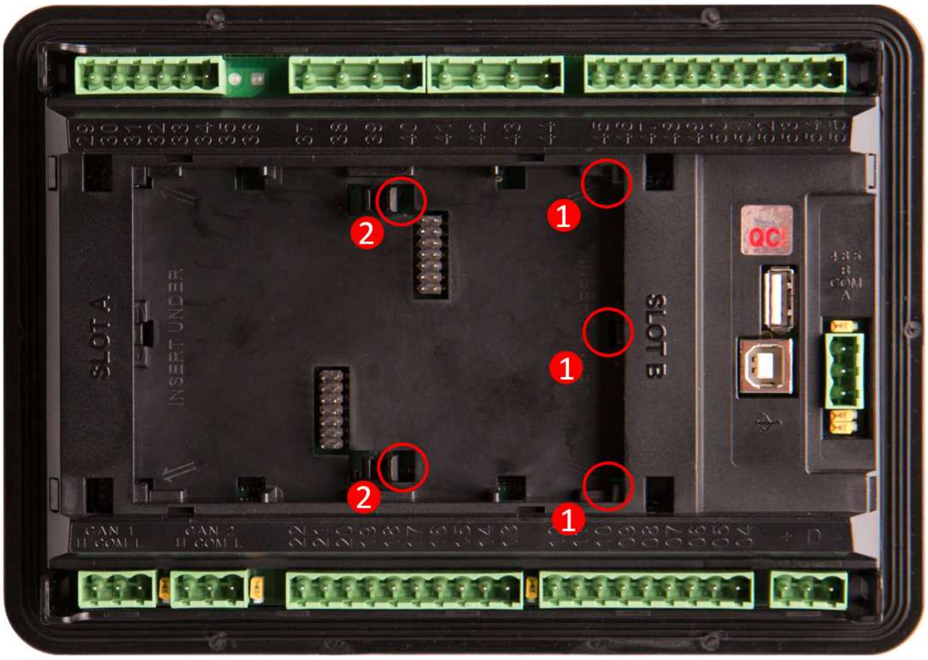
4.5.1 Installation

> **IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.**

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



After removing the back cover insert the plug-in module. The plug-in module must be inserted under holders. Start with holders marked by arrows. There are also arrows on the controller for better navigation. After inserting plug-in module under holders press it down. This locks the module in place.



After locking the plug-in module into holders, reback the back cover (small cover for connectors must be removed from back cover). Finally insert the small cover for the connectors. The small covers are unique for each plug-in module.

4.6 Maintenance

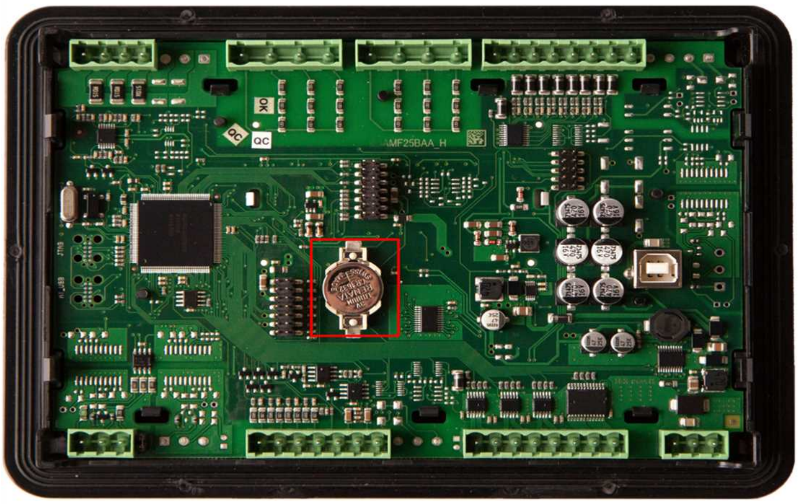
4.6.1 Backup battery replacement

This battery serves to maintain the run of RTC (real time clock) so that controller does not lose information about time and date when disconnected from power supply.

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

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

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



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

back to Installation and wiring

5 Controller setup

back to Table of contents

5.1 Default configuration

5.1.1 Binary inputs

Number	Description	Configured function
BIN1	Generator circuit breaker feedback	GCB Feedback (page 723)
BIN2	Mains circuit breaker feedback	MCB Feedback (page 727)
BIN3	Not used	Not Used (page 728)
BIN4	Access lock keyswitch	Access Lock (page 686)
BIN5	Switch controller to OFF mode	Remote OFF (page 731)
BIN6	Switch controller to TEST mode	Remote TEST (page 733)
BIN7	Suppression of alarms	Sd Override (page 734)
BIN8	Free slot	Not Used (page 728)

5.1.2 Binary outputs

Number	Description	Function
BOUT1	Starter motor control	Starter (page 803)
BOUT2	Fuel solenoid valve	Fuel Solenoid (page 775)
BOUT3	Indication of breaker state	GCB Close/Open (page 777)
BOUT4	Indication of breaker state	MCB Close/Open (page 789)
BOUT5	Activation of any devices before start	Prestart (page 797)
BOUT6	Gen-set can be connected to load	Ready To Load (page 800)
BOUT7	Indication of unconfirmed alarm	Alarm (page 753)
BOUT8	Free slot	Not Used (page 796)

5.1.3 Analog inputs

Number	Configured sensor	Function
AIN1	VDO 10 Bar	Oil Pressure (page 842)
AIN2	VDO 40-120 °C	Coolant Temp (page 839)
AIN3	VDOLevel %	Fuel Level (page 840)
AIN4	None	Not Used (page 841)

5.2 Custom configuration

5.2.1 Init or Service screen logo customization

There is a possibility to change the init or service screen logo.

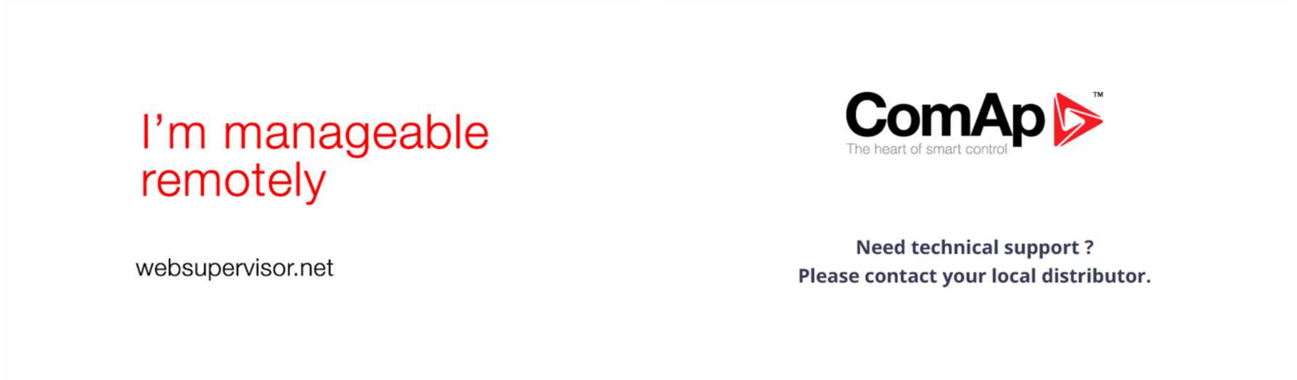
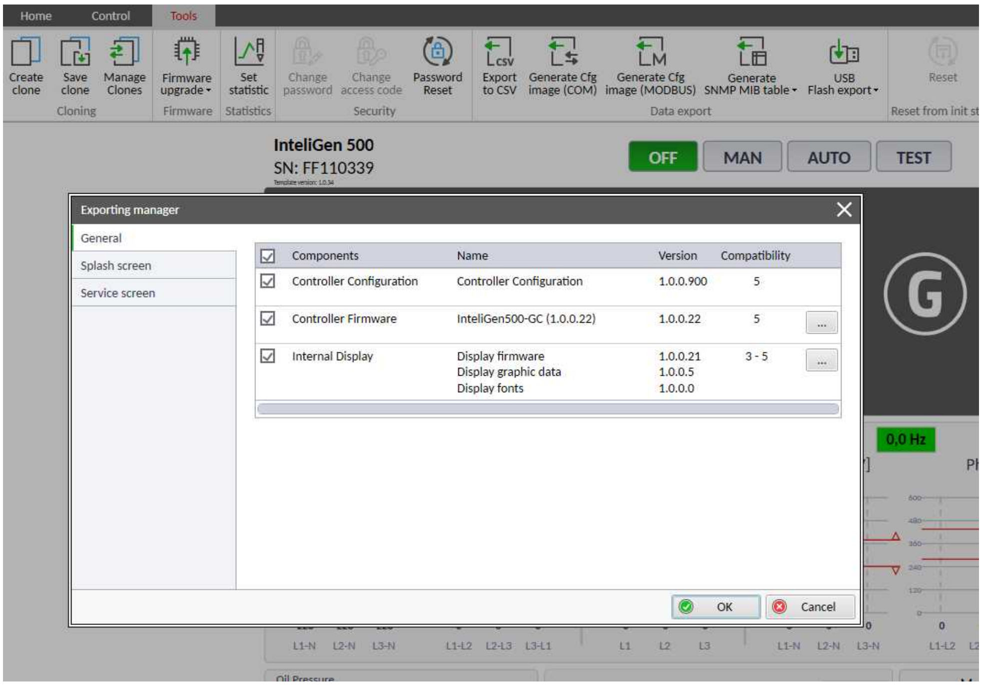


Image 5.1 : Default init and service screen logos

1. Make your own starting logo.
2. The image resolution is 800 × 480 pixels. Target image format is *.png, *.jpg or *.bmp.
3. Open InteliConfig PC application and connect to the controller where you want to change the logo (init, service or both at the same time).
4. Click to the tab Tools – USB Flash Export – Exporting Manager



5. Prepare the package with the requested logos (Init, Service, or both). It is possible to prepare the package only with the logos.
6. Confirm your choice and save the package file in the root directory of your USB stick.
7. Insert the USB stick into the controller unit.
8. Administration - Import/Export screen is automatically displayed when the USB stick is inserted. Or if the USB stick is already inserted use Enter + Menu button combination from metering screen, select the Import/Export item.

9. Select Import package. Insert the administrator (Access Rights level 3) password if not logged in.
10. Press user button 1 (Import)
11. The new logo(s) is(are) being imported to the Controller unit.
12. The device is rebooted and new logos imported.
13. Remove the USB Stick.

5.3 Controller configuration and PC tools connection

back to Controller setup

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

5.3.1 USB

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

Connection using InteliConfig

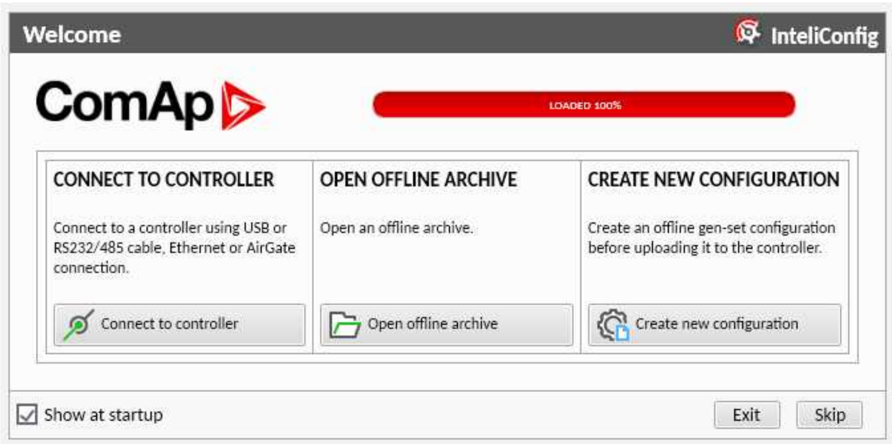


Image 5.2 First screen of InteliConfig – select connect to controller

Image 5.3 Second screen of InteliConfig – select detected controllers

Connection using WinScope

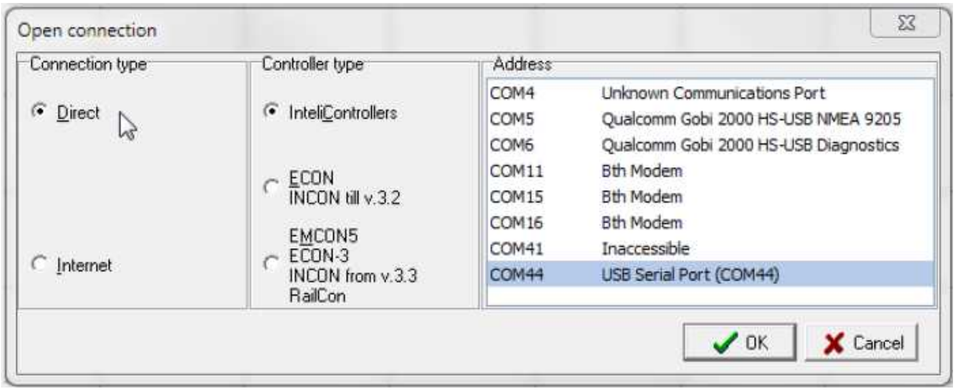


Image 5.4 WinScope screen – select direct connection

5.3.2 RS232/RS485

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

- **COM1 Mode (page 521)** = Direct
- **Controller Address (page 278)** must be set to the same value as in the PC tool

Connection using InteliConfig

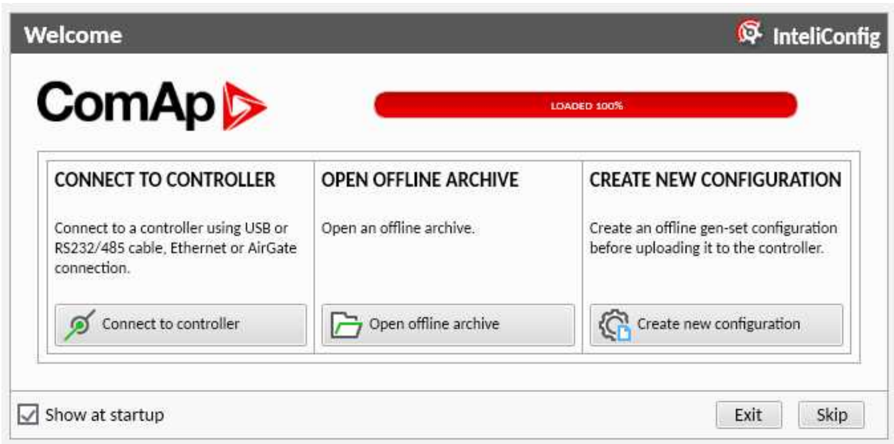


Image 5.5 First screen of InteliConfig – select connect to controller

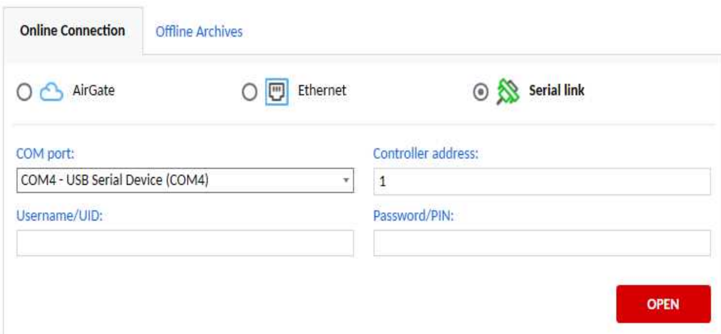


Image 5.6 Second screen of InteliConfig – select Serial link

Connection using WinScope

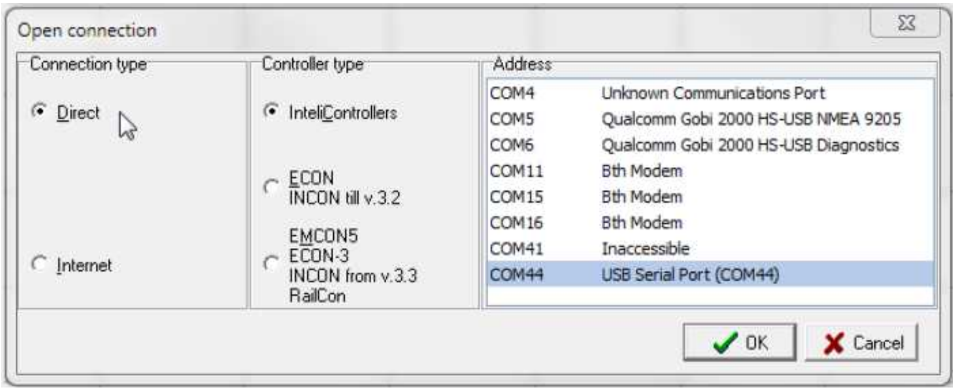


Image 5.7 WinScope screen – select direct connection

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

5.3.3 Ethernet

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

Direct connection

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

- **Controller Address (page 278)** must be set to the same value as in the PC tool
- **IP Address Mode (page 281)** can be set to AUTOMATIC when there is DHCP service available. Otherwise it should be set to FIXED
- **IP Address (page 282)** is either set automatically or it can be adjusted to a specific requested value
- **Subnet Mask (page 282)** is either set automatically or it can be adjusted to a specific requested value
- **Gateway IP (page 283)** can be set here when it is used
- **ComAp TCP Port (page 548)** number is 23. Make sure that this port is open for communication in your network

Connection using InteliConfig

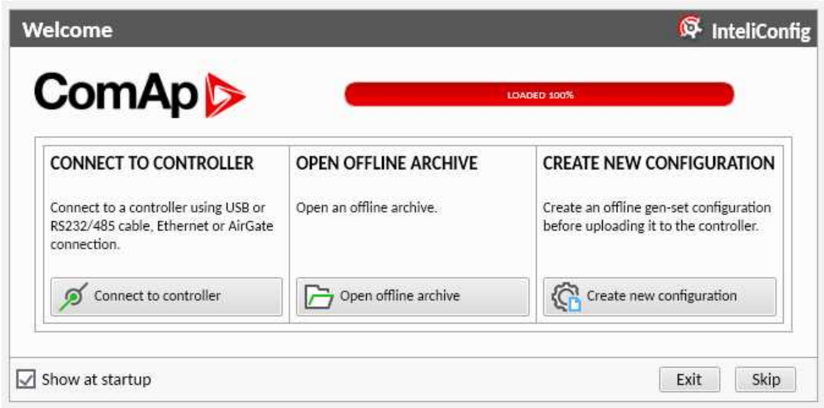


Image 5.8 First screen of InteliConfig – select connect to controller

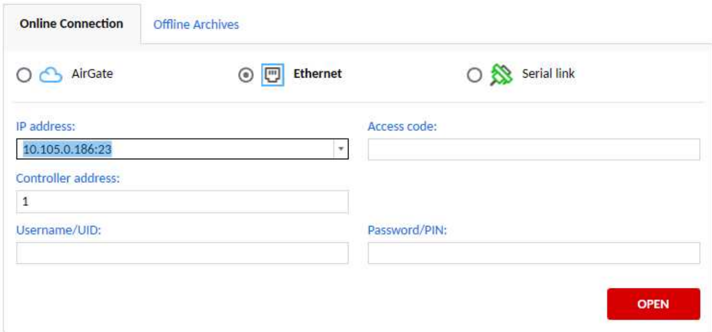


Image 5.9 Second screen of InteliConfig – select Internet / Ethernet

Connection using WinScope

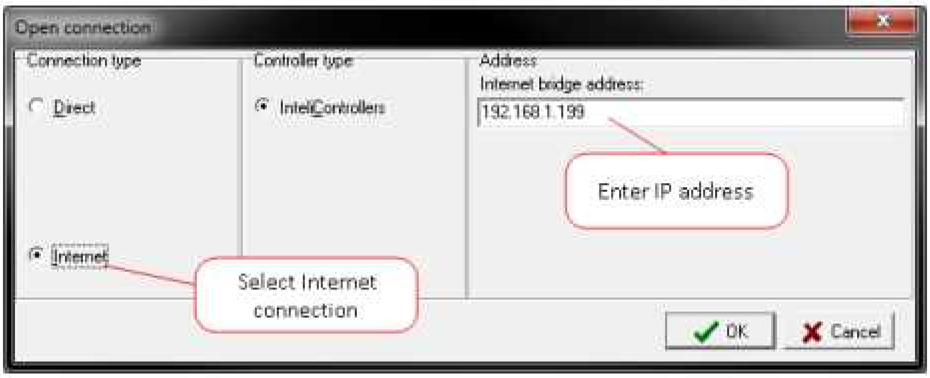


Image 5.10 WinScope screen

AirGate connection

You can use ComAp's AirGate service that allows you to connect to any controller via the internet regardless of the restrictions of the local network (as long asthe controller can connect to the internet AirGate service will work). The following setpoints must be adjusted:

- **Controller Address (page 278)** has to be set to the same value as in the PC tool
- **IP Address Mode (page 281)** must set to AUTOMATIC when there is DHCP service available. Otherwise it should be set to FIXED
- **IP Address (page 282)** is either set automatically or it can be adjusted to a specific requested value
- **Subnet Mask (page 282)** is either set automatically or it can be adjusted to a specific requested value
- **Gateway IP (page 283)** can be set here when it is used
- **AirGate Connection (page 285)** must be set to Enabled
- **AirGate Address (page 286)** currently there is one AirGate server running at URL airgate.comap.cz (enter this URL into the setpoint)

Connection using InteliConfig

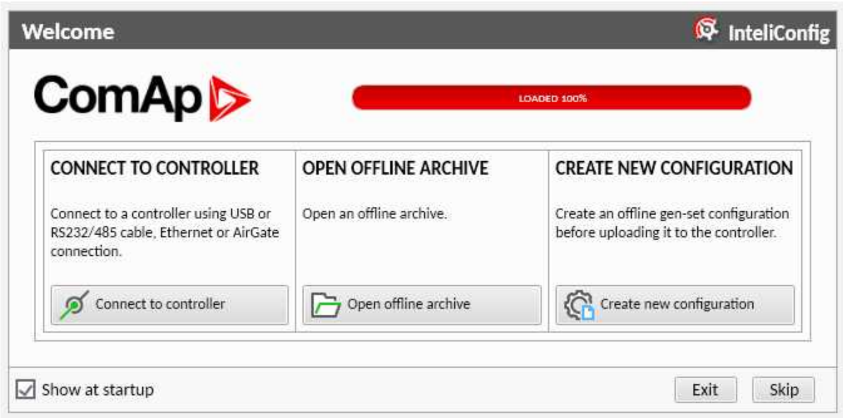


Image 5.11 First screen of InteliConfig – select connect to controller

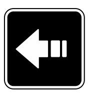
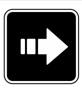
Connection using WinScope

WinScope doesn't support connection via AirGate.

5.4 Operator Guide

5.4.1 Front panel elements

Image 5.12 Operator interface of InteliGen 500

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

		currently selected mode is displayed. ***Note:** This button will not change the mode if the controller mode is forced by one of binary inputs listed in the Reference Guide – "Operating modes" chapter.*
3		**HORN RESET** button. Use this button to deactivate the horn output without acknowledging the alarms.
4		**FAULT RESET** button. Use this button to acknowledge alarms and deactivate the horn output. Inactive alarms will disappear immediately and status of active alarms will be changed to "confirmed" so they will disappear as soon as their reasons dismiss.
5		**UP** button. Use this button to move up or increase value.
6		**PAGE** button. Use this button to switch over display pages.
7		**DOWN** button. Use this button to move down or decrease value.
8		**ENTER** button. Use this button to finish editing a setpoint or moving right in the history page.
9		**START** button. Works in MAN mode only. Press this button to initiate the start sequence of the engine.
10		**STOP** button. Works in MAN mode only. Press this button to initiate the stop sequence of the Gen-set. Repeated pressing of button will cancel current phase of stop sequence (like cooling) and next phase will continue.

Indicators and others

Position	Description
11	Multicolor (RGB) LED. The specified color and flashing function describes the actual state of the unit. For more information **see LED indication on page 69**.
12	Display unit

LED indication

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

Color and flashing function meaning:

- Red is flashing
  - Active unconfirmed level2 (shutdown) alarm
  - Inactive unconfirmed level2 (shutdown) alarm

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

Color state priority:

1. Red is flashing
2. Red lights
3. Cyan lights
4. Yellow lights
5. Green lights

5.4.2 Display screens and pages structure

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

The actual GUI consists of 6 different pages:

- **Metering screens (page 70)**
- **Alarmlist (page 93)**
- **History Log (page 72)**
- **Trends (page 95)**
- **Administration (page 75)**
  - Page administration is accessible only by pressing the combination of the Enter and Menu buttons from the only Metering screen.

Metering screens

Metering screens are dedicated for important controller values and setpoints.

InteliGen 500 controller screens

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

- The movement between the metering screens is done using the arrow up and down buttons in the front panel
- The entire screens and instruments on the screens are dynamically displayed or hidden based on the following state of the controller unit :
  - Application type
  - Wiring controller settings
  - Connected Plug-In modules
  - Configured CAN modules
  - After-treatment ECU list settings
- The following structure is predefined in the InteliGen 500 controller archive by default:

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

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

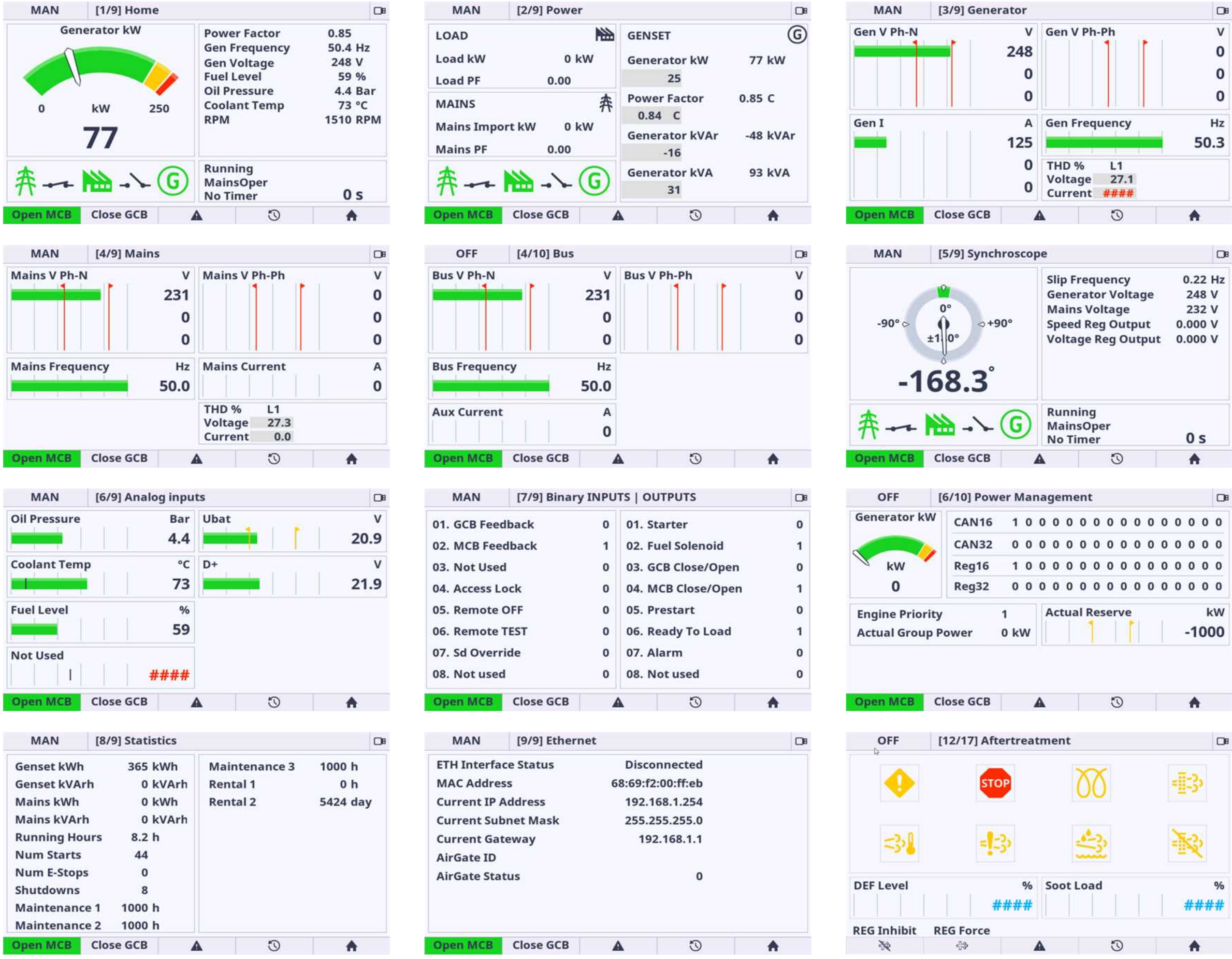


Image 5.13 : InteliGen 500 metering screens overview

Special screens

There are 2 special screens stored in the unit :

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

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

History Log

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

There are 2 types of history records:

- **Event records** – are also known as standard history records. This type of record appears in case the controller event has been made. The time stamp history also belongs in the event history. The time record is stored for a specified period of time.

- **System records** – are also known as text history record. These type of records are generated during the user login/off, controller programming or other system actions.

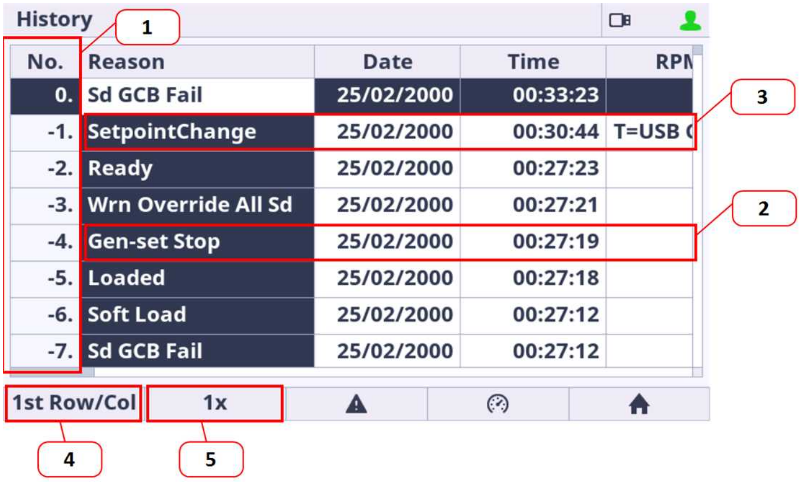


Image 5.14 : History page overview

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

Note: *Pressing the enter button on the actually selected row the dialog with detailed information for selected record is displayed.*

IMPORTANT: Each controller unit supports the specific number of history records. E.g. controller InteliLite AMF supports 500 history records. Default configuration consists of 33 columns. Maximal column amount is approximately 100 columns based on the type of the observed value.

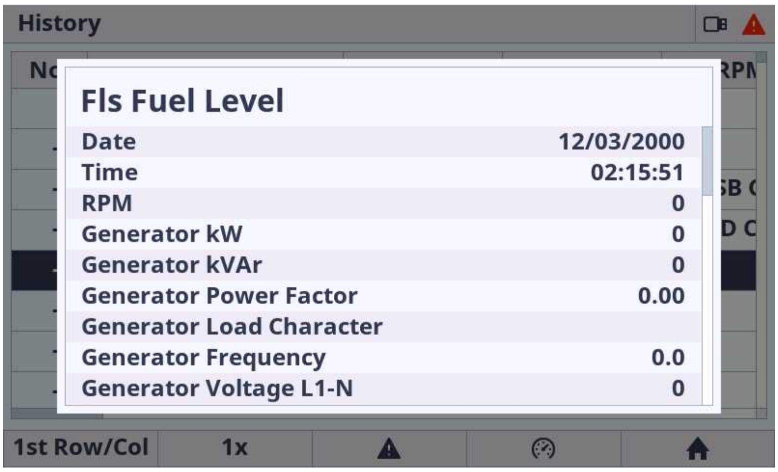


Image 5.15 : History page – Item detail dialog

Note: Pressing the enter button on the actually selected row the dialog with detailed information for selected record is displayed.

IMPORTANT: Each controller unit supports the specific number of history records. E.g. controller InteliGen 500 supports 500 history records. Default configuration consists of 33 columns. Maximal column amount is approximately 100 columns based on the type of the observed value.

Init screen

The init screen is the special screen (bitmap) defined and stored in the controller. The init screen is displayed during the booting procedure. The init screen is also accessible from administration as a first list item. The purpose of the init screen is to allow the user to create and show his own initial logo screen during the booting procedure. The init screen logo can be uploaded using the InteliConfig. By default the init screen is predefined by ComAp.

Image 5.16 : Init screen overview

Note: Init screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.

Service screen

The service screen is the special screen (bitmap) defined and stored in the controller. The service screen is also accessible from administration as a last list item. The purpose of the service screen is to allow the site administrator to put into the display (resp. controller) important data for technical support. The status screen can be uploaded using the InteliConfig. By default the service screen is predefined by ComAp.

Image 5.17 : Service screen overview

> ***Note:*** *Service screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.*

5.4.3 Administration

Administration menu screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.

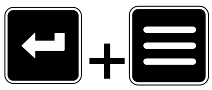


Image 5.18 : Shortcut (jump to the administration)

Controller Info

Controller info page is dedicated for important information about the entire unit. These information is useful mainly for issue troubleshooting .

Controller info page is divided into 3 main blocks of information:

- Integrated Color Display unit
- Controller unit
- Configuration

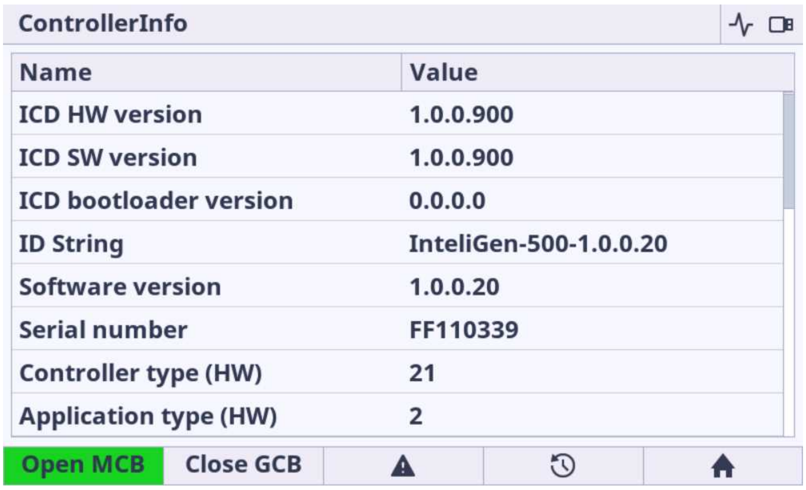


Image 5.19 : Administration Page – Controller Info

Note: *Similar values with similar structure can be displayed using InteliConfig PC tool.*

Note: *Controller Info screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.*

Modules Info

Modules info page is dedicated for important information about the connected modules information. The page Modules Info displays the information from the following type of connected modules:

- Plug-In modules
- CAN peripheral extension modules

Image 5.20 : Administration Page – Modules Info

Note: *The availability of the connected module depends on the type of controller unit.*

Note: *Modules Info screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.*

Electronic Devices

Electronic Devices screen is dedicated for important information about the connected ECU and Modbus Master devices. Modbus Master address is displayed in the Contr.Addr. column due to the fact that the Modbus Master function in the controller acts as a master unit.

Image 5.21 : Administration Page – Electronic Devices

***Note:** The availability of the connected Electronic Device depends on the type of controller unit.*

***Note:** Electronic Devices screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.*

Settings

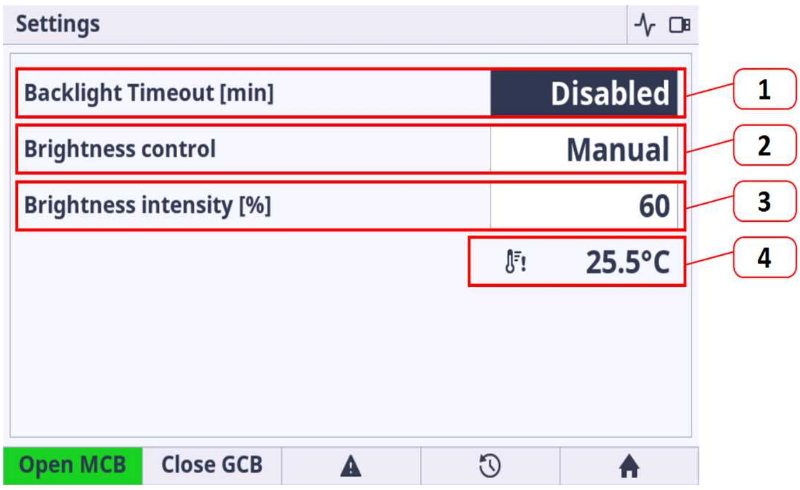


Image 5.22 : Administration Page – Settings

1. **Backlight Time** – if the cell area is pressed the dialog for time settings is displayed. The user is able to set the period from 1 up to 241 minutes. There is also the option to set NO Timeout which means the display unit is backlighted forever.
2. **Brightness Control** :
   a. Manual (by default) – the value of the backlight is set manually using the value dialog (point 3)
   b. External – the value of the backlight is given by the Analog Input settings in InteliConfig and connected value of resistor, voltage or current (based on the type of the selected sensor).

3. **Brightness intensity** – the value is selected using the value dialog. Note the value is applied immediately during the change of the value.
4. **Internal Temperature information** – gives the actual inside temperature of the unit. There is implemented automatic mechanism for lowering the backlight intensity based the internal derating backlight curve. If the inside temperature exceeds 35 °C the area behind the temperature lights yellow. The yellow color indicates that the display backlight curve is applied and automatically starts derate the backlight intensity. The backlight intensity returns to normal when the temperature is decreased bellow 35 °C. This feature saves the lifetime of the internal components.

IMPORTANT: It is strongly recommended to use backlight on the standard level max. 60%. Maximal backlight intensity level of 100% is suitable only for application with higher amount of the ambient light. Be aware that higher intensity level means higher surface front glass temperature and lower lifetime.

IMPORTANT: It is strongly recommended to use Backlight Time (timer) set on the reasonable amount of time (approximately 30 minutes) during the normal running Gen-set or engine phase. It is because of saving lifetime of the display unit. The display unit is still running if the backlight is off. For switching on the LCD backlight the simple pressing any button is necessary.

Note: *Settings screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.*

Languages

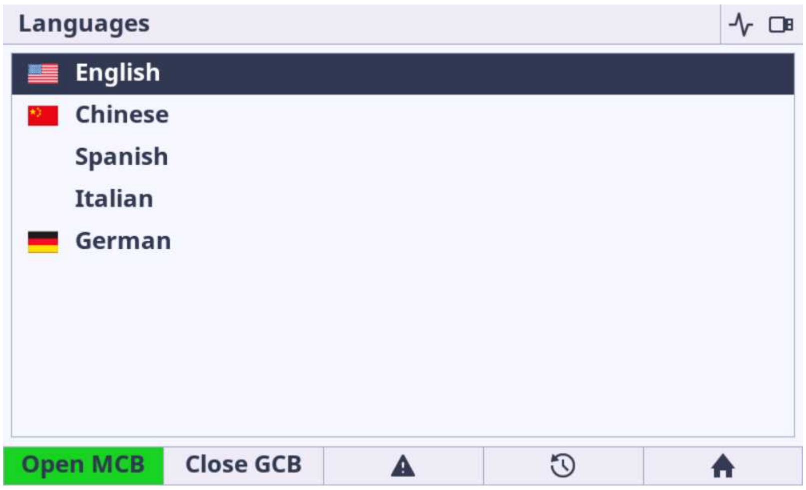


Image 5.23 : Administration Page – Languages

- **Language settings** – the list of languages stored in the controller configuration is displayed in the list of possible languages.
- The integrated color display unit can display the following languages
  - English
  - Chinese
  - Japanese
- The integrated color display unit can **partially** display the following languages
  - Bulgarian, Taiwan, Czech, German, Greek, Spanish, Finnish, French, Hungarian, Icelandic, Italian, Korean, Dutch - Netherlands, Norwegian, Polish, Roman, Russian, Croatian, Slovak, Swedish, Turkish, Ukrainian, Slovenian, Estonian, Latvian, Lithuanian, Vietnamese, Italian, Portuguese, Bosnian

- The integrated color display unit supports the following Unicode standard character sets
  - Basic Latin, Latin-1 Supplement, Latin Extended-A, Latin Extended-B, Latin Extended Additional, Cyrillic, Greek, Greek Extended, Arabic, Arabic Supplement, General Punctuation, Superscripts and Subscripts, Currency Symbols, Arrows, CJK Unified Ideographs, Kanji, Hiragana, Katakana, Hangul Jamo, Thai

IMPORTANT: Even the language is configured in InteliConfig the specific language is unavailable if the language is available in configuration (but empty) or the language is not supported by integrated color display unit.

Note: *The flag is not displayed if the language is supported but the flag icon does not exist in the integrated color display unit.*

Note: *Languages screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.*

Configuration level

Image 5.24 : Administration Page – Configuration Level

- **Standard** – Limited amount of settings are available for configuration. The description which settings are available in chapters concerning to controller functions.
- **Advanced** – Set by factory default. All the settings are available for configuration. Be aware that only experiences users should perform the settings of extended functions.

Note: *By default the Advanced settings is selected which means all the setpoints are available by default. To restrict the availability the Standard setting must be performed. The advanced and standard category are set in InteliConfig PC application.*

Note: *Configuration Level screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.*

Password screen

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

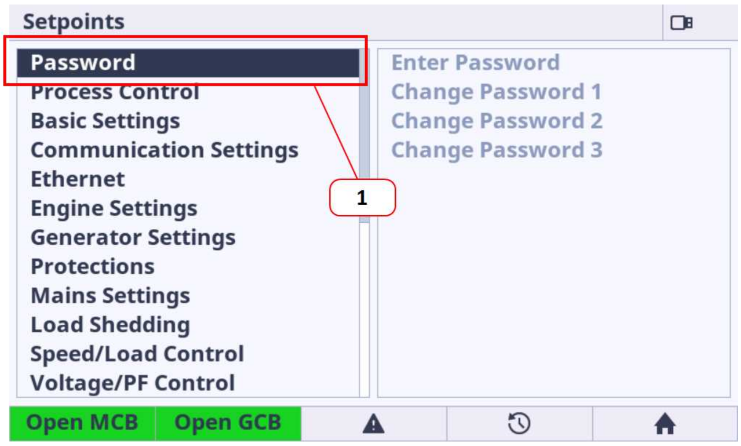


Image 5.25 : Main Setpoints Page

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

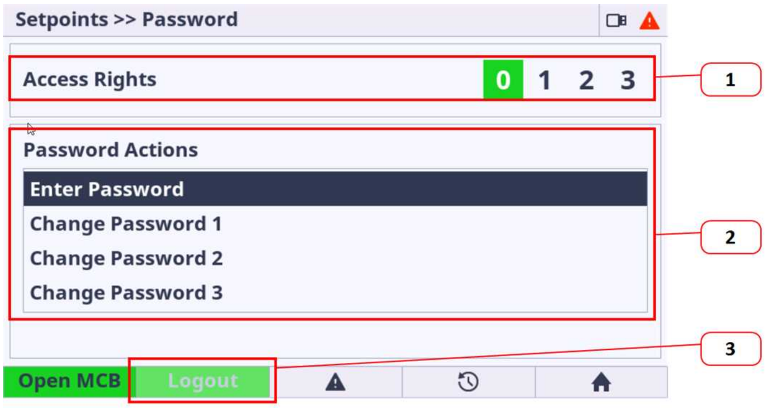


Image 5.26 : Setpoints Password Page

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

Export / Import

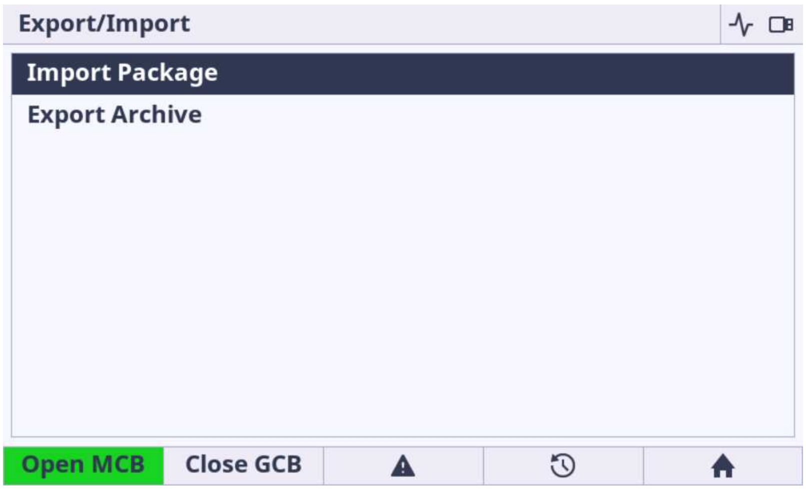
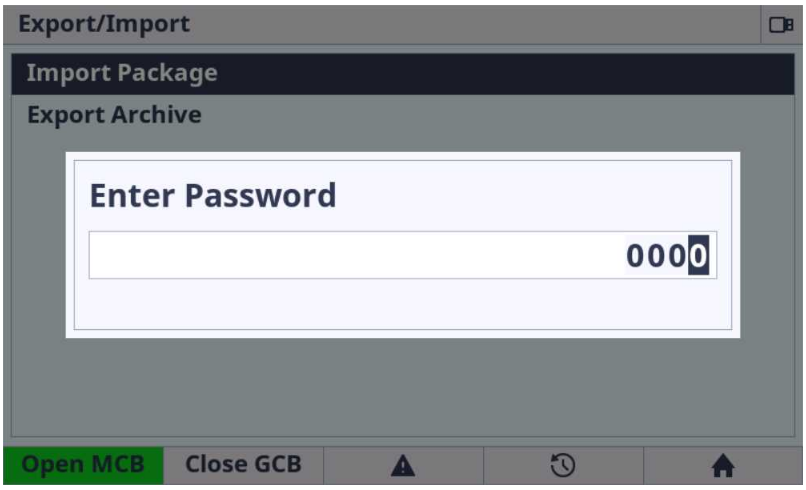


Image 5.27 : Administration Page – Export & Import

- **Import Package** – is dedicated for integrated color display unit firmware updated, controller firmware update, controller archive update. Extension modules firmware update is not supported.
  - If the USB stick is not connected the import function is not available and visually indicated as a grayed text.
  - File packages used for firmware import can be prepared only in InteliConfig PC application **only**.
  - The files (*.pcg3) prepared in InteliConfig (for import) must be stored in the root of USB stick folder – the only root folder is supported for import.
  - Import function is always protected by Administrator (level 3 access rights) password. Until the correct password is not inserted the import function is unavailable. Be aware that there is implemented algorithm to have password protected against the brute force attempts.



  - The message dialog (Controller unit is not ready) is displayed if the controller is not in state ready for programming (e.g. Gen-set running)
- **Export Archive** – is dedicated for the entire archive export.
  - If the USB stick is not connected the export function is not available and visually indicated as a greyed text.
  - The archive files (*.aig3) is exported to the fixed directory in the USB stick (root:/IG500/Archive. The directory structure is automatically created if does not exist.

- Export function is not protected by password.
- The message dialog (Controller unit is not ready) is displayed if the controller is not in state ready for archive export (e.g. Gen-set running)
- Waiting dialog is displayed during the export process.
- The message dialog is displayed after archive process.
  - Archive Export Successful if successfully exported.
  - Archive Export Failed if any error occurs during the export process.
- Integrated color display unit is restarted after export proccess.

Note: *Once the USB stick is inserted to the display unit the directory and its subdirectories are created automatically if does not exist.*

IMPORTANT: Requested files to be imported must be saved in the root directory on a USB Stick.

Imported File selection

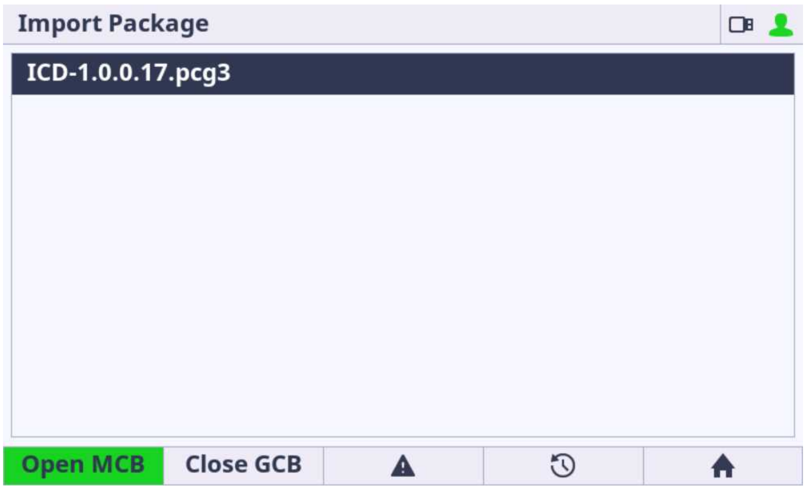


Image 5.28 : Administration Page – Export & Import – File selection

- **File selection** – is available if the conditions above (in section Import Package) is fulfilled
  - Only files with pcg3 extension is displayed.
  - Maximum 100 files (*.pcg3) in root is displayed.
  - The message dialog (Package Incompatible) is displayed if the incompatible pcg3 file is used
  - The message dialog (Invalid File) is displayed if the pcg3 file is invalid or corrupted

Import process

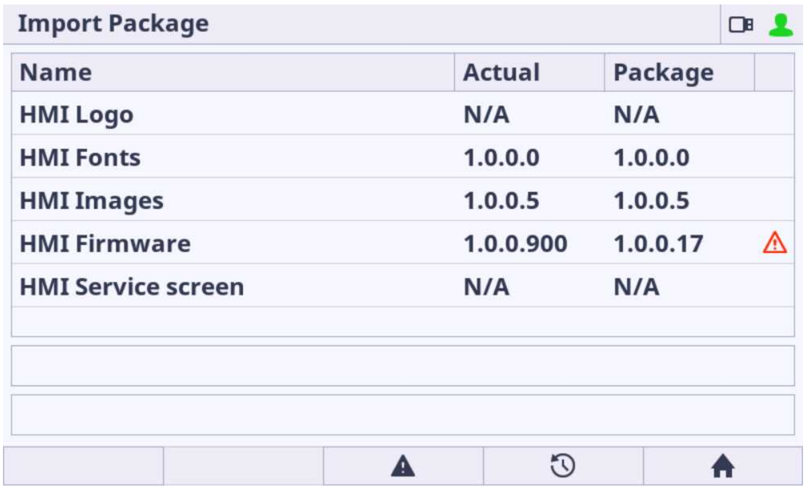


Image 5.29 : Administration Page – Export & Import – Import process

- **Import process** – is available if the correct and compatible file is selected conditions above (in section Import Package) is fulfilled
  - The import process is not allowed if at least one file in the package is not compatible with each other – the Import button is not displayed.
  - When the Import process is started it is not possible to interrupt it.
  - Bar Message is displayed
    - Package Import Successful (green colored) – if success
    - Package Import Failed (red colored) – if any error during the process
  - the user is informed about the actual item progress
    - – the file has been imported correctly
    - – the file import is under progress
    - – the file is incompatible
  - The device is rebooted after import process.

> **IMPORTANT: Integrated color display unit firmware is updated in two steps. Firstly the firmware is uploaded to the internal memory (indicated by icon). The second step is the firmware update from internal memory. The firmware is updated immediately after reboot using bootloader (Indicated by progress bars and messages in limited GUI). After all the unit is automatically started with new firmware.**

> **IMPORTANT: Only in some special cases the import process using USB stick must be performed twice. This situation is always described in New Feature List with more detailed information.**

> **IMPORTANT: Only FAT16 and FAT32 file system on USB stick are supported.**

Note: *If the USB stick is plugged in the Import / Export page is automatically displayed.*

Note: *If the import process fails try the import process again.*

Note: *If the import proccess fails try to create new package file using InteliConfig.*

__Note:__ Export / Import screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.

Service QR Codes

Service QR Codes screen is dedicated for easy maintenance and technical support. Together with ComAp Smart Hint application the usage of the small display is even easier.

Image 5.30 : Administration Page - Service QR Codes

1. **Password Reset** – Password Reset function is dedicated for simple handling of the password reset procedure. Scan the QR code using the Smart Hint application and send the reset code to the ComAp technical support.
2. **Controller Statistics** – Controller statistics data gathered during the controller operation. Smart Hint application displays the controller statistic data in one place in a readable text form and could be further investigated.
3. **System Info** – System data info in one place in Smart Hint application.

IMPORTANT: Each dialog in the Setpoints screen consists of the small QR code which represents the name of the setpoint. Smart Hint application gives you additional help or hint of the setpoint.

__Note:__ Settings screen is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.

5.4.4 Dialogs

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

Dialog Value

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

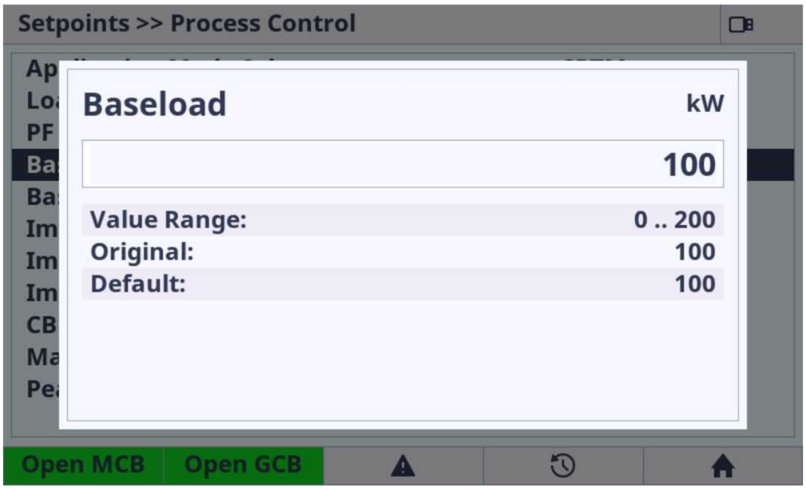


Image 5.31 : Dialog Value overview

Dialog Value Extended

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

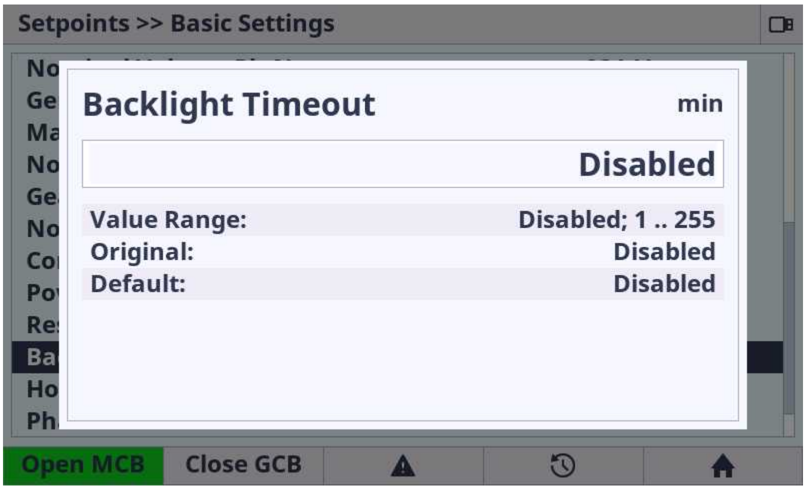


Image 5.32 : Dialog Value Extended overview

Dialog String List

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

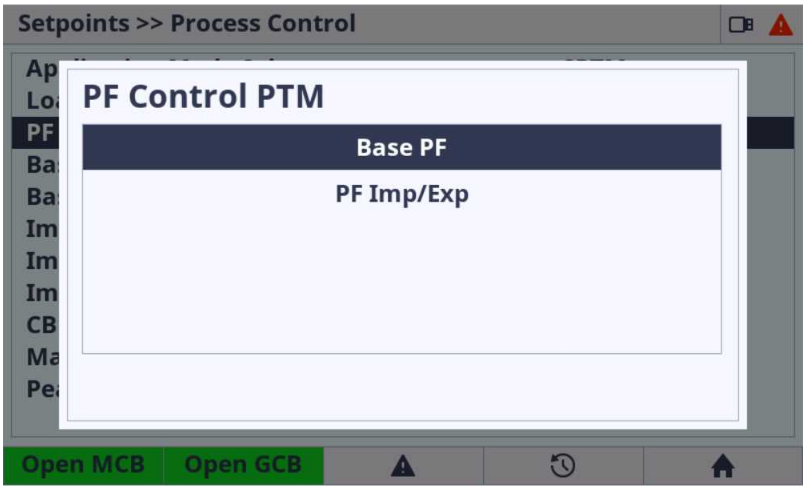


Image 5.33 : Dialog String List overview

Dialog Text

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

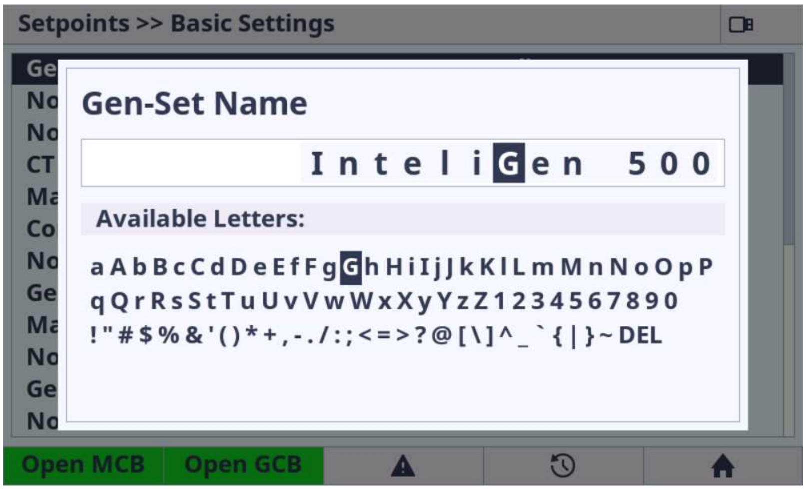


Image 5.34 : Dialog Text overview

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

Dialog IP address

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

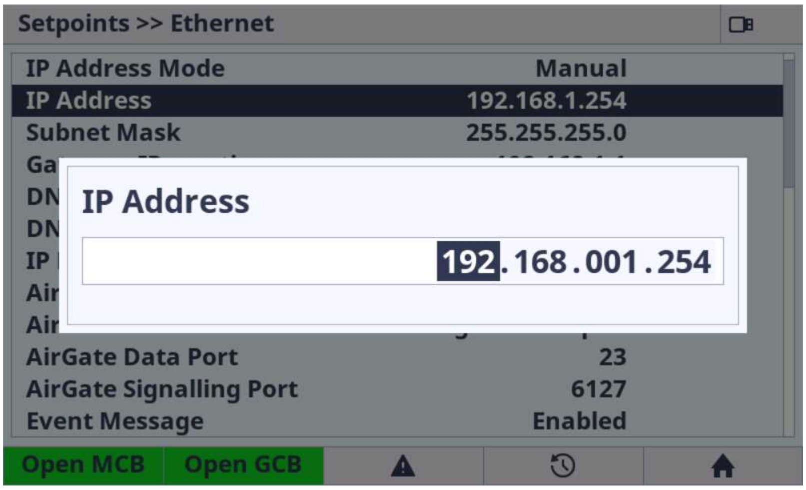


Image 5.35 : Dialog IP address overview

Dialog Message

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

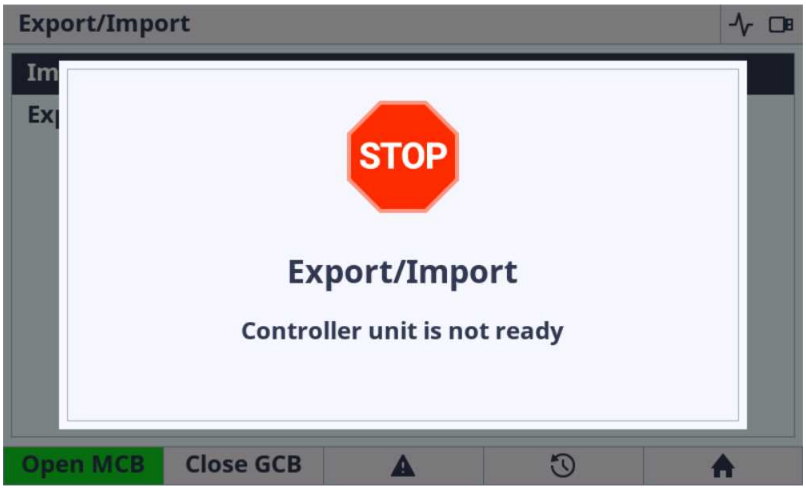


Image 5.36 : Dialog Message overview

Dialog Progress

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

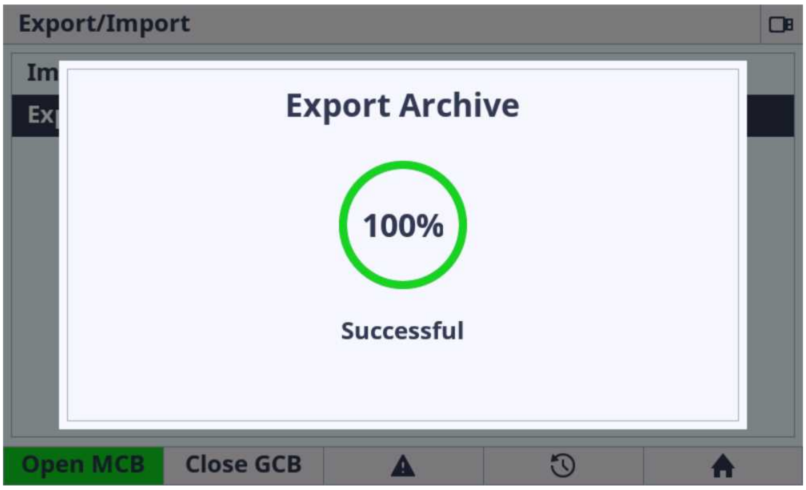


Image 5.37 : Dialog Progress overview

Dialog Date

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

Image 5.38 : Dialog Date overview

Dialog Time

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

Image 5.39 : Dialog Time overview

Dialog Password

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

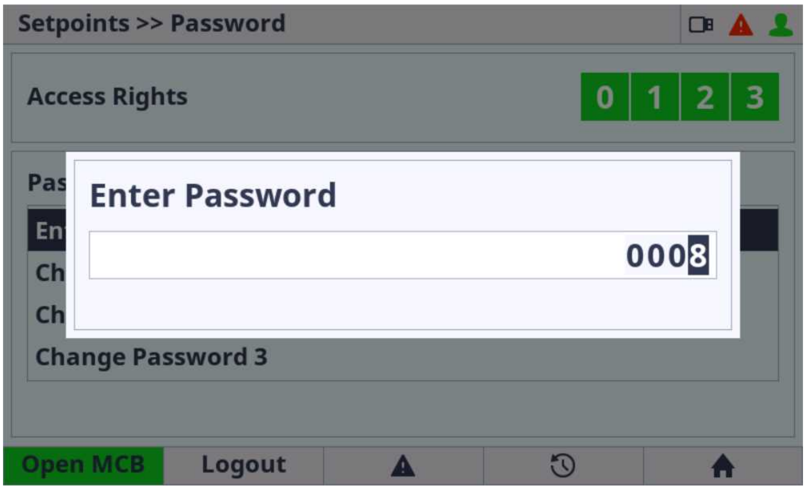


Image 5.40 : Dialog Password overview

Dialog Password Change

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

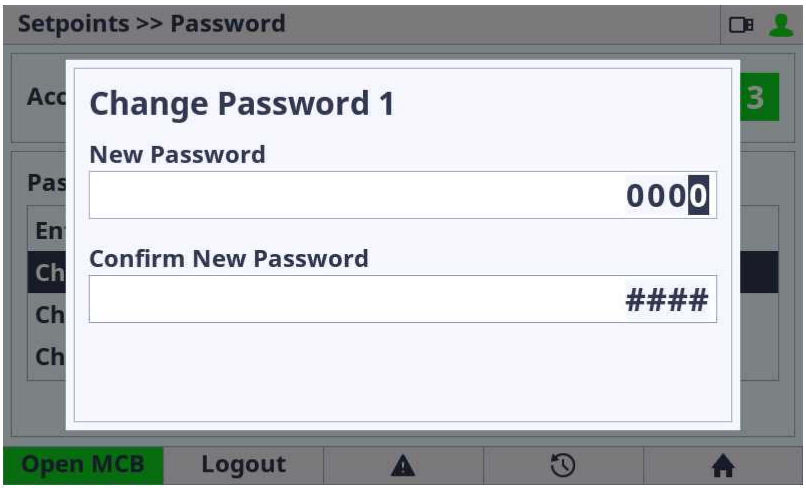


Image 5.41 : Dialog Password Change overview

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

Dialog Timer

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

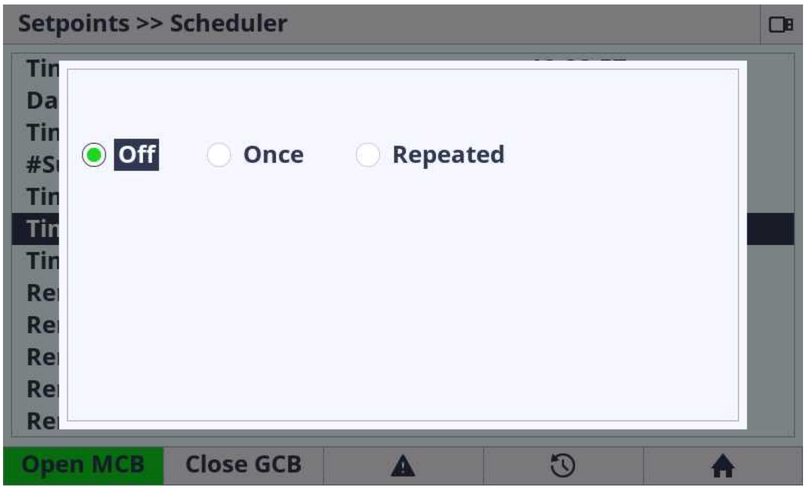


Image 5.42 Dialog Timer (Off) overview

Image 5.43 : Dialog Timer (Once) overview

Image 5.44 : Dialog Timer (Repeated) overview

5.4.5 Status bars

Bottom status bar

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

Image 5.45 : Example (bottom status bar on Home metering screen)

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

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

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

Top status bar

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

Image 5.46 Top Status Bar description

Image 5.47 : Top Status Bar – Mode selector dialog

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

5.4.6 Alarmlist

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

There are 4 different types of controller alarms:

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

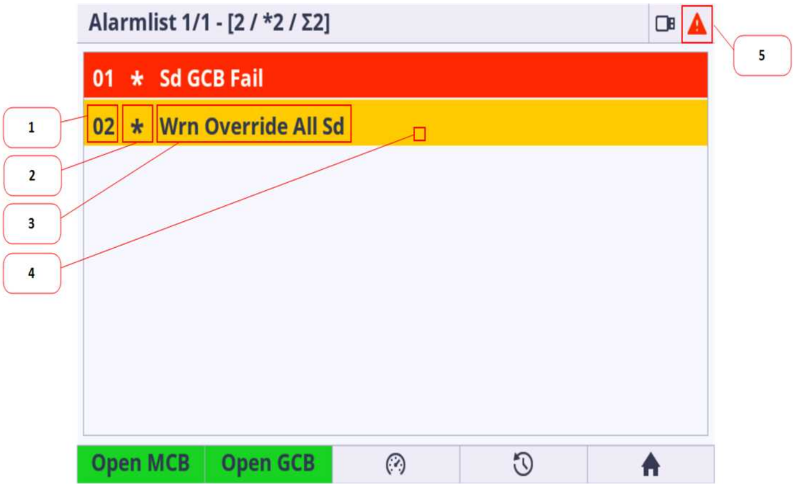


Image 5.48 : Alarmlist Page

1. **Alarm item number** – displays the number of the concrete alarm.
2. **Alarm item star** – describes if the alarm is CONFIRMED or NOT CONFIRMED. The confirmation action is performed by the Alarm reset button in the front panel
   a. Star is displayed – alarm is NOT CONFIRMED
   b. Star is not displayed – alarm is CONFIRMED (using alarm reset button)
3. **Alarm description** – The short description of the alarm
4. **Alarm coloring** – There are specified the color and asterix combination
   - Level 1 (warning) alarm
     - Active/unconfirmed : *** / yellow background / dark text** (asterix active)
     - Active/confirmed : **yellow background / dark text** (asterix inactive)
     - Inactive/unconfirmed : *** / dark background / yellow text** / asterix active
   - Level 2 (shutdown) alarm
     - Active/unconfirmed : *** / red background / white text** (asterix active)
     - Active/confirmed : **red background / white text** (asterix inactive)
     - Inactive/unconfirmed : *** / dark background / red text** (asterix active)
   - Sensor fail alarm
     - Active/unconfirmed : *** / white background / dark text** (asterix active)
     - Active/confirmed : **white background / dark text** (asterix inactive)

    - Inactive/unconfirmed : * / dark background / white text (asterix active)
  - ECU alarm
    - Active/unconfirmed : * / blue background / white text (asterix active)
    - Active/confirmed : blue background / white text (asterix inactive)
    - Inactive/unconfirmed : * / dark background / blue text (asterix active)
5. **Topstatus bar Alarmlist icon** – The alarm icon is flashing red if there is at least one unconfirmed alarm (shutdown or warning) in the alarmlist. The icon lights red if there is at least one confirmed active alarm and no unconfirmed alarm in the alarmlist. The icon is inactive if the alarmlist is empty. This is information that something is wrong and need to be checked and resolved.

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

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

IMPORTANT: InteliGen 500 controller displays maximum 16 alarms.

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

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

5.4.7 Trends

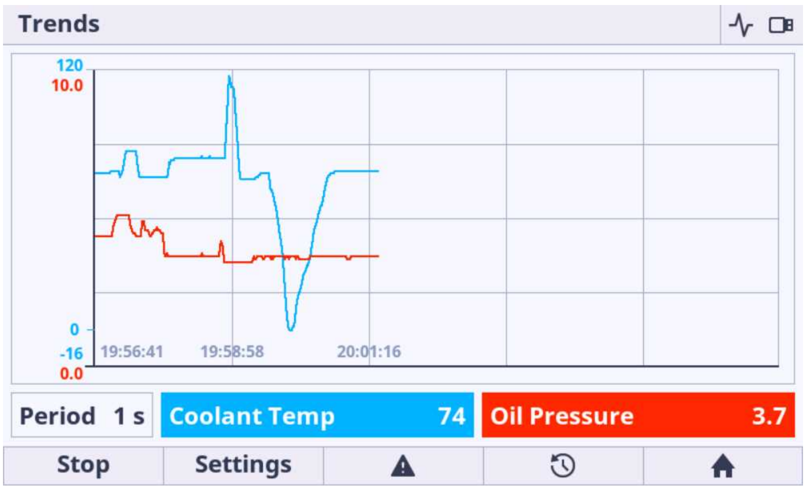


Image 5.49 : Trends page overview

The Trends page is divided on to 3 main blocks:

- **Main Trends Window** is intended to display all trends. The view and chart movement is fully automatic.
- **Channel panel** displays the actual values and sample period.
- **Function buttons** is intended for start, stop and settings of the trends.

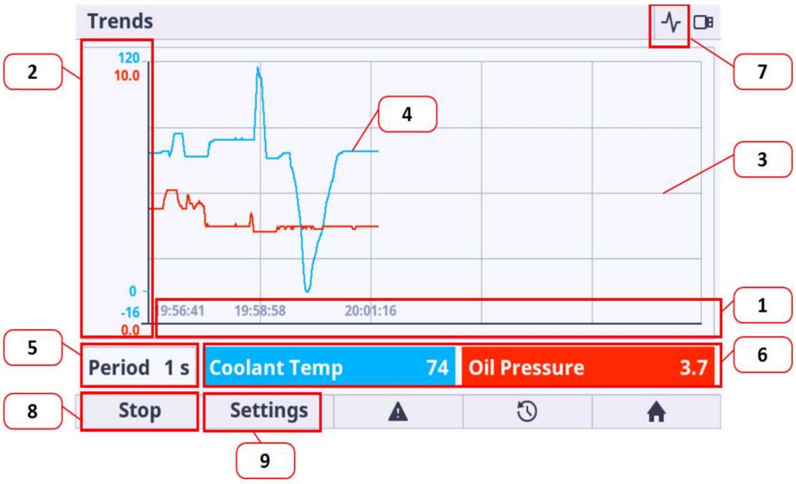


Image 5.50 : Trends page description

1. **X axis** – X axis displays the time stamps. The view of X axis is fully automatic.
2. **Y axis** – If the default range is not suitable for the displaying of the value it can be adjusted in settings option. See bellow for more information.
3. **Grid** – the grid is displayed behind the trends charts. The grid is fully automatic.
4. **Trend line** – each channel have different color for better value identification. The color of the trend line match to the Value color in channel panel.
5. **Actual period** – Actual period settings. The period can be adjusted in settings option.
6. **Actual channel value panels** – display the values of the newest (actual) sample.
7. **Trend Icon** (Top Status bar) – if the trends are running the informative icon is shown in the top status bar
8. **Start / Stop button** – the button is dedicated for manual start and stop of the trends. It is possible to setup the automatic start of trending based on the trigger. There are 2 triggers : Return to Home metering screen and the specified bit of the available binary value.
9. **Channel settings button** – There are some settings available for the trends. See more information bellow.

Trends settings

Trends settings page is dedicated for the available trends settings. The navigation in trends settings page is done by buttons arrow up, arrow down, arrow left, arrow right, enter, user button 1 and 2.

Image 5.51 : Trends page settings overview

1. **Channel value** – the channel value menu appears if the enter button is pressed just on the position. Inside the channel value menu the requested channel value can be selected. The value availability

depends on the type of configuration stored in the controller.

2. **Low limit value** – the low limit value is intended for changing the low border of the value range. For the best view of the displayed trends it is highly recommended to set this limit to the minimum expected value with some reserve.
3. **High limit value** – the high limit value is intended for changing the high border of the value range. For the best view of the displayed trends it is highly recommenced to set this limit to the maximum expected value with some reserve.
4. **Quick channel removal** – pressing the enter button on the trash bin icon the actual channel is not configured.
5. **Period** – section is dedicated for setting of the sample time period.
6. **Run** – the section is intended for the selection of the run mode
   a. once - trending only until the trend chart window is full
   b. circular – cyclic mode (trending is repeated continuously) – be aware the samples are stored only in internal temporal memory, the trend chart starts moving when the trend chart window is full, the oldest samples are trashed out
7. **Start option** – The start of trends are triggered by the start option. There are 3 start options.
   a. Binary state – the trigger is the bit of the selected binary value. Manual start and stop is still active.
   b. Manual (by default) – the trigger is the start button called by user.
   c. Home – the trigger is the return to the Home metering screen from any GUI position. Manual start and stop is still active.
8. **Bit of binary value selection** – If the start option is set to Binary state then the field for the bit of the concrete binary value is activated.
9. **Acknowledgment button** – Pressing the user button 1 (Confirm) the settings are saved.
10. **Cancel button** – Pressing the user button 2 (Cancel) the settings are canceled and the main trends page is displayed without any change of the trends configuration.

Note: *To get the best view of the displayed trends it is recommended to manually set the typical value range for each channel.*

IMPORTANT: If the trending is started and the changes have been made in the settings the trending is restarted based on the new settings.

IMPORTANT: Be aware the samples are stored only in internal temporal memory. Trend chart starts moving when the trend chart window is full, the oldest samples are trashed out.

IMPORTANT: There is no option to store the trends to the external memories like USB stick, etc.

5.4.8 Quick Help

Logging in/off to the Controller

The user is able to log in/off to/from the controller via the menu Passwords in Setpoint page.

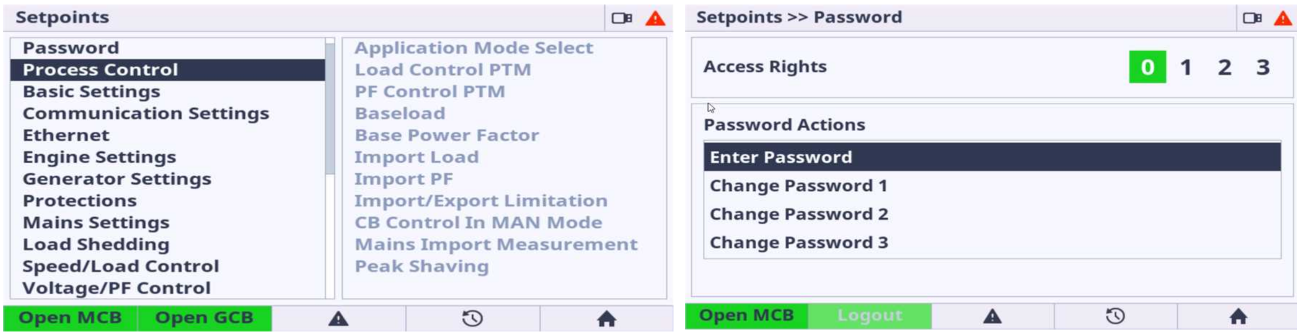


Image 5.52 : Password menu

1. Current Access Rights are shown on the top of the page.
2. Press the button on item Enter Password, the Password dialog will appear.
3. Insert the correct password. If the password is not correct, the user is informed about it. Be aware there is a brute force algorithm protection implemented.
4. The icon (user) in the top status bar turns green when the user is logged in.

Image 5.53 : Password dialog

Note: *Each Access Rights password can be changed by inserting old password and new password.*

IMPORTANT: If the setpoint is protected by password the password dialog appears when the attempt to password change is performed.

IMPORTANT: Be aware there is a brute force algorithm protection implemented. If the brute force protection is active then the user is informed by Invalid Password message even the password is inserted correctly.

Important values

The important controllers values and system buttons are displayed by default and accessible from the Home, Power and Synchro metering screens. The breaker status, controller status and system timer are also displayed on the Home metering screen.

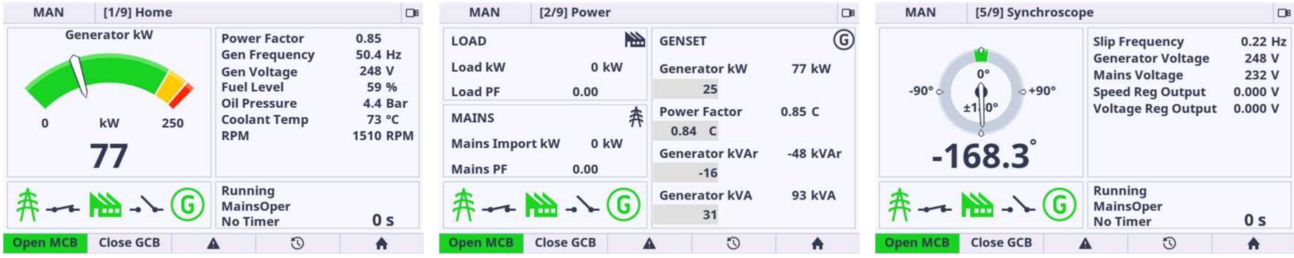


Image 5.54 : Important values

Gen-set mode change

Image 5.55 : Gen-set mode change

1. Press the button arrow left or right in any metering screen
2. Change the controller mode using button arrow left or right and confirm the selection using enter button.
3. If all the controller conditions are fulfilled the Gen-set mode is changed.

> **IMPORTANT: If the controller mode setpoint is protected by password the password dialog appears when the attempt to confirm the selection is performed.**

Password change

The password change can be performed using the Password menu in Setpoint page.

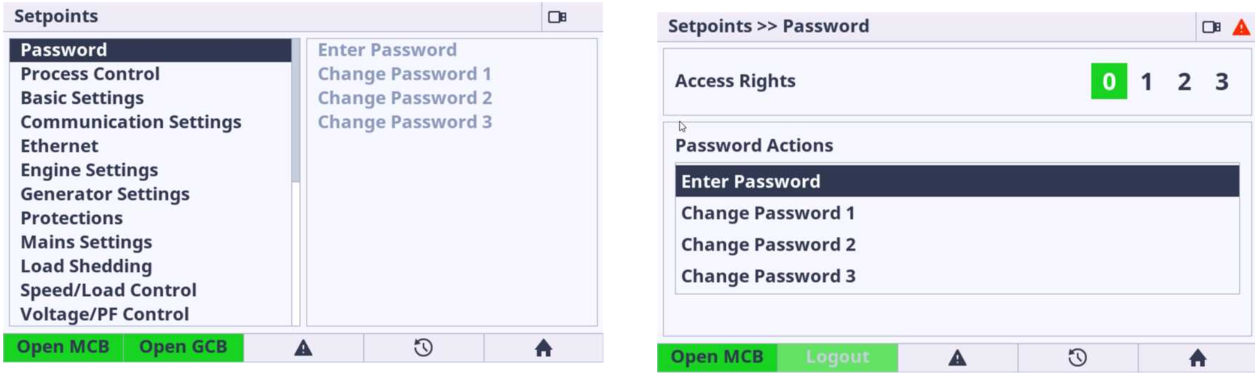


Image 5.56 : Password menu

1. Choose the item for which access right you want to change password.
2. Using password change dialog enter correct old and new requested password and confirm the choice.
3. The password for respective Access Rights level is changed.

Display brightness settings

The display brightness setting is adjustable using the Administration Menu – InteliVision Settings.

Image 5.57 : Display brightness settings

Backlight Timeout – can be set at a range of 1 to 254 minutes or Disabled. Disabled means the backlight never shuts down.

Brightness control

1. If the manual mode is chosen the user is responsible for his own backlight intensity.
2. If the External mode is chosen the display unit expects the external resistor (potentiometer) on its Analog input. The type of sensor can be set in InteliConfig.

Brightness intensity – The backlight intensity can be adjusted using the value dialog from 1 up to 100%. It is not possible to set 0 to avoid total shutdown of backlight intensity.

IMPORTANT: It is strongly recommended to use maximum backlight if it is really needed. The temperature of the LCD grows linearly with the set of LCD backlight intensity. The product lifetime is temperature dependent. In general it means higher temperature lower lifetime.

IMPORTANT: It is strongly recommended to set the Backlight Timeout to reasonable time (e.g 5 minutes). If the backlight is off then any button press switch on the backlight again.

State messages

State message	Description
Running	Indication of correctly running controller.
Initialize control unit	Controller unit initialization is under progress. The message is displayed during the booting procedure.
Control unit is programmed	The controller upgrade process is under progress.
Configuration Reading	Controller configuration reading is in progress. Text disappears when controller is detected.
Detecting main CU failed	Internal communication error. Switch power supply OFF, wait 10 sec, switch Power supply ON. If the message persists on the display, send the unit through ComAp office to workshop for restoration.
Unsupported configuration format	Configuration version is not supported
Unsupported screen format	Screens template has unsupported screen format. Screens template is missing in configuration.
Control unit firmware is corrupted	Controller unit is not in valid state.
Wrong configuration content	Content of the configuration in controller unit does not match to configuration.

5.5 Functions

back to Controller setup

5.5.1 Operating Modes

Selecting the operating mode is done with the Left and the Right buttons on the front panel or by changing the **Controller Mode (page 273)** setpoint (from the front panel or remotely).

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

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

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

- **Remote OFF (page 731)**
- **Remote TEST (page 733)**
- **Remote MAN (page 730)**
- **Remote AUTO (page 730)**

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

OFF

No start of the Gen-set is possible. If the Gen-set is running, it is not possible to switch directly to OFF mode. First you have to stop the engine. After that the controller will stay in Not ready status and cannot be started any way. The MCB is closed permanently (**MCB Opens On (page 366)** = GenRun) or is open or closed according to whether the mains is present or not (**MCB Opens On (page 366)** = MainsFail). No AMF or Power management function will be performed. The buttons MCB, GCB, Start and Stop including the appropriate binary inputs for external buttons are not active.

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

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

MAN

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

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

Also MCB can be closed and opened manually using the MCB button, if mains is present. MCB can be opened manually after mains failure (it is not tripped in case of mains failure), but it can not be closed with failed mains.

Controller does not respond to external signals and/or conditions. The gen-set is fully in manual control; there is no automatic way to stop it (except protections). The Gen-set stays running until STOP button is pressed. Controller does not take place in **Power management (page 128)** in MINT application.

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

AUTO

Gen-set is controlled based on external signal (**Remote Start/Stop (page 732)**) or by conditions (AMF, Power management system, …).

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

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

IMPORTANT: If a red alarm is present and the Gen-set is in AUT mode, it can start by itself after all red alarms become inactive and are acknowledged!!! To avoid this situation, adjust the setpoint Reset To Manual (page 274) to the Enabled position.

System activation is controlled based on external signal (**Remote Start/Stop (page 732)**) or by conditions (AMF, Power management system, …).

When one condition is deactivated, Gen-set will not be deactivated if another condition for automatic starts is active.

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

TEST

The behavior of the controller in TEST mode depends mainly on the setting of the setpoints and binary inputs. TEST mode can be activated via front panel of controller or via binary input **Remote Test (page 733)**.

The Gen-set will be started when the controller is put to TEST mode and will remain running unloaded. If a mains failure occurs, the MCB will be opened and after **Open Transfer Min Break (page 394)** the GCB will be closed and the Gen-set will supply the load. After the mains have recovered, the delay **Mains Return Delay (page 359)** will count down and if it elapses and the mains is still ok, the controller will transfer the load back to the mains after **Open Transfer Min Break (page 394)** and the Gen-set will remain running unloaded again until the mode is changed.

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

Behavior of TEST mode also depends on setpoints **Transfer Gen To Mains (page 397)** and **Transfer Mains To Gen (page 397)** and on binary inputs **Force Island (page 719)** and **Force Parallel (page 720)**.

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

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

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

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

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

The transfer is depending on the setting **see Subgroup: Load Transfer on page 393**.

5.5.2 Engine start

Diesel engine

The setpoint **Fuel Solenoid (page 298)** must be switched to the Diesel position.

- After the command for start is issued (pressing the Start button in MAN mode, auto start condition is fulfilled in AUTO mode or controller is switched to TEST mode), **Prestart (page 797)** and **Glow Plugs (page 782)** outputs are energized for a time period established by the setpoints **Prestart Time (page 300)** and **Glow Plugs Time (page 301)**.
- After **Prestart Time (page 300)** and **Glow Plugs Time (page 301)**, the output **Fuel Solenoid (page 775)** is energized after **Fuel Solenoid Lead (page 302)** the motor starter is activated by energizing the output **Starter (page 803)**.
- When one or more of following conditions is met, the starter output is de-energized:
  - The engine speed exceeds the value of **Starting RPM (page 300)**, or
  - One of the **Additional running engine indications (page 184)** signals is active.
- The controller remains in the Starting phase until the engine speed exceeds the value of **Starting RPM (page 300)**, after which it is considered started and the Idle period will follow.

- The maximum duration that the output **Starter (page 803)** is energized is determined by the setpoint **Maximum Cranking Time (page 299)**. If the engine does not start within this period, the output **Starter (page 803)** is de-energized and a pause with a length determined by **Cranking Fail Pause (page 299)** will follow. **Prestart (page 797)** and **Glow Plugs (page 782)** outputs are active during the pause. After the pause has elapsed, the next start attempt is executed. The number of start attempts is given by the setpoint **Cranking Attempts (page 298)**.
- Once the engine is started, the Idle period follows. The binary output **Idle/Nominal (page 785)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 302)**. When controller is in the MAN mode, it is possible to finish the **Idle Time (page 302)** count down by pushing the Start button.
- After the idle period has finished, the output **Idle/Nominal (page 785)** is activated and the start-up sequence is finished. The **Stabilization (page 109)** phase follows.

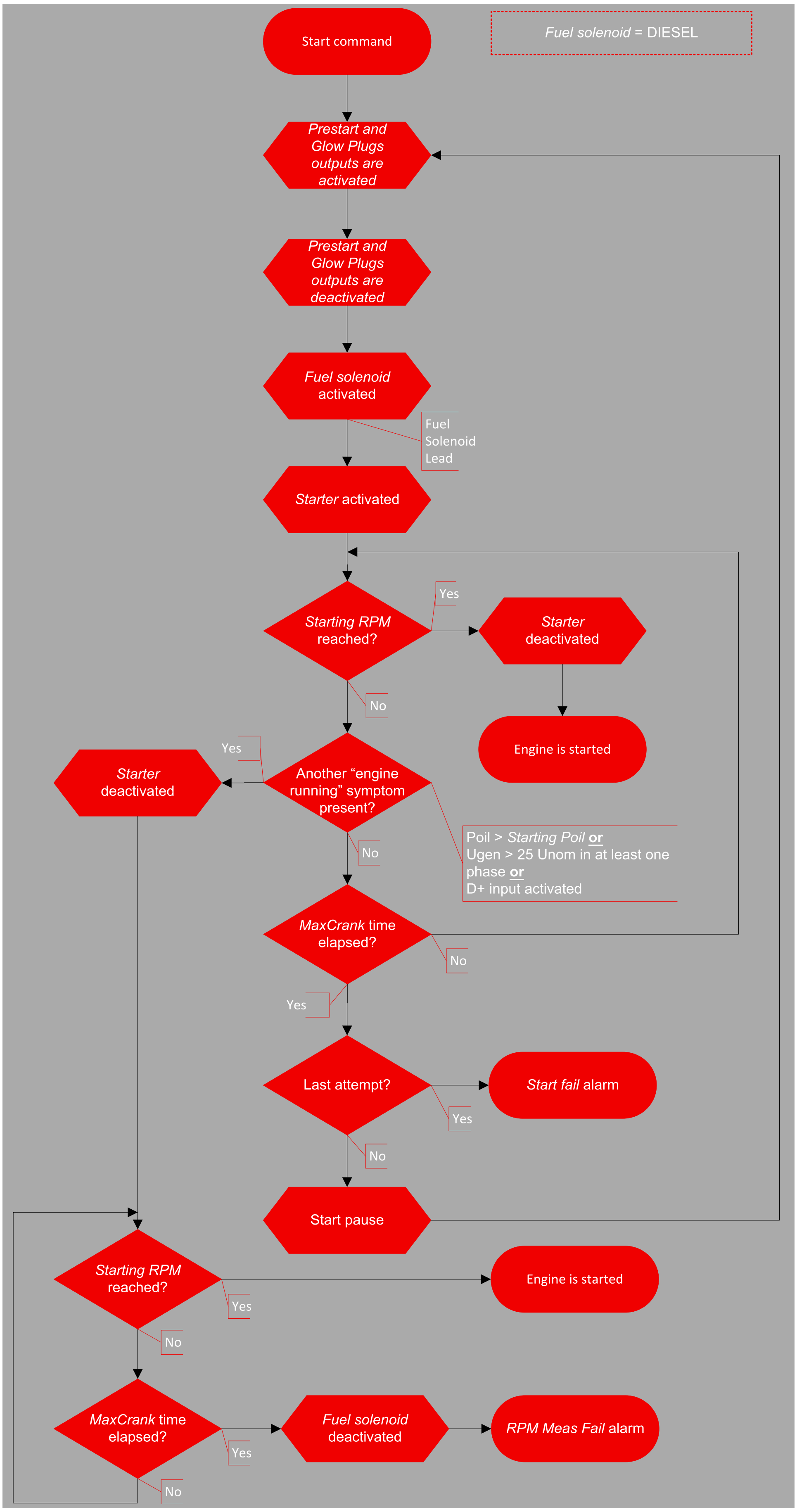


Image 5.58 Flowchart of start of diesel engine

GAS engine

The setpoint **Fuel Solenoid (page 298)** must be switched to the Gas position.

- After the command for start is issued (pressing the Start button in MAN mode, auto start condition is fulfilled in AUTO mode or controller is switched to TEST mode), **PRESTART (PAGE 797)** and **GLOW PLUGS (PAGE 782)** outputs are energized for a time period established by the setpoints **Prestart Time (page 300)** and **Glow Plugs Time (page 301)** begins.
- After **Prestart Time (page 300)** and **Glow Plugs Time (page 301)**, the countdown of **Sd Ventilation Time (page 306)**
- After **Sd Ventilation Time (page 306)**, the engine starter is activated by energizing the output **STARTER (PAGE 803)**.
- When the engine speed exceeds 30 RPM, the outputs **FUEL SOLENOID (PAGE 775)** and **IGNITION (PAGE 786)** are energized.
- When the engine speed exceeds value of **Starting RPM (page 300)**, the engine starter is de-energized. The engine is considered as started and the Idle period will follow.

> **IMPORTANT: Additional running engine indications (page 184) signals are not evaluated during the start of a gas engine. The Pickup must be used in any case!**

- The maximum duration that the output **STARTER (PAGE 803)** is energized is determined by the setpoint **Maximum Cranking Time (page 299)**. If the engine does not start within this period, outputs **STARTER (PAGE 803)** and **FUEL SOLENOID (PAGE 775)** are de-energized and a pause with length determined by **Cranking Fail Pause (page 299)** will follow. **PRESTART (PAGE 797)**, **GLOW PLUGS (PAGE 782)** and **IGNITION (PAGE 786)** outputs are active during the pause. After the pause has elapsed, the next start attempt is executed. The number of start attempts is given by the setpoint **Cranking Attempts (page 298)**.
- Once the engine is started, the Idle period follows. The binary output **IDLE/NOMINAL (PAGE 785)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 302)**.
- After the idle period has finished, the output **DESCRIPTION (PAGE 785)** is activated and the start-up sequence is finished. The **Stabilization (page 109)** phase follows.

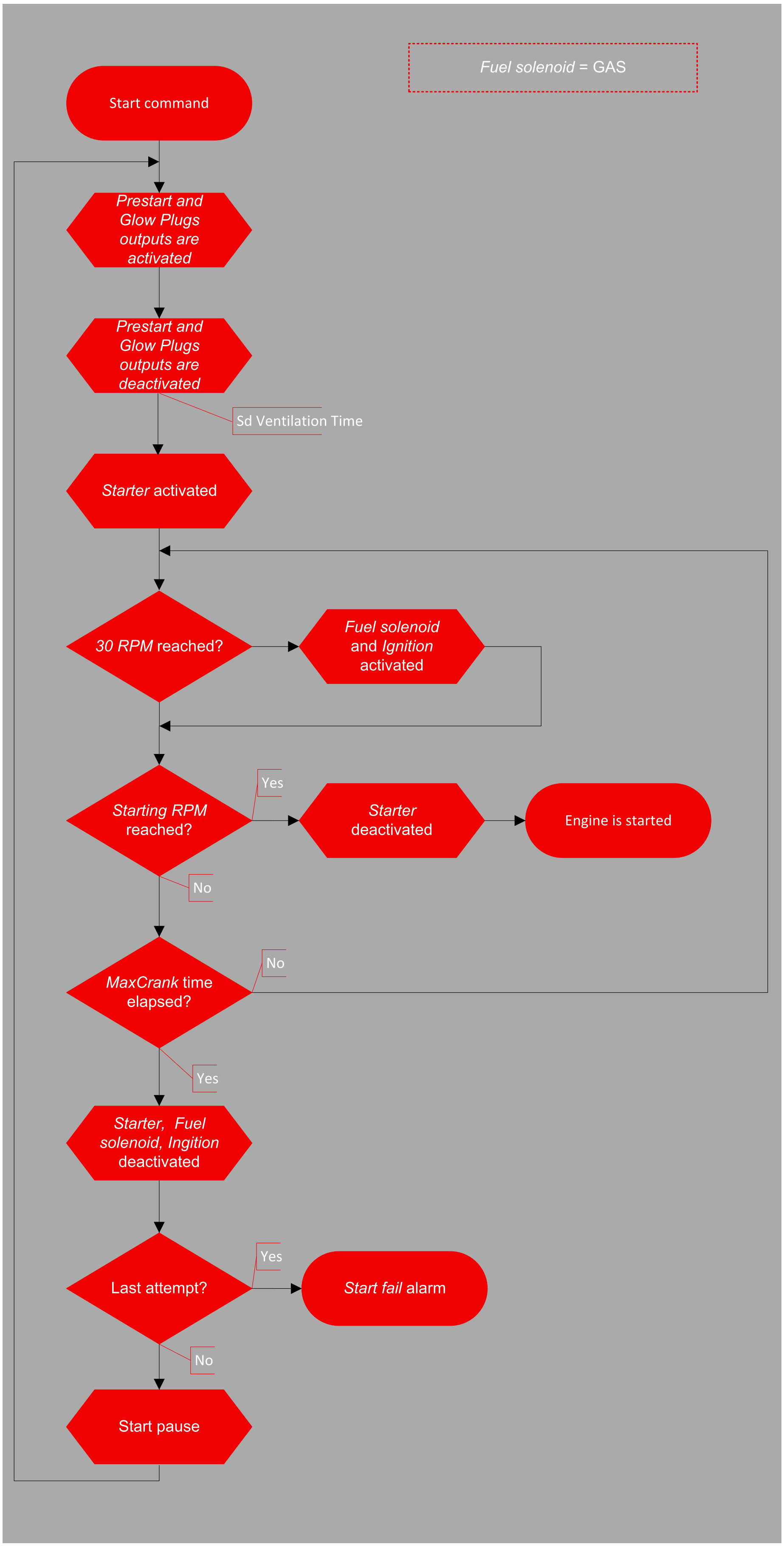


Image 5.59 Flowchart of start of gas engine

5.5.3 Stabilization

When the **Engine start (page 104)** sequence is finished, the Gen-set goes into the stabilization phase. There are two timers (setpoints) in this phase:

- **Minimal Stabilization Time (page 304)** starts to count down just after the idle period has finished. Generator voltage and frequency are not checked (respective protections are not evaluated) and the GCB cannot be closed even if the generator voltage and frequency are within limits.
- **Maximal Stabilization Time (page 305)** starts to count down just after the idle period has finished. Generator voltage and frequency are not checked (respective protections are not evaluated), but contrary to the previous timer, the GCB can be closed if generator voltage and frequency are within limits.

In situations where the GCB is closed automatically (AUTO, TEST modes), the closing of GCB will occur as soon as the generator voltage and frequency will get into limits and the **Minimal Stabilization Time (page 304)** has elapsed.

In the event that the generator voltage or frequency are not within limits of the **Maximal Stabilization Time (page 305)** period, the appropriate protection(s) will be activated and the Gen-set will be cooled down and stopped.

Note: *The limits for the generator voltage and frequency are given by setpoints in the* ***Group: Generator settings (page 343)****.*

Note: *The value of the* ***Minimal Stabilization Time (page 304)*** *setpoint has to be lower than the value of* ***Maximal Stabilization Time (page 305)*** *setpoint.*

5.5.4 Start Up Synchronization (SUS)

Start up Synchronization or SUS, is a ComAp feature set that allows for a faster start-up sequence for multiple generators. By using SUS there is no need to synchronize generators in the standard way and wait until all of them are synchronized on the same BUS. The whole system is available at full capacity in 8-10 seconds from the start of the command – which makes SUS a great solution for emergency backup power, especially in datacenters, hospitals and banking centers, and is ideal for systems using a battery powered UPS. ComAp's SUS eliminates any blackout time, and the start-up time is the same for sites running 2, 10, or even 30 Gen-sets. To avoid delaying availability of the system due to slow-starting generators or other problems, any engines that fail to reach running speed with a specified time are rejected from the scheme and, if able, are left to perform traditional synchronizing after the majority of sets have become available.

Conditions when Start up Synchronization can be used

- Setpoint **SUS Sequence (page 334)** = Enabled
- RPM pick-up is connected (i.e. Setpoint **Gear Teeth (page 272)**!= FGen->RPM
- Voltage < 15 V on the bus/mains line
- MCB is opened (SPtM)
- LBI **GCB Disable (page 722)** is not activated
- LBI **SUS Excitation Block (page 735)** is activated before Start command, if setpoint **Excitation Control (page 337)** = External
- GCB Feedback must activate latest during **Prestart Time (page 300)**. Otherwise the Gen-set is switched to standard start sequence.
- Bus voltage has to be below the **Dead Bus Limit (page 334)** during the SUS starting sequence. GCB is immediately opened, if bus voltage is above the limit and standard start sequence is used.

Reasons of Start up Synchronization Fail

- Whenever the SUS sequence fails the reason of unsuccessful SUS procedure is written into the history.

SUS seq break-1	MCB gets closed in SUS start sequence (**MCB FEEDBACK (PAGE 727)** gets active)
SUS seq break-2	MCB is open, Mains voltage is higher then level given by setpoint **Dead Bus Limit (page 334)**
SUS seq break-3	Bus voltage is higher than limit given by setpoint **Dead Bus Limit (page 334)**
SUS seq break-4	The **GCB FEEDBACK (PAGE 723)** does not response until the **Prestart Time (page 300)** elapsed.
SUS seq break-5	When the setpoint **Excitation Control (page 337)** = External. The LBI **SUS EXCITATION BLOCK (PAGE 735)** is not active before the SUS sequence starts or is deactivated during the SUS sequence in advance the LBO **READY TO EXCITE (PAGE 799)** gets active.
SUS seq break-6	RPM reached window given by **SUS RPM Window (page 338)** and stayed there for a while, but run away
No History record needed	The setpoint GCB Control Mode = Follow. When the GCB is tripped externally, the SUS sequence has to be canceled. However no history record is needed because the reason is described by history record "GCB opened Externally".

SUS in SPTM application

- Decrease the inrush current of the transformer supplied from the Gen-set.

In cases where the load is a huge transformer and standard application is used, there may be a situation where the Gen-set is started and it is about to close GCB to a transformer. During first energizing of a transformer, a transient inrush current is up to 10 to 15 times bigger than the rated transformer current (this inrush current can flow for several cycles).

For elimination of this high current – Start up Synchronization sequence can be used. The principal is to energize the transformer at lower voltage. In first step the Gen-set is started without excitation (without voltage), when the RPM reaches the limit, the excitation is started.

Most important setpoints

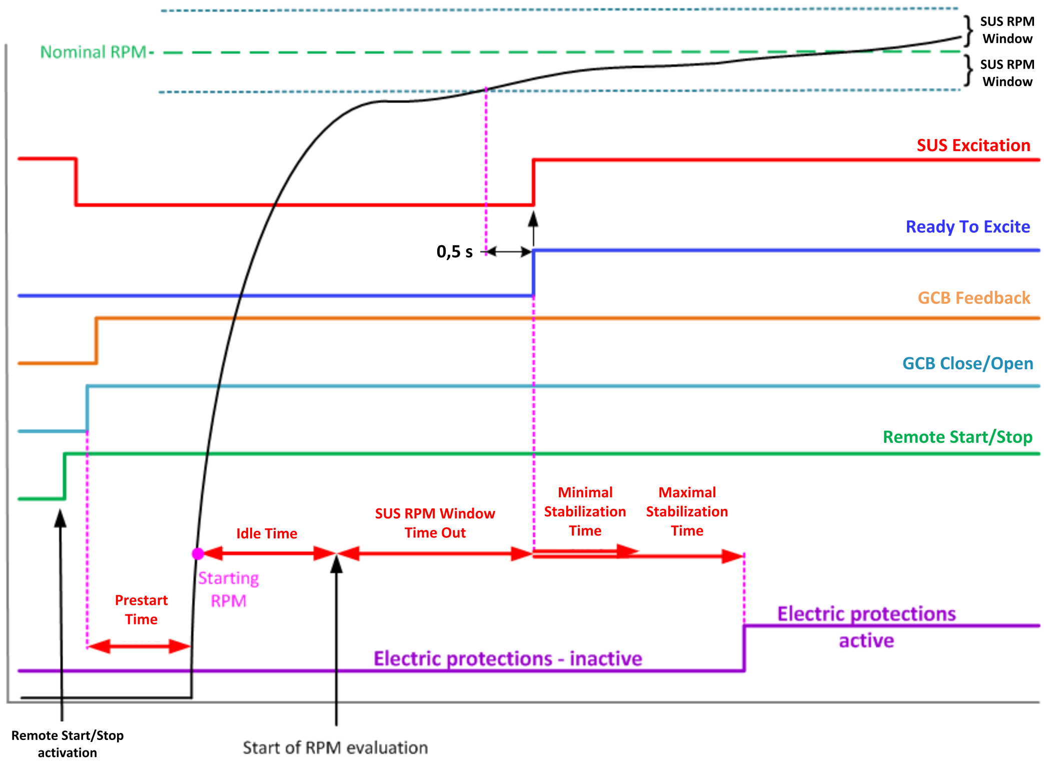
- **SUS Sequence (page 334)** – for activation and deactivation of SUS sequence.
- **Excitation Control (page 337)** – for configuration of internal or external excitation on/off control.
- **SUS RPM Window (page 338)** – defines the RPM window, where a Gen-set can be excited.
- **SUS RPM Window Time Out (page 338)** – defines the maximal time for achieving the RPM window and activating LBO **READY TO EXCITE (PAGE 799)**. If the controller does not activate LBO **READY TO EXCITE (PAGE 799)** in this time, the GCB is opened and Gen-set is started in the standard way.

Examples

Example 1

Application Mode (page 652) = SPtM, **Excitation Control (page 337)** = Internal

RPM reaches **SUS RPM Window (page 338)** in time of **SUS RPM Window Time Out (page 338)**



After **REMOTE START/STOP (PAGE 732)** activation, **Prestart Time (page 300)** is counted. Then the Gen-set is started.

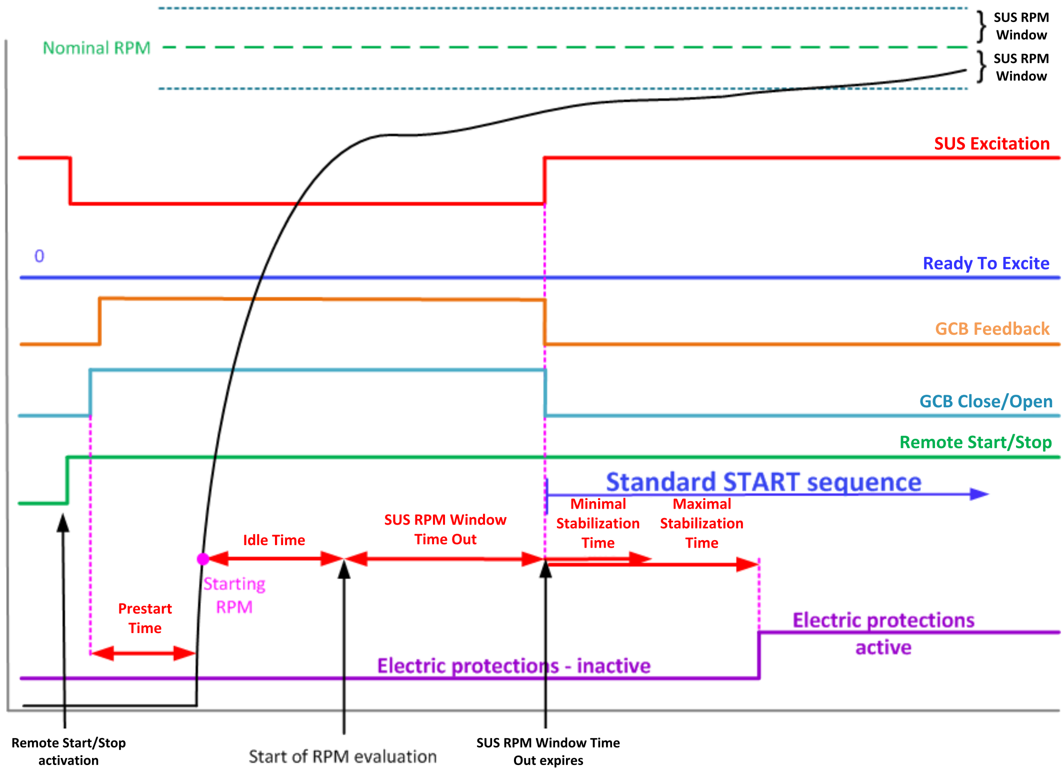
If the start command comes from **AMF operation (page 126)**, the delay **Emergency Start Delay (page 359)** is counted before the start sequence is initiated.

After reaching **Starting RPM (page 300)** the **Idle Time (page 302)** is counted. When the Idle time is up, the evaluation or **SUS RPM Window (page 338)** is activated.

Example 2

Application Mode (page 652) = SPtM, **Excitation Control (page 337)** = Internal

RPM does not reaches **SUS RPM Window (page 338)** in time of**SUS RPM Window Time Out (page 338)**

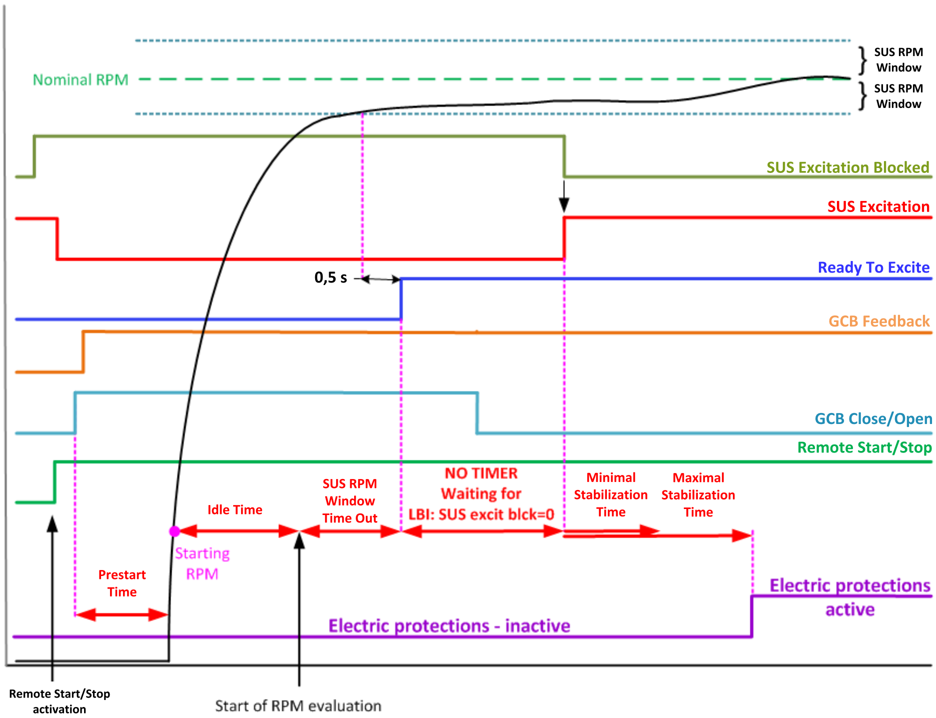


RPM did not reach **SUS RPM Window Time Out (page 338)** and LBO **Ready To Excite (page 799)** did not get activated before **SUS RPM Window Time Out (page 338)** expired. This caused opening of the GCB and standard start sequence has been initiated.

Example 3

Application Mode (page 652) = SPtM, **Excitation Control (page 337)** = External

RPM reaches **SUS RPM Window (page 338)** in time of **SUS RPM Window Time Out (page 338)**.

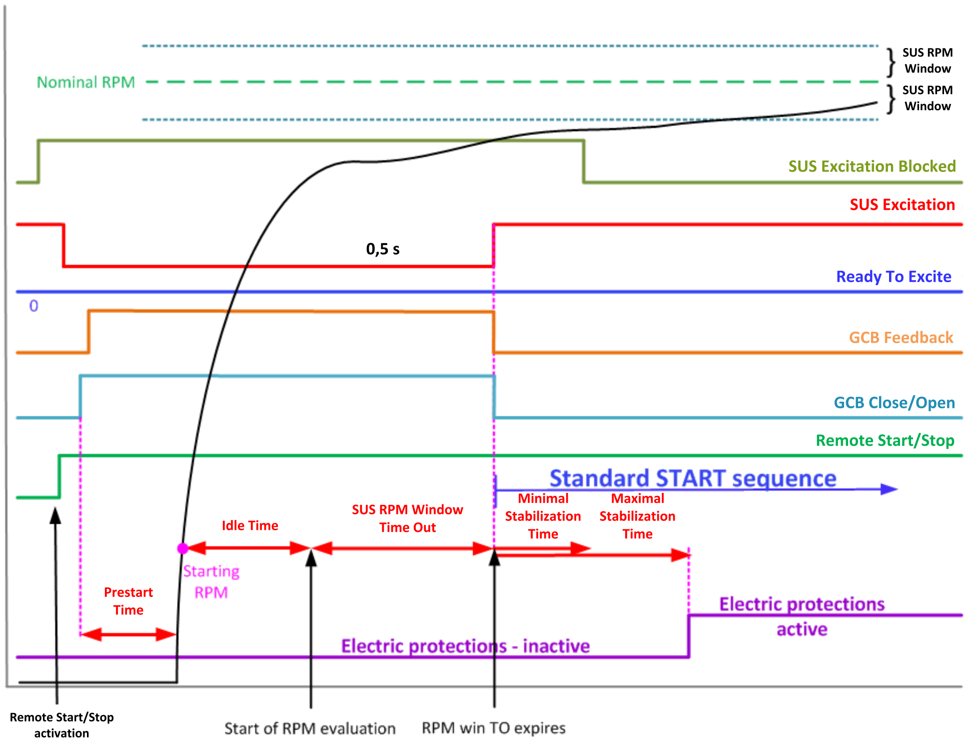


Gen-set achieved the **SUS RPM Window (page 338)** and LBO **Ready To Excite (page 799)** has been activated during **SUS RPM Window Time Out (page 338)**. After this there is no timer and controller/system waits for activation of excitation (deactivation of LBI **SUS Excitation Block (page 735)**. After the excitation is activated, **Minimal Stabilization Time (page 304)** and **Maximal Stabilization Time (page 305)** follows.

Example 4

Application Mode (page 652) = SPtM, **Excitation Control (page 337)** = External

RPM does not reach **SUS RPM Window (page 338)** in time of**SUS RPM Window Time Out (page 338)**.



When timer **SUS RPM Window Time Out (page 338)** is up and LBO **Ready To Excite (page 799)** is not activated, the system is switched over to standard start sequence. This causes GCB to open and the controller activates excitation (LBI **SUS Excitation Block (page 735)** is ignored from the moment and excitation is controlled **INTERNALLY**).

SUS in MINT application

- Fast synchronization of group of Gen-sets in multiple island operation due to GCB closing before start up.

Several Gen-sets may start and synchronize simultaneously. This provides a great advantage because the Gen-sets are ready to provide full power of group at once.

All Gen-sets are started with closed GCBs and without excitation (no voltage). Required sum of **Nominal Power (page 261)** of all Gen-sets is set by **#SUS Min Power 1 (page 335)**, **#SUS Min Power 2 (page 336)** or **#SUS Min Power 3 (page 337)** (based on LBI **SUS Min Power 2 (page 735)** and LBI **SUS Min Power 2 (page 735)**. When sum of **Nominal Power (page 261)** of these Gen-sets achieves active condition, rest of Gen-sets (without of activated LBO **Ready To Excite (page 799)** are switched to STANDARD sequence (GCBs are opened) and Gen-sets with active LBO **Ready To Excite (page 799)** are excited.

If the active condition of minimal power is not met, and on the bus all Gen-sets have LBO **Ready To Excite (page 799)** activated, timer **#SUS Excitation Delay (page 338)** is started (only if **#SUS Excitation Delay (page 338)** > 0). After the timer expires, excitation of Gen-sets with active LBO **Ready To Excite (page 799)** is activated.

Because the Gen-sets are rotating and they are connected together on the bus – and they are excited in the same moment – they are synchronized during the voltage ramping.

It is strongly recommended to use exactly same Gen-sets for this application to eliminate currents flowing among Gen-sets.

Most important setpoints

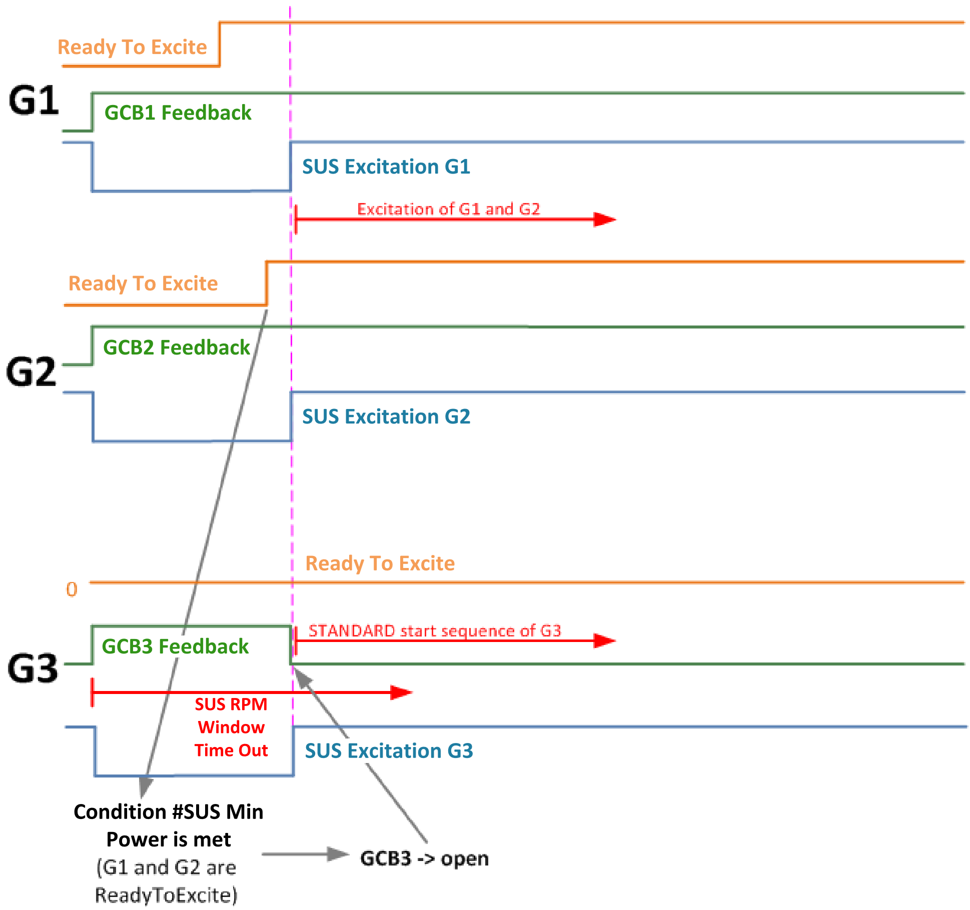
- **SUS Sequence (page 334)** – for activation and deactivation of SUS sequence.
- **Excitation Control (page 337)** – for configuration of internal or external excitation on/off control.
- **SUS RPM Window (page 338)** – defines the RPM window, where a Gen-set can be excited.
- **SUS RPM Window Time Out (page 338)** – defines the maximal time for achieving the RPM window and activating LBO **READY TO EXCITE (PAGE 799)**. If the controller does not activate LBO **READY TO EXCITE (PAGE 799)** in this time, the GCB is opened and Gen-set is started in the standard way.
- **#SUS Excitation Delay (page 338)** – Delay for which Gen-sets will be waiting for other Gen-sets before excitation
- **#SUS Min Power 1 (page 335)** - **#SUS Min Power 3 (page 337)** – Minimal power required for allowing excitation

Examples

Example 1

Application Mode (page 652) = MINT, **Excitation Control (page 337)** = Internal, **#SUS Min Power 1 (page 335)** = 2x **Nominal Power (page 261)**

Condition **#SUS Min Power 1 (page 335)** is met.



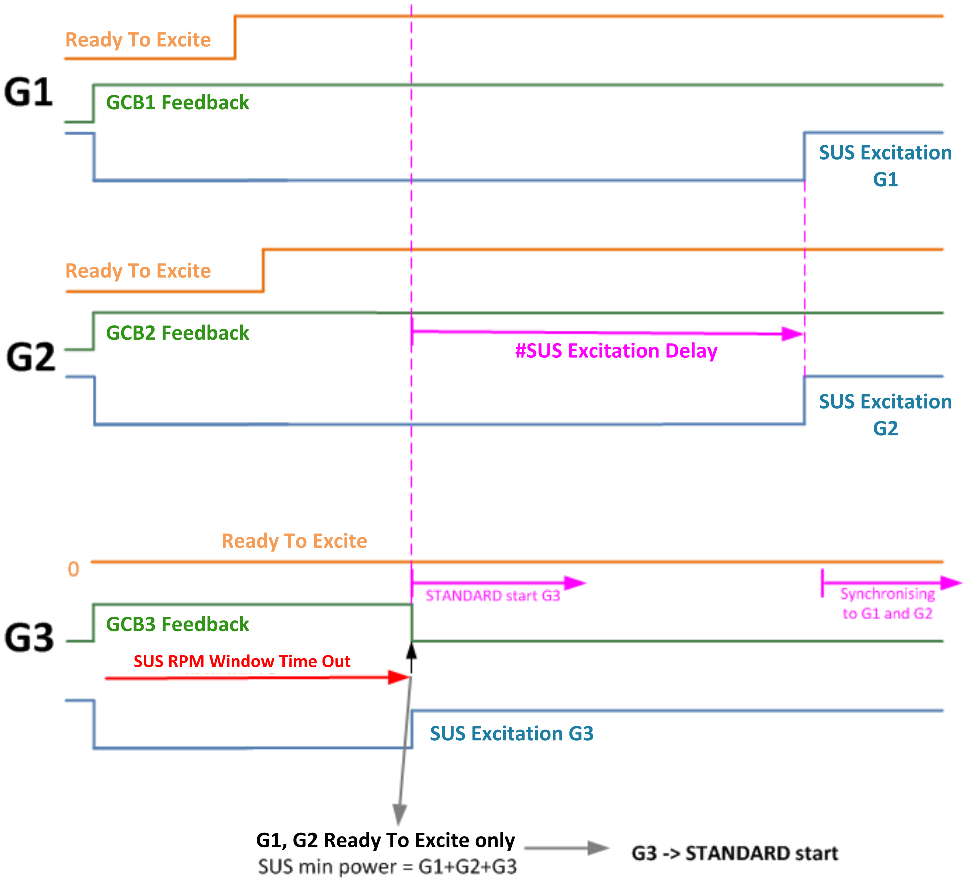
First two Gen-sets are in **SUS RPM Window (page 338)** with active LBO **Ready To Excite (page 799)** so the condition **#SUS Min Power 1 (page 335)** is met → G3 opens the GCB3 and G1, G2 are excited (LBO

SUS EXCITATION (PAGE 806) is activated). G3 is switched to standard start and will be synchronized to the bus.

Example 2

Application Mode (page 652) = MINT, **Excitation Control (page 337)** = Internal, **#SUS Min Power 1 (page 335)** = 3x Gen-set **Nominal Power (page 261)**

Condition **#SUS Min Power 1 (page 335)** is not met.

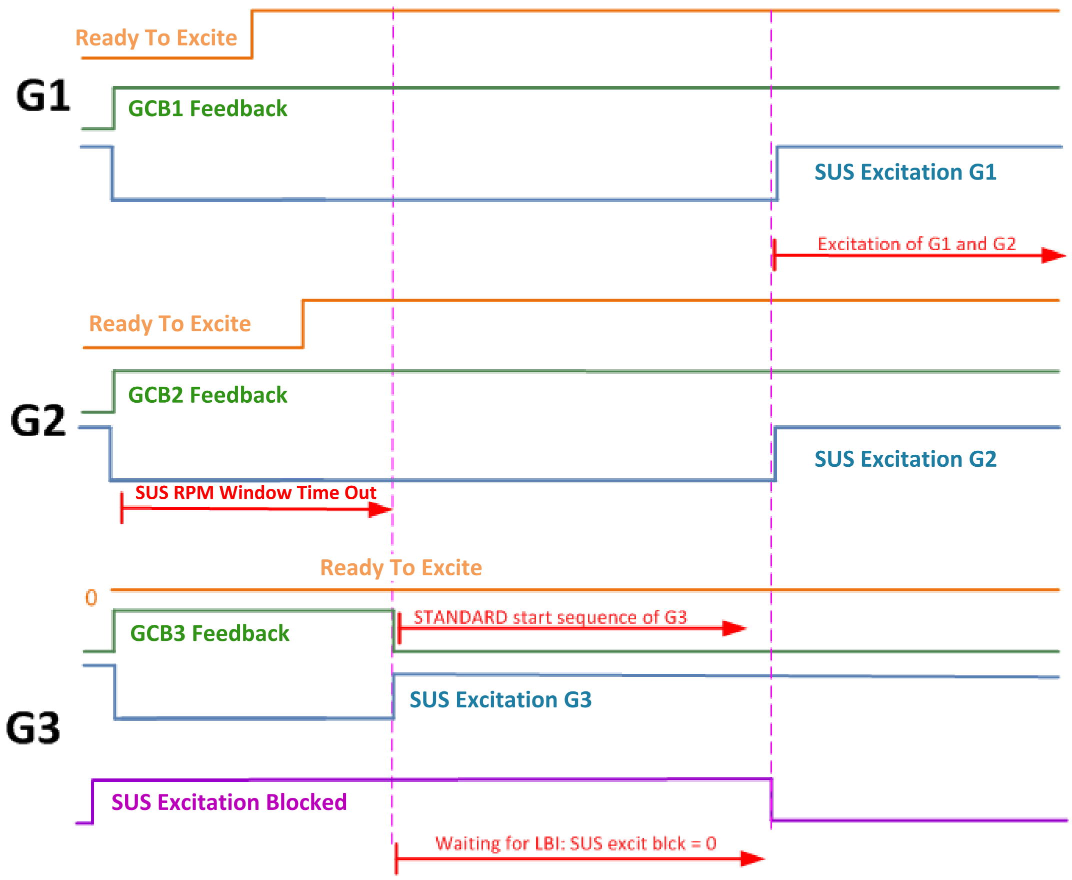


First two Gen-sets are in **SUS RPM Window (page 338)** and with active LBO **Ready To Excite (page 799)**. **#SUS Min Power 1 (page 335)** is equal to the **Nominal Power (page 261)** of 3 Gen-sets, but G3 did not activate **Ready To Excite (page 799)** in time of **SUS RPM Window Time Out (page 338)** → G3 opens the GCB3 ad it is switched to standard start.

From opening of GCB3 the **#SUS Excitation Delay (page 338)** is counted. When the timer is up, G1 and G2 are excited, then G3 can be synchronized to the bus standard way.

Example 3

Application Mode (page 652) = MINT, **Excitation Control (page 337)** = External, **#SUS Min Power 1 (page 335)** is ignored when excitation is external



In the case of **Excitation Control (page 337)** = External, all Gen-sets start in the SUS sequence (base of the Load reserves). Gen-sets which activate LBO **READY TO EXCITE (PAGE 799)** in **SUS RPM Window Time Out (page 338)** will stay non-excited and will be waiting for deactivation of LBI **SUS EXCITATION BLOCK (PAGE 735)**. Then they are excited.

Gen-sets which do not activate LBO **READY TO EXCITE (PAGE 799)** in **SUS RPM Window Time Out (page 338)** are switched to standard start and GCBs are opened. Then they wait for voltage on the bus, after there is healthy voltage, the will synchronize to the bus.

5.5.5 Connecting to load

When the **Stabilization (page 109)** phase is finished, the Gen-set can be connected to the load.

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

- The Gen-set is running and the **Minimal Stabilization Time (page 304)** timer has elapsed.
- The Gen-set voltage and frequency are within limits.

***Note:** The speed governor and AVR must be adjusted properly to achieve these limits as the controller does not perform any regulation and the regulation outputs have constant values given by the **Voltage Regulator Bias (page 401)** and **Speed Governor Bias (page 389)** setpoints.*

There are two ways to connect the Gen-set to the load (bus bar). This depends on the state of **MCB FEEDBACK (PAGE 727)** and on the measured mains/bus voltage.

Connecting to dead bus

SPtM

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

MINT

The measured bus voltage is also taken in account – it must be below 2 % of the nominal bus voltage and with the open MCB (evaluated by **MCB Feedback** **(page 727)**) and also others GCB have to be open to close the GCB without synchronization.

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

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

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

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

Synchronization

Synchronization process

Behavior of synchronization process depends on, which breaker is used for synchronization and in which **Controller Mode** **(page 273)** is controller switched.

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

Synchronization via GCB in AUTO mode

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

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

Synchronization via GCB in MAN mode

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

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

Synchronization via MCB in AUTO mode

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

- if the mains (bus) voltage or the Mains frequency gets out of the limits during synchronization, then the synchronization process is interrupted and can continue again when mains parameters gets restored after **Mains Return Delay (page 359)**.
- if the Gen-set voltage or frequency gets out of the limits during the synchronization, the synchronization process continues until the generator parameters fail is confirmed.
- If the synchronization timeout gets elapsed the **Wrn Reverse Synchro Fail (page 892)** protection gets active and GCB stays closed. Synchronization is stopped.

Synchronization via MCB in MAN mode

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

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

Synchronization types

There are two types of synchronization. Type of synchronization is adjusted via setpoint **Synchronization Type (page 405)**.

Phase match

The phase match synchronization consists of voltage matching and frequency / angle matching. The maximum duration of synchronization is given by the setpoint **Synchronization Timeout (page 406)**. If the synchronization is not successful within this period of time, the **Stp Synchronisation Fail (page 895)** alarm will be issued.

Voltage matching

The Gen-set bus voltage is regulated to match the mains/bus voltage with tolerance given by the setpoint **Voltage Window (page 406)**. The regulation is adjusted by the setpoints **Voltage Gain (page 402)** and **Voltage Int (page 402)**.

Frequency / angle matching

The Gen-set bus frequency is regulated to match the mains/bus frequency first. The frequency regulation loop is active (setpoints **Frequency Gain (page 390)** and **Frequency Int (page 391)**). Once the frequency is matched, the regulation loop is switched to match the angle (setpoint **Angle Gain (page 391)**). When the angle is matched with tolerance ± **Phase Window (page 407)** for a time given by the setpoint **Dwell Time (page 407)** and the voltage is matched too, then the GCB or MGCB is closed.

> ***Note:*** *The matching loops will continue to run even if the GCB or MGCB close command has been already issued until the controller receives* ***GCB Feedback (page 723)*** *or MGCB Feedback or a GCB or MGCB fail alarm occurs. After the feedback has been received, the control loops are switched to load and power factor loops or load and power factor sharing respectively.*

Slip synchronization

The slip synchronizing is based on frequency / angle matching. The maximum duration of synchronizing is given by the setpoint **Synchronization Timeout (page 406)**. If the synchronizing is not successful within this period of time, the Sync Timeout alarm will be issued.

The Gen-set frequency is regulated to match the mains/bus frequency + **Slip Frequency (page 407)** value and the window is set by setpoint **Slip Frequency Window (page 408)**. When the generator frequency reaches (Mains/Bus Frequency + Slip frequency) value regulation loop is stopped (output is frozen at the actual value). If the generator frequency remains inside the window for the time longer than setpoint **Dwell Time (page 407)** the controller will allow GCB closing. The controller calculates periodically so called preclosing angle (based on the actual value **Slip Frequency (page 407)** and CB closing delay given by the setpoint CB Latency). When the preclosing angle is reached the controller issues CB closing command. The breaker will close and CB feedback confirms that to the controller. When the breaker is closed the controller goes to parallel and activates regulation loops again (parallel to Mains regulation loop).

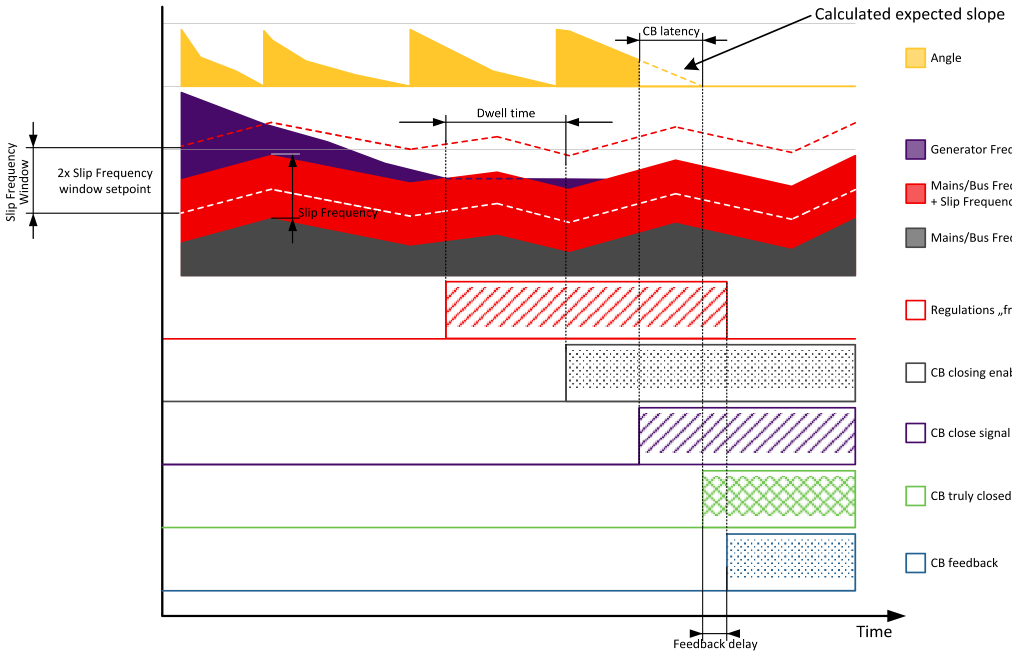


Image 5.60 Slip synchronization

If the generator frequency goes out of the window (either because generator frequency changes or Mains/Bus frequency changes or setpoint **Slip Frequency Window (page 408)** changes) the controller will reactivate regulation loop and try to reach the target value again. The sync timeout timer runs regardless of this. If the generator frequency reaches the target frequency again the regulations are frozen and if the generator frequency remains in the window for the time longer than setpoint **Dwell Time (page 407)** the controller will continue in the standard sequence as seen in the previous case. *If the sync timeout elapses the controller will immediately stop synchronization.

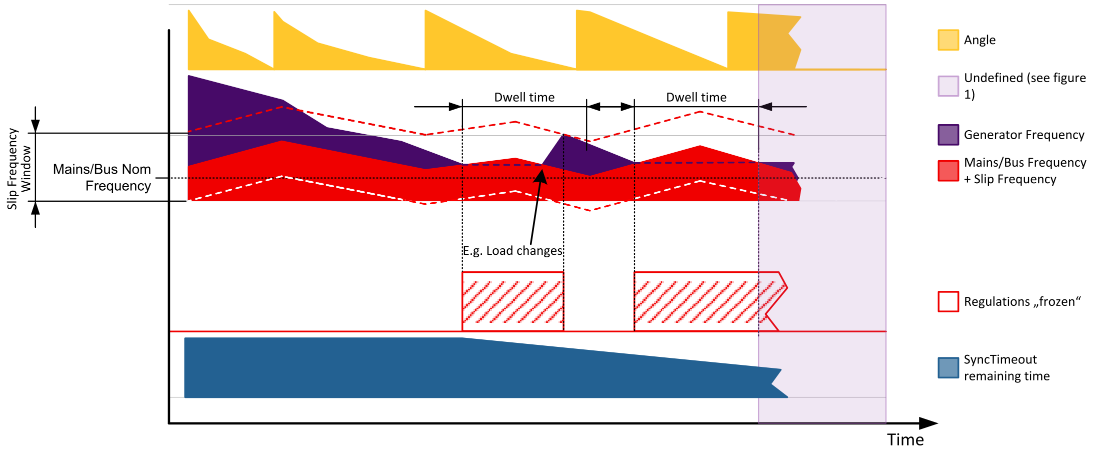


Image 5.61 Slip synchronization

The window is limited by the actual measured Mains/Bus frequency if one of the window limits is below this value (e.g. for setting where setpoint **Slip Frequency (page 407)** is set to 0.1 Hz and setpoint **Slip Frequency Window (page 408)** is set to 0.5 Hz).

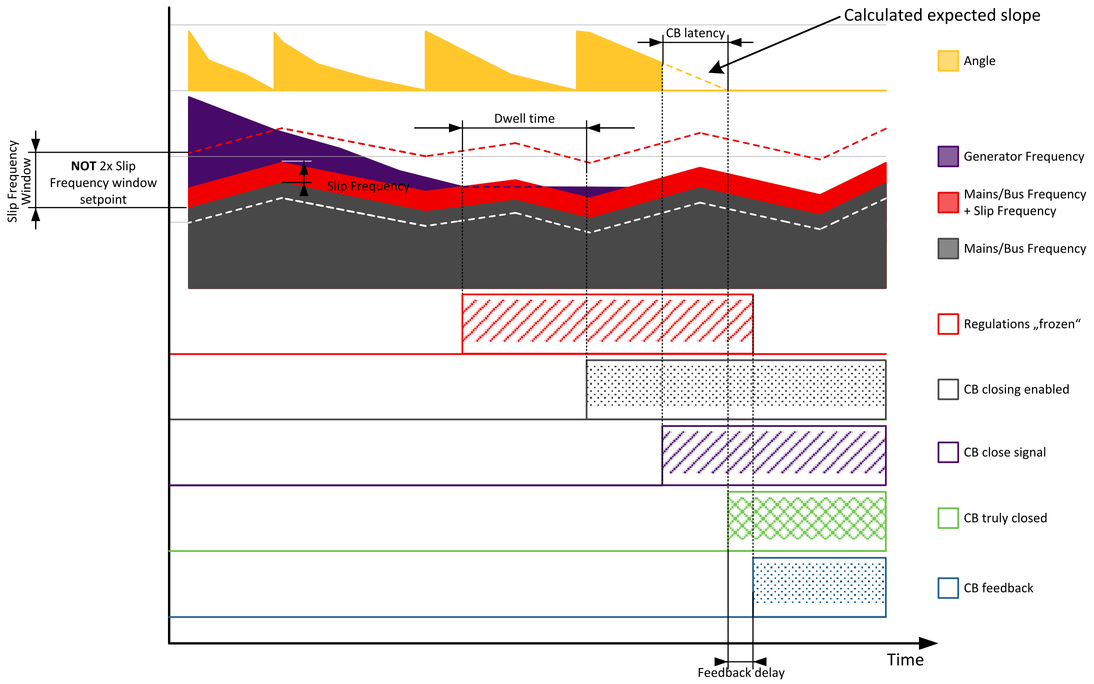


Image 5.62 Slip synchronization

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

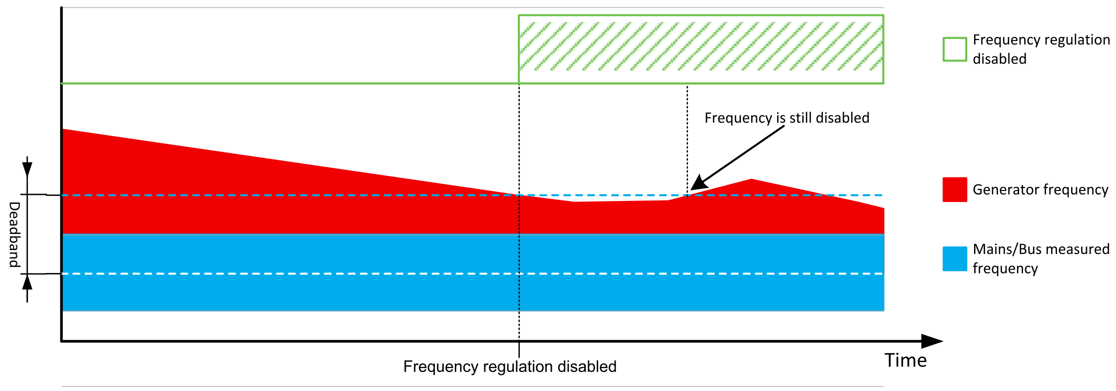
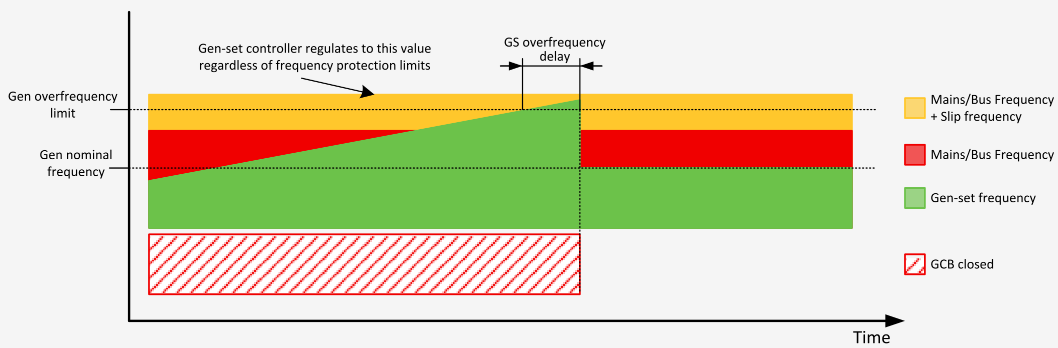


Image 5.63 Slip synchonization – deadband

***Note:** Due to the nature of this function it is possible that in limit cases the Gen-set controller will regulate the generator frequency outside of protection limits. Example: Mains/Bus frequency is high but within its protection limits (e.g. 50.9 Hz, limit is 51 Hz). **Slip Frequency (page 407)** is set to 0.5 Hz. This will cause regulation loop of the gen-set controller to push the gen-set frequency to 51.4 Hz and eventually the controller will issue overfrequency delay. It is recommended to set the setpoint **Slip Frequency (page 407)** as low as possible that still enables successful synchronization. This minimizes the risk of this problem happening. Furthermore when slip synchronization is used it is recommended to set Mains/Bus Frequency protection limits to more rigid values than the generator frequency protection limits. In this case the setpoint **Slip Frequency (page 407)** can be set to 0.1 Hz and the Mains/Bus Frequency overfrequency protection limit is set to 50.9 Hz instead of 51 Hz. This will ensure that problematic state cannot be reached.*



5.5.6 Multiple island operation

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

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

IMPORTANT: The controller in MINT application does not control the MCB! Only the MCB position is evaluated from the binary input MCB FEEDBACK (PAGE 727) and the position is the basic source of information for switching between island and parallel to mains operation.

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

When a stop command is received, e.g. from the power management or binary input **REMOTE START/STOP (PAGE 732)** is deactivated or the STOP button is pressed, the GCB will be opened and the Gen-set will go to cool down phase.

Behavior of controllers is adjusted via **Power management (page 128)** settings. Please see this chapter for more information.

5.5.7 Parallel to mains operation – SPtM application

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

Ramping the power

Power up

The first phase of the parallel to mains operation is the ramping of the gen-set up to the desired power level. The speed of the ramp is given by the setpoint **Load Ramp (page 400)**. The setpoint adjusts the ramp time for a change from 0% to 100% of nominal power.

Power down

When a stop command is received the gen-set load is ramped down before opening the GCB. The ramp speed is given by the setpoint **Load Ramp (page 400)** and the end level is given by **Generator Unload GCB Open Level (page 399)**.

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

Load control

Load control ensures that the gen-set keep the certain load in parallel to mains operation (**MCB FEEDBACK (PAGE 727)** and **GCB FEEDBACK (PAGE 723)** = active).

There are available two modes of load control. Type of control is adjusted via setpoint **Load Control PTM (page 249)**.

Note: *In both modes, the lower level of the power is always limited by the setpoint* ***MINIMAL POWER PTM (PAGE 344)****. If the requested load (given by the active load control mode, e.g. Baseload, Import/Export) is below this limit the requested load is limited to the level adjusted by this setpoint.*

Baseload

Load Control PTM (page 249) = Baseload. Gen-set produces amount of the power given by setpoint **Baseload (page 252)**. The rest of power is supplied from the mains or exported to the mains (depends on proportions of load and **Baseload (page 252)** setpoint). Even in baseload control mode can be the Import/Export limited. This function can be activated by setpoint **Import/Export Limitation (page 254)** = Enabled. Then the request for the power of the genset operating in baseload can be limited to prevent the Import/Export go below the limit given by setpoint **Import Load (page 253)**.

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

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

Import/Export

Load Control PTM (page 249) = Imp/Exp. Gen-set produces the certain amount of power to keep constant import/export from the mains regardless the demand of the load. The requested import/export is given by setpoint **Import Load (page 253)**. If the value of the setpoint is >0 the power is imported from the mains, if setpoint value is <0, then the power is exported to the mains.

PF control

PF control ensures that the Gen-set keep the certain reactive load in parallel to mains operation (**MCB Feedback (page 727)** and **GCB Feedback (page 723)** = active).

There are available two modes of PF control. Type of control is adjusted via setpoint **PF Control PTM (page 250)**.

Base PF

The power factor on the gen-set is kept on the level given by the setpoint **BasePower Factor (page 252)** regardless the load demand. The rest of demanded reactive power is supplied from the mains. Values >1 means that capacitive reactive power is supposed to be imported from mains, values <1 means that inductive reactive power is imported from the mains.

Import/Export

Gen-set produces the certain amount of reactive power to keep constant PF imported from the mains regardless the demand of the load. The requested power factor import is given by setpoint **Import PF (page 253)**. Values >1 means that the Gen-set is pushing the capacitive power to the system (sytem Gen-set – Load- Mains), values <1 means that the Gen-set is pushing the inductive power to the system.

Transfers of load

Type of transfer of load between mains and Gen-set and vice versa is adjusted via setpoints **Transfer Gen To Mains (page 397)** and **Transfer Mains To Gen (page 397)**.

Types of transfers

Open	Transfer of the load from generator to mains and vice versa without parallel work and synchronization (one breaker opens and second is closed – checking feedbacks). The setpoint **Open Transfer Min Break (page 394)** sets the minimal duration of break.
Close Only	Transfer of the load from generator to mains and vice versa with synchronization and parallel work. The maximal time of parallel work is given by setpoint **Close Transfer Max Duration (page 393)**. In case of synchronization fail, MCB stays close and Gen-set is stopped.
Close Primarily	Transfer of the load from generator to mains and vice versa with synchronization and parallel work. The time of parallel work is given by setpoint **Close Transfer Max Duration (page 393)**.

	In case of synchronization fail, open transfer is done.
Soft Transfer	Transfer of the load from generator to mains and vice versa with parallel work and soft loading/unloading of the Gen-set This function is proceeded like the closed transfer, but there is time limitation of loading/unloading of the Gen-set adjusted via setpoint **Load Ramp (page 400)**. The transfer is succeed only when the Gen-set is fully loaded/unloaded (level of load when mains is considered as unloaded – Gen-set is loaded is adjusted via setpoint **Generator Unload GCB Open Level (page 399)**), level of load when Gen-set is considered as unloaded is adjusted via setpoint **Generator Unload GCB Open Level (page 399)**).

Transfer of load in MAN mode

Behavior of transfer of load in MAN mode is adjusted via setpoint **CB Control In MAN Mode (page 257)**. For details see the setpoint description.

Transfer of load in AUTO mode

Behavior of transfer of load in AUTO mode is affected by binary inputs **FORCE ISLAND (PAGE 719)**, **FORCE PARALLEL (PAGE 720)** and **REMOTE START/STOP (PAGE 732)**.

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

- **FORCE ISLAND (PAGE 719)** (highest priority).
- **REMOTE START/STOP (PAGE 732)**.
- **FORCE PARALLEL (PAGE 720)** (lowest priority).

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

Logical binary input	AUTO mode	TEST mode
FORCE ISLAND (PAGE 719)	When activated: › starts Gen-set › the transfer of load from mains to generator is done When deactivated: › the transfer of load from generator to mains is done › cooling and stopping of the Gen-set	The Gen-set is started anyway due to the TEST mode. When activated: › the transfer of load from mains to generator is done When deactivated: › the transfer of load from generator to mains is done
Remote Start/Stop (page 732)	When activated: › starts Gen-set › if mains parameters ok – synchronize, run in parallel › if mains parameters not ok – run in island When deactivated: › unloading (if Gen-setwas in parallel), cooling and stopping of the Gen-set	The Gen-set is started anyway due to the TEST mode. When activated: › if mains parameters ok – synchronize, run in parallel When deactivated: › unloading, of the Gen-set, opening GCB
FORCE PARALLEL (PAGE 720)	When activated: › check mains parameters – if not ok no action, if ok the procedure follows › starts the Gen-set, synchronize, parallel operation › in case of mains fail – Gen-set is stopped (if AMF function is disabled, otherwise it goes to island operation) When deactivated: › unloading, cooling and stopping of the gen-set	The Gen-set is started anyway due to the TEST mode. When activated: › check mains parameters – if not ok no action, if ok the procedure follows › synchronize, parallel operation When deactivated: › unloading, of the Gen-set, opening GCB

Type of transfer of load between mains and Gen-set and vice versa is adjusted via setpoints **Transfer Gen To Mains (page 397)** and **Transfer Mains To Gen (page 397)**.

5.5.8 Parallel to mains operation – MINT application

If the MCB is closed (**MCB FEEDBACK (PAGE 727)** is present) and the Gen-set has been synchronized to the bus bar, the parallel to mains operation will follow. It consists of the following phases:

Ramping the power

Power up

The first phase of the parallel to mains operation is the ramping of the Gen-set up to the desired power level derived from the **#System BaseLoad (page 254)** or up to the load given by load sharing with other Gen-sets connected to the bus bar. The speed of the ramp is given by the setpoint **Load Ramp (page 400)**. The setpoint adjusts the ramp time for a change from 0 % to 100 % of nominal power.

Power down

When a stop command is received the Gen-set load is ramped down before opening the GCB. The ramp speed is given by the setpoint **Load Ramp (page 400)** and the end level is given by **Generator Unload GCB Open Level (page 399)**.

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

Load control

If **MCB Feedback (page 727)** is active (parallel to mains operation) the load of group of the Gen-sets is controlled to reach the power defined by setpoint **#System BaseLoad (page 254)**. Each loaded Gen-set takes equal part (relative to their nominal power) from **#System BaseLoad (page 254)** requested value. The load is regulated locally in each controller by load control regulation loop, load-sharing regulation loop is not active. The setpoint **#System BaseLoad (page 254)** is also used for determining which Gen-sets have to run or not. Control is adjusted via setpoints **Load Int (page 392)** and **Load Gain (page 392)**.

PF control

If **MCB Feedback (page 727)** is active (parallel to mains operation) the value of PF (power factor) of group of the Gen-sets is controlled to reach the PF defined by setpoint **#System Power Factor (page 255)**. The PF is regulated locally in each controller by PF control regulation loop, VAr-sharing regulation loop is not active. Control is adjusted via setpoints **PF Gain (page 403)** and **PF Int (page 403)**.

5.5.9 AMF operation

The "AMF function" represents the automatic start in the event that the mains have failed, and a stop after the mains have been restored. The automatic start can be enabled or disabled by binary inputs **AMF Start Block (page 686)** or **Mains Fail Block (page 725)**.

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

Mains failure detection

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

- The mains voltage is out of the limits given by the setpoints **Mains Undervoltage (page 361)** and **Mains Overvoltage (page 360)** for a time period longer than **Mains Voltage Unbalance Delay (page 362)**.
- The mains voltage unbalance is out of limit given by setpoint **Mains Voltage Unbalance (page 361)** for a time period longer than **Mains Voltage Unbalance Delay (page 362)**.
- The mains frequency is out of the limits given by the setpoints **Mains Underfrequency (page 362)** and **Mains Overfrequency (page 362)** for a time period longer than **Mains < > Frequency Delay (page 363)**.

- The MCB close command was not successful and the alarm **Wrn MCB Fail (page 891)** was not reset.
- Phase rotation is incorrect.
- The mains import is higher than limit given by setpoints **Overload BOC (page 343)** for a time longer than **Overload Delay (page 344)**.
- The mains current is higher than limit given by setpoint **Short Circuit BOC (page 345)** for a time longer than **Short Circuit BOC Delay (page 345)**.
- The IDMT protection is activated due to over-crossing the IDMT curve set by setpoints **IDMT Overcurrent Delay (page 345)**.

Healthy mains detection

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

- The mains voltage is within the limits given by the setpoints **Mains Undervoltage (page 361)** and **Mains Overvoltage (page 360)**.
- The mains voltage unbalance is within the limits given by the setpoint **Mains Voltage Unbalance (page 361)**.
- The mains frequency is within the limits given by the setpoints **Mains Underfrequency (page 362)** and **Mains Overfrequency (page 362)**.
- The alarm **Wrn MCB Fail (page 891)** is not active (if MCB feedback is active). This condition is not required if MCB is open (MCB feedback is inactive).
- Phase rotation is correct.

The AMF procedure

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

- If the setpoint **MCB Opens On (page 366)** is set to Mains Failure, the MCB is opened
- The timer for automatic start of the Gen-set **Emergency Start Delay (page 359)** begins to count down.
- After the timer has elapsed, the Gen-set is started.

***Note:** The automatic start of the Gen-set due to AMF function can be disabled by the binary inputs **AMF START BLOCK (PAGE 686)** or **MAINS FAIL BLOCK (PAGE 725)**.*

- If the setpoint **MCB Opens On (page 366)** is set to Gen Run, the MCB is opened once the generator voltage is within limits.

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

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

- After Transfer Delay elapses, the GCB and MGCB (in case of MGCB application) is closed and the Gen-set begins to supply the load.
- After the mains are restored to normal, the timer **Mains Return Delay (page 359)** begins to count down.
- Transition of load back to mains is adjusted via setpoint **Transfer Gen To Mains (page 397)**. Behavior of transition is also is affected by binary inputs **FORCE ISLAND (PAGE 719)**, **FORCE PARALLEL (PAGE 720)** and **REMOTE START/STOP (PAGE 732)**. See more in **Transfer of load in AUTO mode (page 124)** chapter.

IMPORTANT: Controller has this behavior only in AUTO mode!

5.5.10 Engine cool down and stop

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

- Duration of the cool down phase is determined by the setpoint **Cooling Time (page 307)**.
- Cooling is performed either at nominal speed (generator voltage and frequency protections are evaluated) or at idle speed (generator voltage and frequency protections are not evaluated). Selection of the speed is done by the setpoint **Cooling Speed (page 307)**.
- The cool down can be finished manually in MAN mode by pressing the STOP button.
- If a new start request comes, the cool down will be interrupted and the Gen-set will go back to the stabilization phase. If the cooling was at nominal speed, the stabilization timers will not count down again so the GCB is ready to be closed (after 2s delay).

When the cool down is finished, the output **FUEL SOLENOID (PAGE 775)** is de-energized and **STOP SOLENOID (PAGE 804)** is energized. The engine will stop within the time period determined by the setpoint **Stop Time (page 307)**. If the engine does not stop within this time, the alarm **Wrn Stop Fail (page 892)** will be issued.

The output **STOP SOLENOID (PAGE 804)** is energized until the engine is stopped, but at least for the duration of **Stop Time (page 307)**. If the **Stop Time (page 307)** has elapsed and the engine has still not stopped, the **STOP SOLENOID (PAGE 804)** is de-energized for 5 s and then energized again for **Stop Time (page 307)**.This is repeated until the engine is stopped.

The output **Ignition (page 786)** is continuously energized until the engine is stopped.

Stopped Gen-set evaluation

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

- The engine speed is lower than 2 RPM.
- The generator voltage in all phases is lower than 10 V.
- None of the **Additional running engine indications (page 184)** signals is active.

5.5.11 Power management

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

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

The Power management function decides how many Gen-sets should run and selects particular Gen-sets to run. The power management is applicable in cases multiple Gen-sets run in parallel to mains or in the island operation. The function is based on the load evaluation in order to provide enough of available running power. Since it allows the system to start and stop Gen-sets based on the load demand, it can vastly improve the system fuel efficiency. In other words, an additional Gen-set starts when the load of the system raises above certain level. The additional Gen-set stops, when the load of the system drops down below a certain level. The process of determining Gen-set start and stop is done in each controller; there is no "master slave" system. Therefore, the system is very robust and resistant to failures of any unit in the system. Each of the controllers can be switched off without influencing the whole system. Except the situation the respective Gen-set is not available for the power management.

The power management evaluates so called load reserve. The load reserve is calculated as difference between actual load and nominal power of running Gen-sets. The reserve is calculated as absolute value (in kW / kVA) or relatively to the nominal power of Gen-set(s) (in %). The setpoint **#Power Management Mode (page 374)** is used to select the absolute or relative mode.

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

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

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

Basic power management

The setpoint **Power Management (page 373)** enables and disables the Gen-set to be active within the power management and makes automatic load dependent starts and stops. If the power management is disabled, the start and stop of the Gen-set do not depend on the load of the group. If the Gen-set remains in AUTO mode, the running condition depends only on the Logical binary inputs **REMOTE START/STOP (PAGE 732)**.

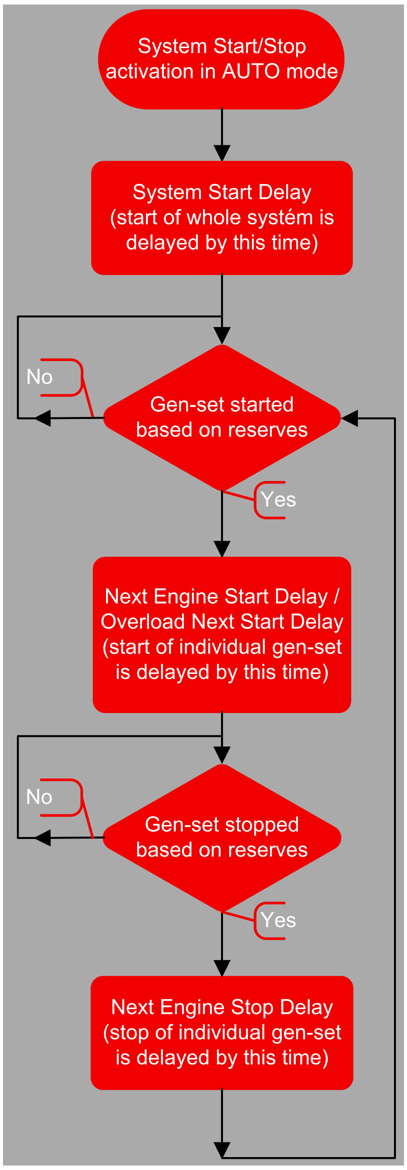
The Logical binary inputs **REMOTE START/STOP (PAGE 732)** requests the system to start or stop. If the input is not active, the system stops with delay **#System Stop Delay (page 377)** after the input has been deactivated and will not start again if in AUTO mode. If the input is activated again, the delay **#System Start Delay (page 377)** starts to count down. Once the delay elapsed, the system is activated and can be started by the power management. In other words, the power management is activated only if the Logical binary inputs **REMOTE START/STOP (PAGE 732)** is activated, the option of setpoint **Power Management (page 373)** = ENABLED and the AUTO mode is selected.

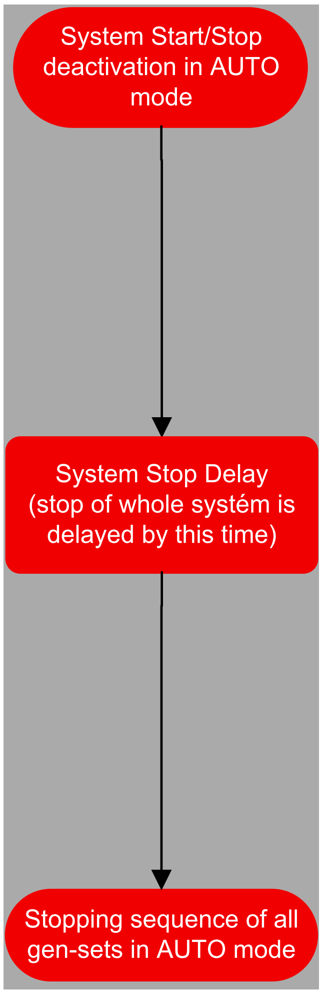
Note: *The Gen-set performs load and VAR sharing whenever it is connected to the bus bar i.e. it is independent on whether the controller is in AUTO or MAN mode or whether the power management is active or not.*

Function of power management can be temporarily blocked after **REMOTE START/STOP (PAGE 732)** activation a count down of **#System Start Delay (page 377)**. The delay is given by setpoint **Power Management Delay (page 373)**. In this delay all Gen-sets where power management is enabled are running. After this period elapses, only the Gen-set(s) needed according to the Power Management calculation stay running and the rest is stopped.

Principle of power management

Internal conditions based on remaining load reserves and priorities are evaluated once a delay is elapsed. If the load reserve is insufficient the Gen-set is started after delay given by the setpoint **#Next Engine Start Delay (page 382)** is elapsed. Once the Gen-set runs the controller evaluates stopping conditions based on load reserves and priorities. If the reserve is sufficient enough to stop a particular Gen-set, it is stopped after delay given by the setpoint **#Next Engine Stop Delay (page 383)** is elapsed. All the time the system stop condition – i.e. the Logical binary inputs **REMOTE START/STOP (PAGE 732)** deactivated – is evaluated as well. Once the delay given by the setpoint **#System Stop Delay (page 377)** has elapsed all Gen-sets in AUTO mode are stopped. Following figure depicts the system activation and deactivation logic.





Setpoint **#Overload Next Start Delay (page 384)** is used in case that **#Overload Next Start Protection (page 384)** is enabled and Gen-sets are running at **#Overload Next Start Level (page 384)** or more of their nominal power.

Load reserve

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

Case #1

This case is used in island operation.

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

Case #2

This case is used in parallel to mains operation.

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

List of abbreviations:

- ARstrt .. Actual Absolute reserve in kW or kVA – for engine start calculation.
- ARstp .. Actual Absolute reserves in kW or kVA – for engine stop calculation.
- RRstrt .. Actual Relative reserve in % – for engine start calculation.
- RRstp .. Actual Relative reserves in % – for engine stop calculation.
- ΣPgNom .. Sum of Nominal power of all Gen-sets on the bus.
- ΣPg*Nom .. Sum of Nominal power of all Gen-sets on the bus apart of the one, which is going to be stopped.
- ΣPgAct .. Sum of Actual power of all Gen-sets on the bus = system load.
- BaseLd .. Baseload is given by the setpoint **#System BaseLoad (page 254)**

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

Starting sequence

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

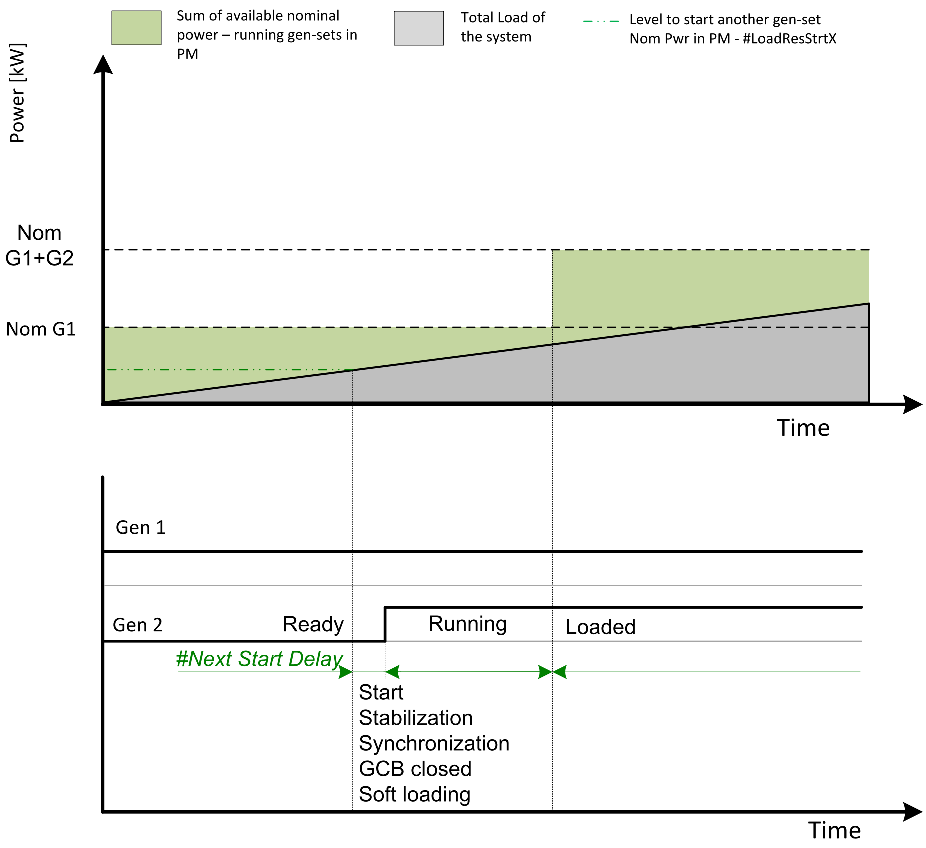


Image 5.64 Start sequence of power management

As shown above, the load of the system has increased above the level defined by the start condition – i.e. the load reserve is not sufficient as required by the appropriate setpoint. Further explanation is provided in chapters **Absolute power management (page 133)** and **Relative power management (page 136)**.

The level is illustrated by the green dashed line. If the load reserve keeps insufficient for longer time than defined by the setpoint **#Next Engine Start Delay (page 382)**, the next Gen-set is actually started. The standard starting sequence follows. Once the synchronization procedure is done, the GCB breaker is closed and the Gen-set power is ramping up. Once loaded, the system load reserve is raised and becomes sufficient again. Please note the sum of nominal power of all Gen-sets on the bus is increased by the nominal power of the additional Gen-set.

Stopping sequence

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

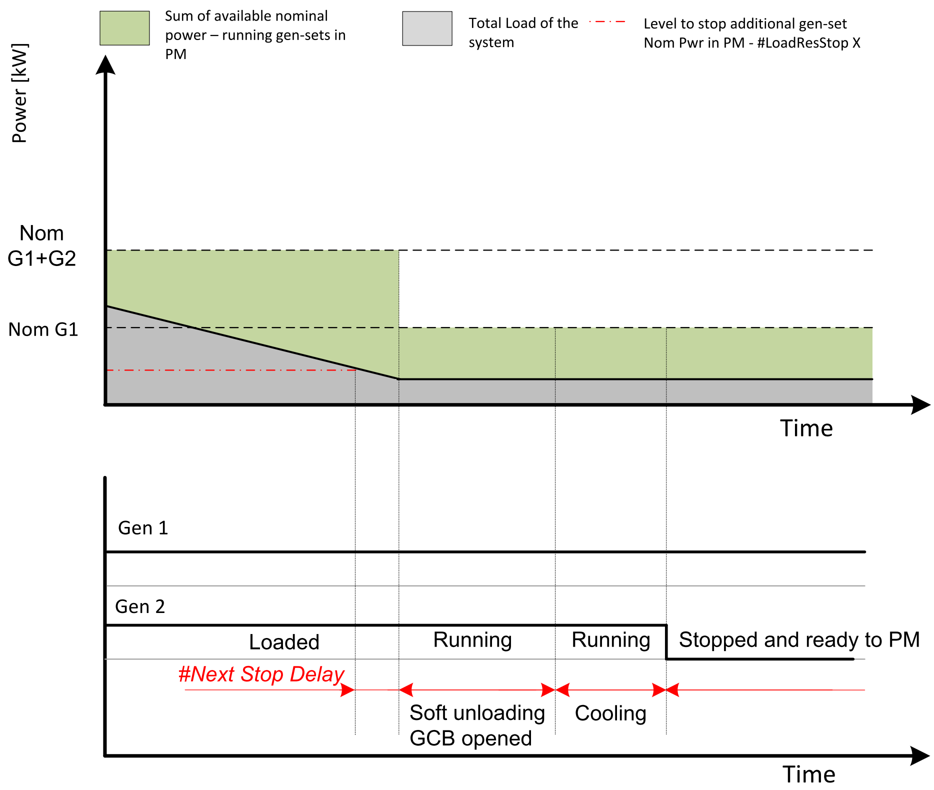


Image 5.65 Stopping sequence of power management

As shown above, the system load has decreased below the level defined by the stop condition – i.e. the load reserve is over a limit given by the appropriate setpoint. Further explanation is provided in chapters **Absolute power management (page 133)** and **Relative power management (page 136)**.

The level is illustrated by the red dashed line. If the load reserve keeps over this limit for longer time than defined by setpoint **#Next Engine Start Delay (page 382)**, the next Gen-set is actually requested to stop. Once the Gen-set is unloaded, the GCB breaker is opened. Please note the sum of nominal power of all Gen-sets on the bus is decreased by the nominal power of the stopped Gen-set. The cooling sequence follows before the Gen-set is actually stopped. The Gen-set is ready to be started if the system load increases again.

Absolute power management

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

The absolute power management guarantees adjustable load reserve in kW. This mode is active when **#Power Management Mode (page 374)** is set to ABS [kW] mode.

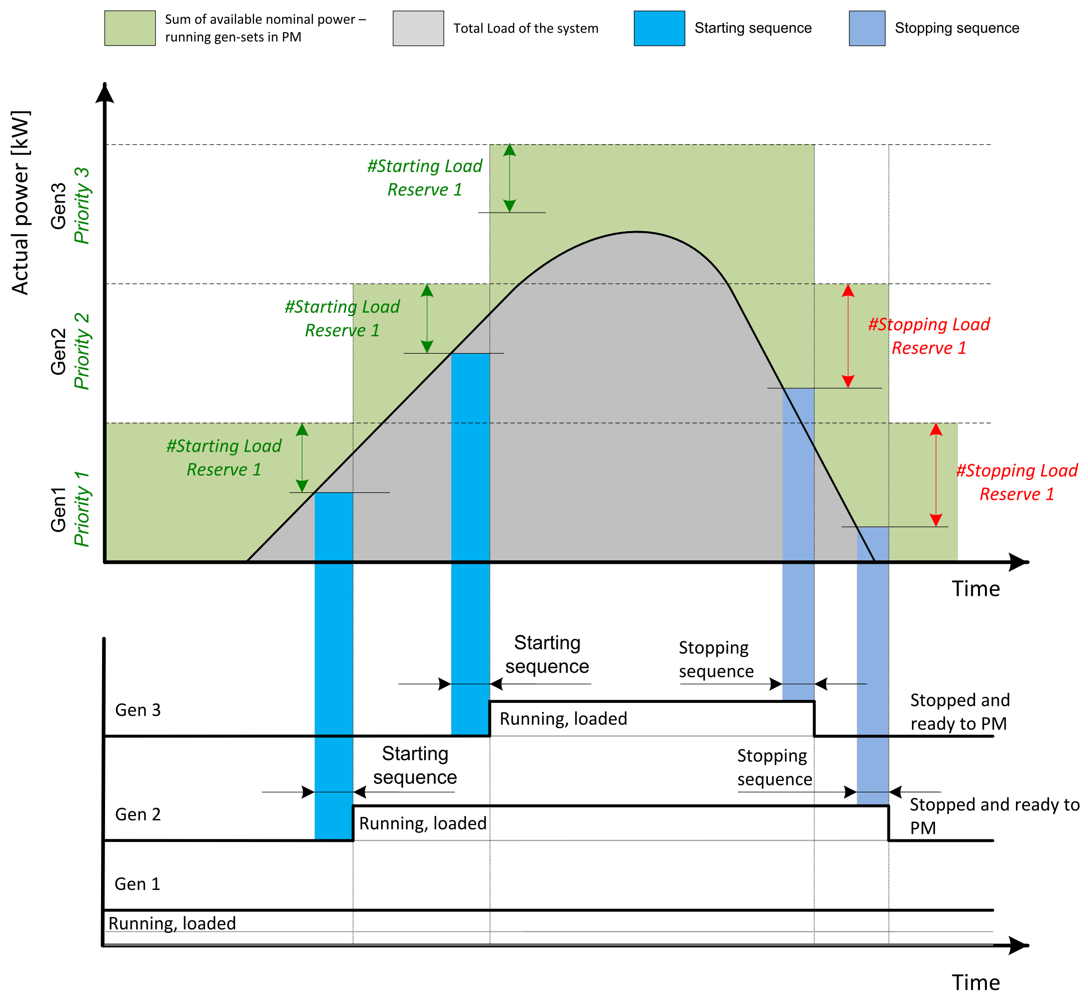


Image 5.66 Power management based on absolute load reserve

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

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

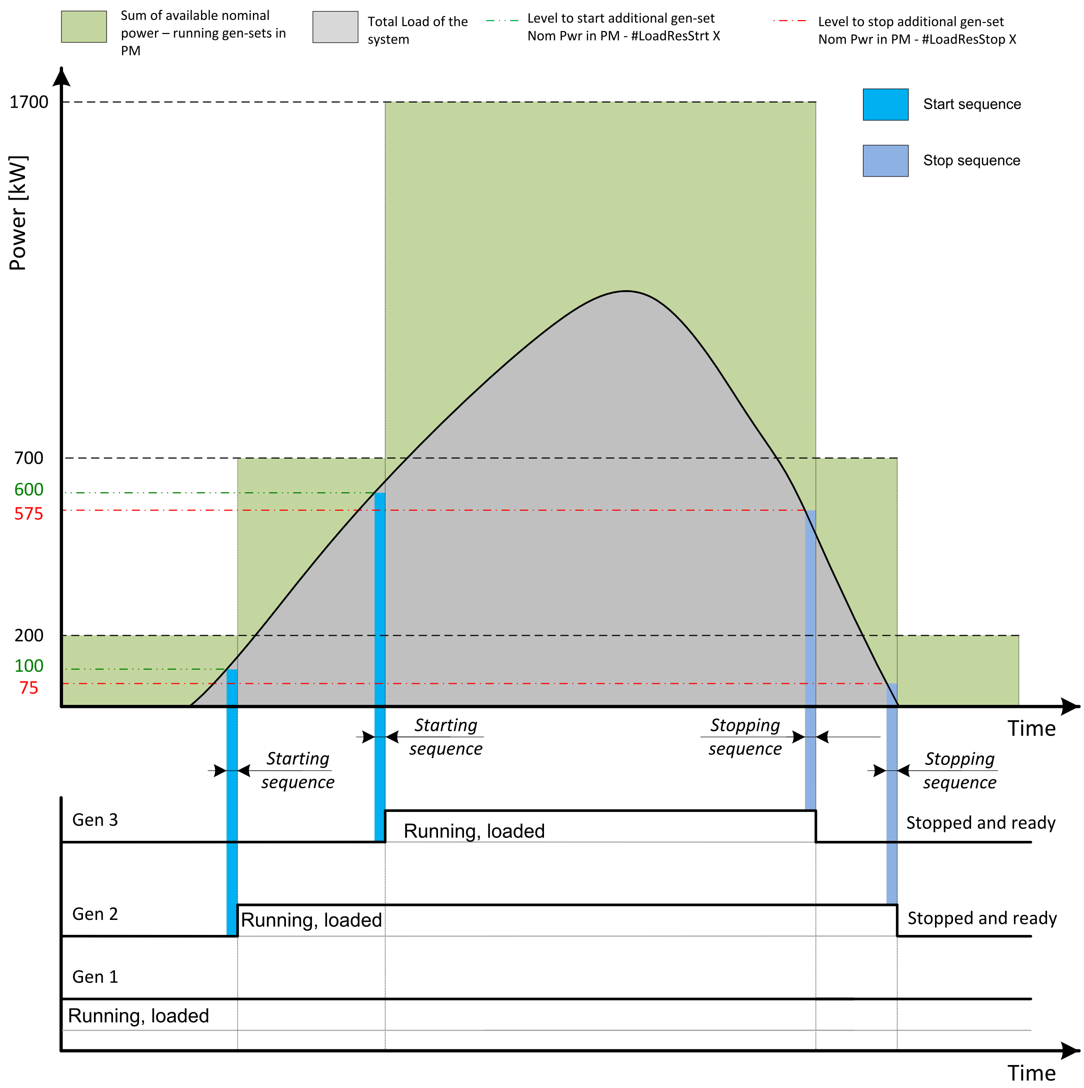


Image 5.67 Absolute power management example

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

The green dashed line depicts the value of load at which the additional Gen-set is requested to start. This value of the load is linked with the setpoint **#Starting Load Reserve 1 (page 378)** (or other selected reserve set) in following way:

Sum of nominal power for start – **#Starting Load Reserve 1 (page 378)** (or other selected reserve set) = value of load when additional Gen-set requested to start (e.g.: 700 kW - 100 kW = 600 kW).

The red dashed line depicts the value of load at which the additional Gen-set is requested to stop. This value of the load is linked with the setpoint **#Stopping Load Reserve 1 (page 378)** (or other selected reserve set) in following way:

Sum of nominal power for stop – **#Stopping Load Reserve 1 (page 378)** (or other selected reserve set) = value of load when additional Gen-set requested to stop (e.g.: 700 kW - 125 kW = 575 kW).

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

- **#Starting Load Reserve 1 (page 378)** and **#Stopping Load Reserve 1 (page 378)**
- **#Starting Load Reserve 2 (page 380)** and **#Stopping Load Reserve 2 (page 380)** considered if binary input **LOAD RES 2 ACTIVE (PAGE 725)** is activated

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

Relative power management

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

The relative power management guarantees that the engines are not continuously loaded more than to a certain level. This mode is active when **#Power Management Mode (page 374)** is set to REL [%] mode.

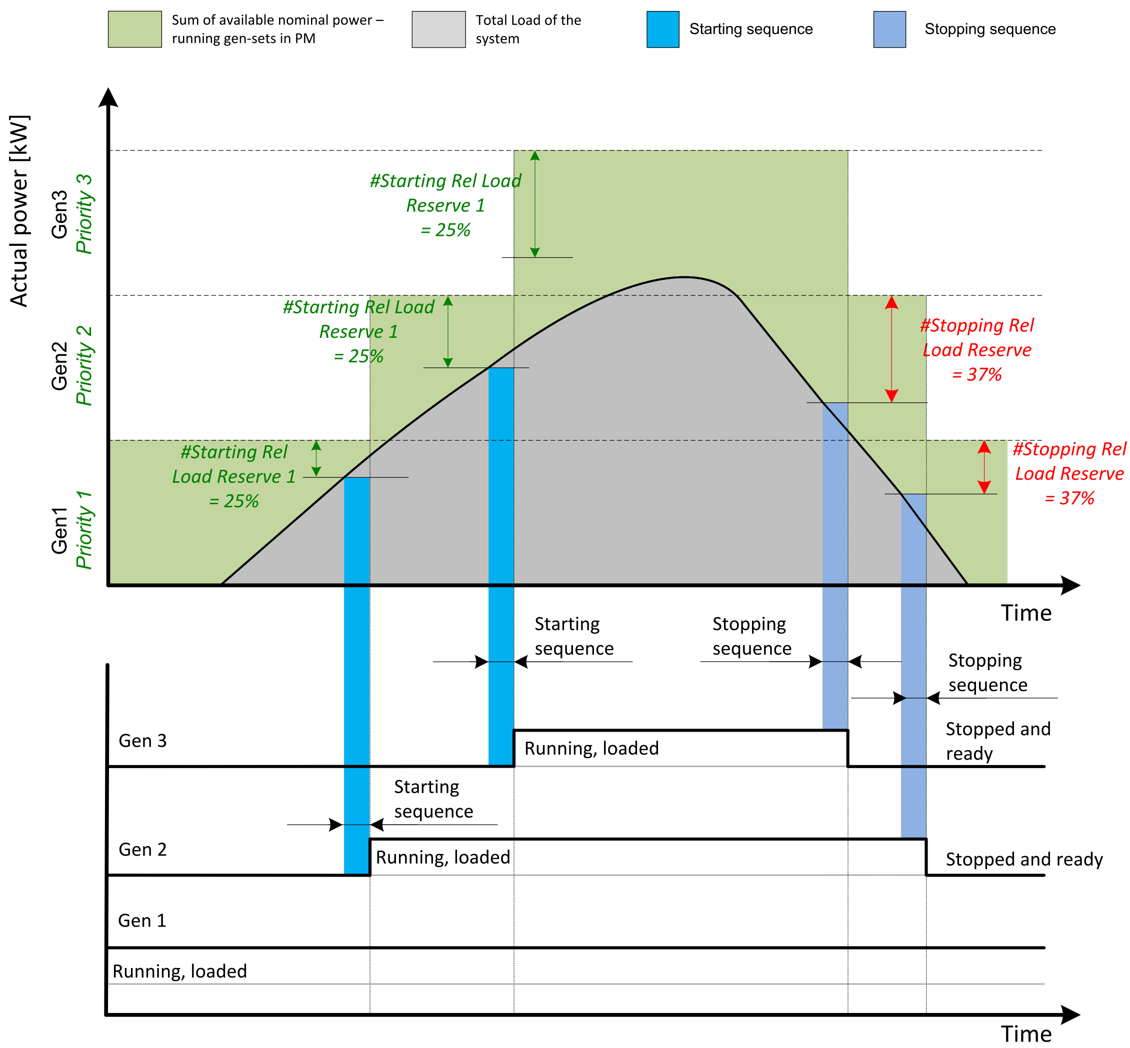


Image 5.68 Power management based on relative load reserve

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

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

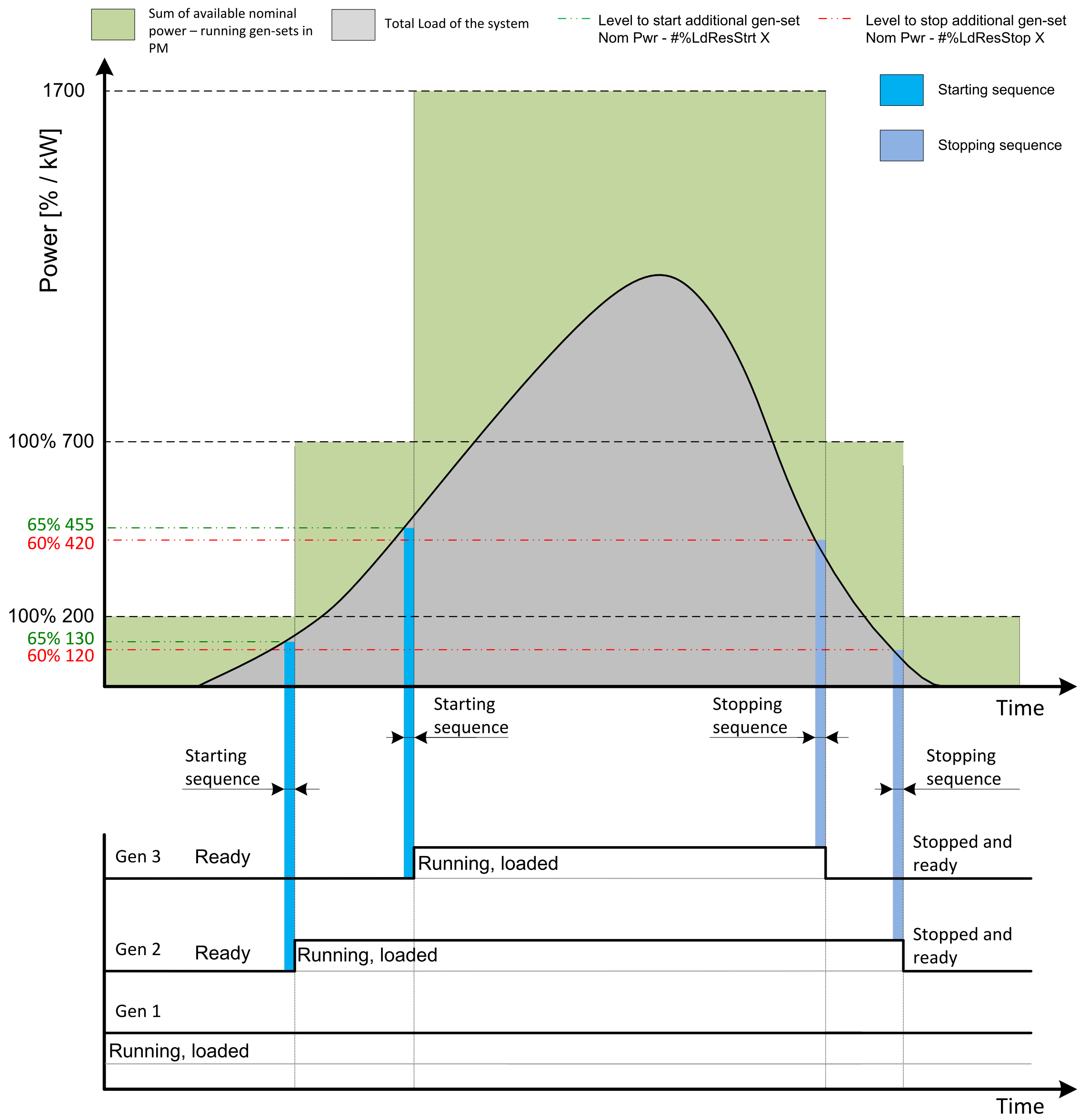


Image 5.69 Relative power management example

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

The green dashed line depicts the value of load at which the additional Gen-set is requested to start. This value of the load is linked with the setpoint **#Starting Rel Load Reserve 1 (page 379)** (or other selected reserve set) in following way:

(100 % - **#Starting Rel Load Reserve 1 (page 379)** (or other selected reserve set)) * Sum of Nominal power = Value of load when additional Gen-set requested to start in kW (in % of nominal power), e.g.: (100 % – 35 %) * 700 kW = 455 kW (65 % of nominal power).

The red dashed line depicts the value of load at which the additional Gen-set is requested to stop. This value of the value is linked with the setpoint **#Stopping Rel Load Reserve 1 (page 379)** (or other selected reserve set) in following way:

(100 % - **#Stopping Rel Load Reserve 1 (page 379)** (or other selected reserve set)) * Sum of Nominal power = Value of load when additional Gen-set requested to stop in kW (in % of nominal power), e.g.: (100 % – 40 %) * 700 kW = 420 kW (60 % of nominal power).

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

- **#Starting Rel Load Reserve 1 (page 379)** and **#Stopping Rel Load Reserve 1 (page 379)**
- **#Starting Rel Load Reserve 2 (page 381)** and **#Stopping Rel Load Reserve 2 (page 381)** considered if binary input **Load Res 2 Active (page 725)** is activated

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

Priorities

The priority of the Gen-set within the group is given by the setpoint **Priority (page 375)**. Lower number represents "higher" priority, i.e. a Gen-set with lower number starts before another one with higher number. In other words, the setpoint **Priority (page 375)** means order in which Gen-sets are started and connected to the bus. An example is shown on the figure below. There are four Gen-sets with following choice of setpoints:

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

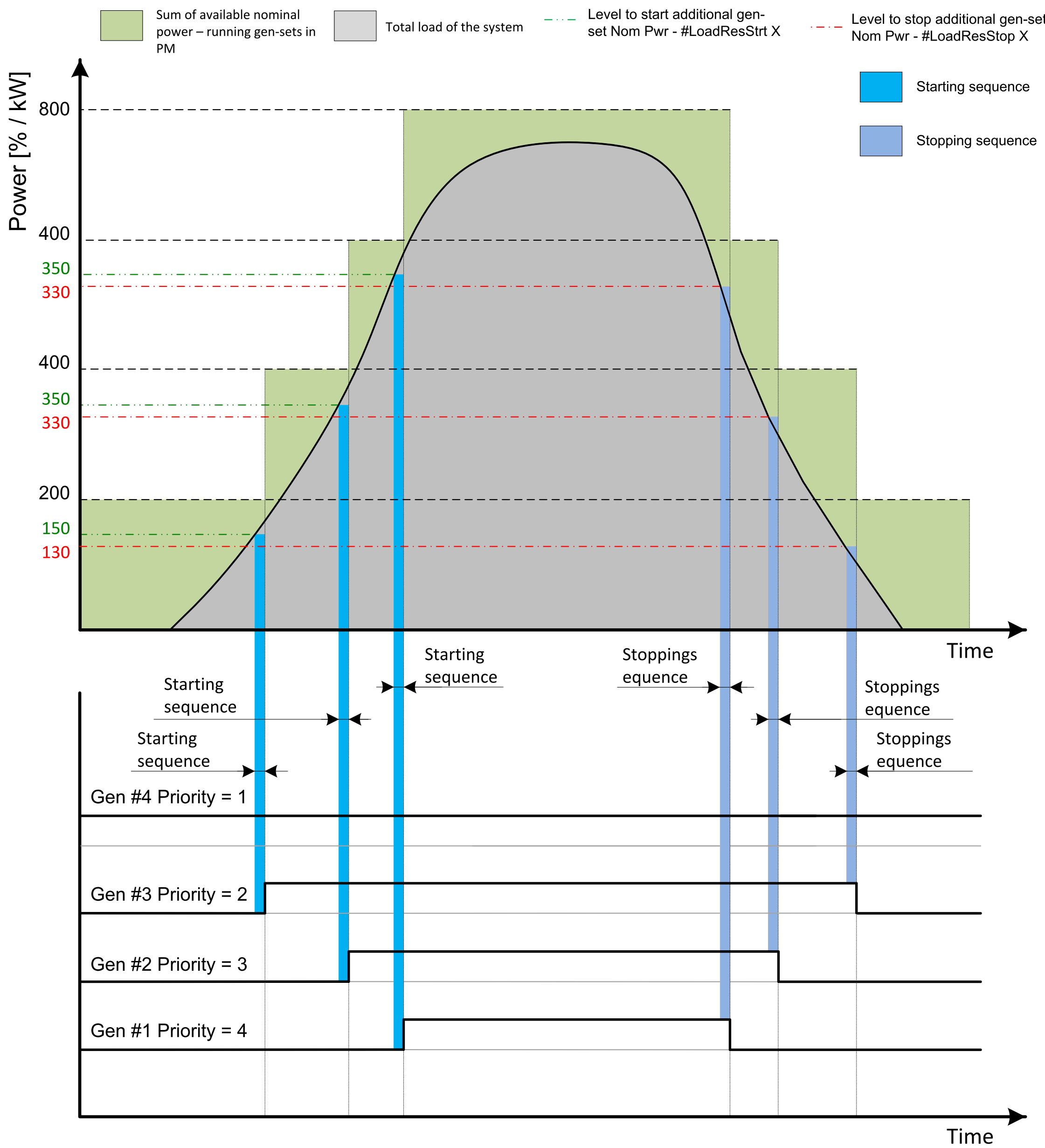


Image 5.70 Example of priorities in power management

By choosing the setpoint **Priority (page 375)** = 1, the Gen-set #4 is running all the time in the example shown on the image above (AUTO mode selected, Power management enabled and LBI **Remote Start/Stop (page 732)** ctivated).

The LBI **Top Priority (page 736)** can be used to force priority 0 into the setpoint **Priority (page 375)**. Priority 0 is the "highest" one, which means the Gen-set will be running all the time while the power management is switched on.

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

Priority auto swap

As stated in the chapter **Priorities (page 139)**, the operator is able to select the order of gen-set starting. There is also the option of automatic priority selection. The controllers are sharing data concerning the running hours and all important information relevant to the actual load. Thanks to the Automatic priority swapping function the controllers choose the Gen-set(s) to be running with consideration of their running hours and the actual load.

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

Note: *The Automatic priority swapping function does not change the setpoint* ***Priority (page 375)****. The function sets the order of Gen-sets by virtual values "engine priority".*

Run hours equalization

The Gen-sets engine priorities are automatically swapped to balance engine running hours. In other words, the controllers compare running hours of each Gen-set and select Gen-set(s) to run in order to maintain constant maximal difference of running hours. Up to 32 controllers are supported. This function is activated via setpoint **#Priority Auto Swap (page 376)** = RUN HOURS.

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

RHE = **Running Hours (page 650)** – **Run Hours Base (page 385)**

RHE is considered value for running hours equalization, **Running Hours (page 650)** is a cumulative sum of run hours available in statistic values of the controller, **Run Hours Base (page 385)** is a setpoint. This setpoint may be used in the case of Gen-sets with different runs hours are intended to be set at the same initial point (e.g. a new Gen-set and a used Gen-set after retrofit maintenance inspection).

The Running hours equalization function compares RHE value of each controller in the group. Once the difference between RHE of individual controllers is higher than **#Run Hours Max Difference (page 385)** (i.e. **#Run Hours Max Difference (page 385)** + 1), the Gen-set(s) with the lowest RHE is/are started.

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

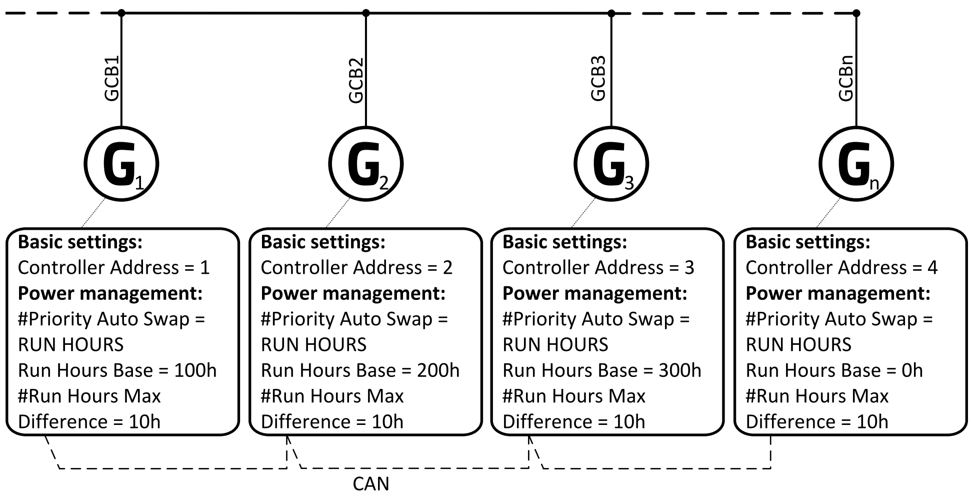


Image 5.71 Example of the system

3 cases are considered:

- Case #1: 2 Gen-sets available
- Case #2: 3 Gen-sets available with same initial RHE.
- Case #3: 3 Gen-sets available with different initial RHE.

Case #1:

- Gen-set 1 running hours = 250 -> running hours considered in RHE = 100 (150 - **Run Hours Base (page 385)**)
- Gen-set 2 running hours = 450 -> running hours considered in RHE = 200 (250 - **Run Hours Base (page 385)**)

Both Gen-sets have the same nominal power of 700 kW. Originally, priority of Gen-sets was G1 = 2, G2 = 1. Load demand in this example is constant and it is 500 kW (i.e. only one engine is running at any time). In this case, the controllers set the engine priority of the Gen-set 1 to 1 because it has the lowest considered RHE and the difference between RHE2 (i.e. considered RHE of Gen-set 2) and RHE1 is higher than **#Run Hours Max Difference (page 385)** that is set to 10 h.

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

The Gen-set 1 runs for 100 hours to equalize the RHE of both Gen-sets. The Gen-set 1 keeps running until the difference between RHE1 and RHE2 exceeds **#Run Hours Max Difference (page 385)** (i.e. 10h). The Gen-set 1 runs 100 + **#Run Hours Max Difference (page 385)** + 1 = 100 + 10 + 1 = 111 hours. After 111 hours the Gen-sets 2 has the lowest RHE and the difference between RHE1 and RHE2 is higher than **#Run Hours Max Difference (page 385)**. The Gen-set 2 runs 11 hours to equalize the RHE of both Gen-sets and then additional **#Run Hours Max Difference (page 385)** + 1 hours (i.e. 11 + 10 + 1 = 22 hours). The evolution of RHE1 and RHE2 is shown on the figure below.

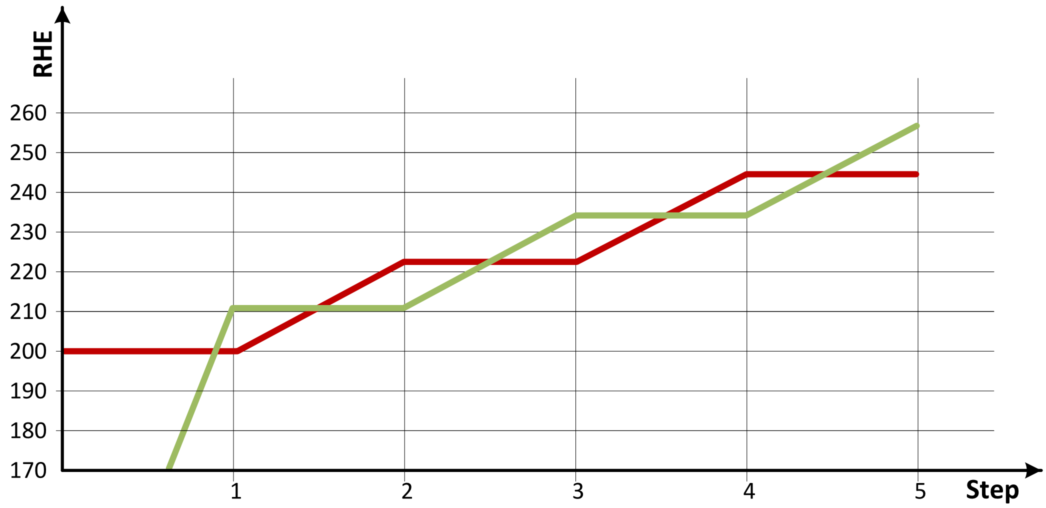


Image 5.72 Run hours equalization – case #1

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

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

SwapTime = Second lowest considered running hours – Current lowest considered running hours + **#Run Hours Max Difference (page 385)** +1

Case #2:

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

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

SwapTimeG1 = 0 – 0 + 10 + 1 = 11

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

SwapTimeG2 = 11 – 11 + 10 + 1 = 11

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

SwapTimeG2 = 11 – 0 + 10 + 1 = 22

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

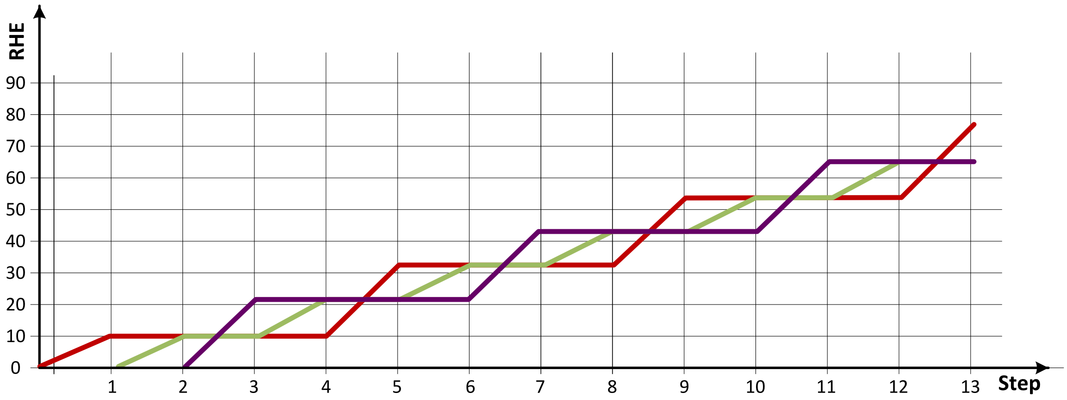


Image 5.73 Run hours equalization – case #2

step	0	1	2	3	4	5	6	7	8	9	10	11	12	13
RHE1	0	11	11	11	11	33	33	33	33	55	55	55	55	77
RHE2	0	0	11	11	22	22	33	33	44	44	55	55	66	66
RHE3	0	0	0	22	22	22	22	44	44	44	44	66	66	66
Run G1 (ΔRHE1)	0	11	0	0	0	22	0	0	0	22	0	0	0	22
Run G2 (ΔRHE2)	0	0	11	0	11	0	11	0	11	0	11	0	11	0
Run G3 (ΔRHE3)	0	0	0	22	0	0	0	22	0	0	0	22	0	0

Case #3:

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

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

SwapTimeG1 = 200 – 100 + 10 + 1 = 111

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

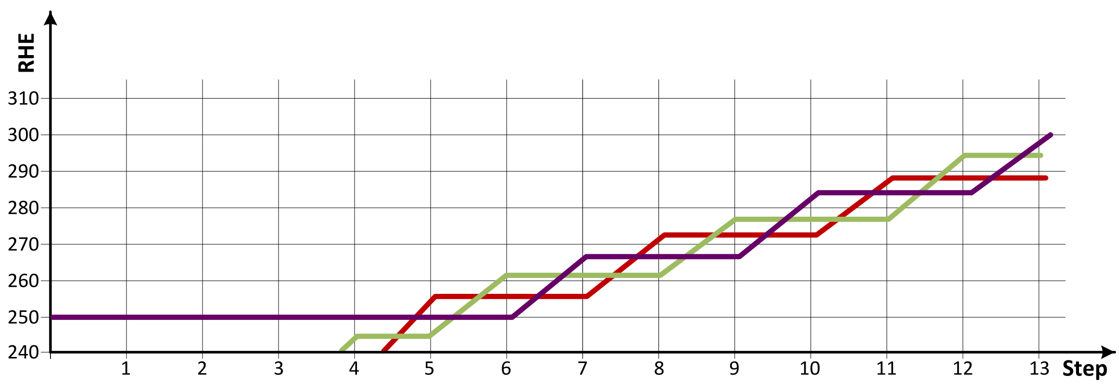


Image 5.74 Run hours equalization – case #3

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

Note: *Setting* ***#Run Hours Max Difference (page 385)*** *= 5 does not mean that Gen-sets swap every 5 hours. The Swap time is determined by the formula stated above. Please read the entire chapter Running hours equalization for better understanding.*

Note: *In the case* ***#Run Hours Max Difference (page 385)*** *is set to 0 and all Gen-set in the group are at the same initial point (RHE are equal), the Gen-set swapping happens every hour.*

Efficiency

The gen-sets engine priorities are automatically swapped to best fit to the actual load demand (load demand swap – LDS). Also engine running hours are taken to the calculation (run hours equalization – RHE). This function is activated via setpoint **#Priority Auto Swap (page 376)** = Efficiency.

Algorithm of function:

- In the first step, the Gen-sets are sorted according to their nominal power.
- In the second step, the Gen-sets with the same nominal power are sorted according to their RHE
- The Gen-set(s) with nominal power which fits the most actual load demand are chosen. From those with same nominal power, the Gen-set(s) with lowest RHE are chosen. Selection formula:
  - **#Power Management Mode (page 374)** = ABS (kW)
    - Nominal power of Gen-set > actual load demand + **#Starting Load Reserve 1 (page 378)**
  - **#Power Management Mode (page 374)** = REL (%)
    - Nominal power of Gen-set > (actual load demand × 100)/(100 - **#Starting Rel Load Reserve 1 (page 379)**)
- If two or more Gen-sets are available for taking over the load always the one with the lowest CAN address is chosen.
- If load demand is higher than nominal power of the biggest Gen-set, this one is fixed and the whole process repeats from the third bullet.

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

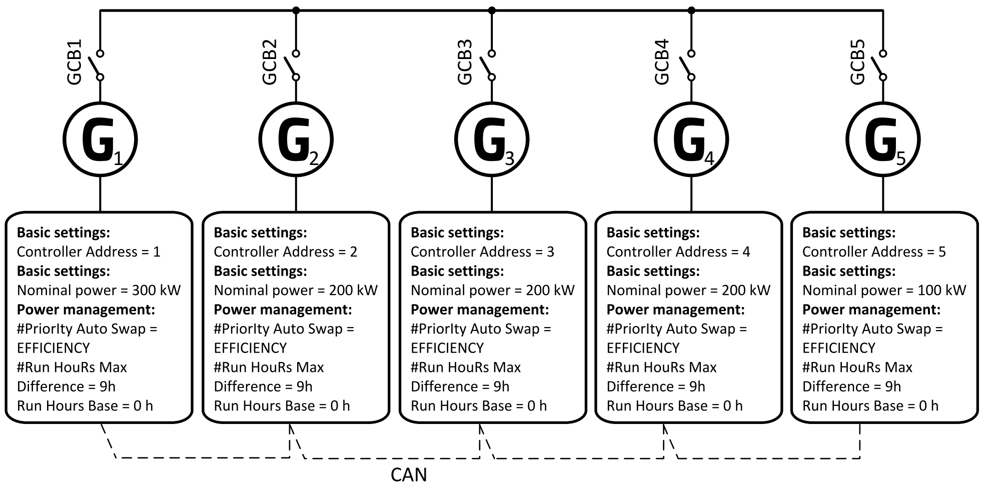


Image 5.75 Example of the system

Following table provide an example of Gen-set selection in respect to the system load evolution. The table is an example of Efficiency priority optimization function (**#Power Management Mode (page 374)** = ABS (kW) and **#Starting Load Reserve 1 (page 378)** = 20 kW).

System Load [kW]	Running Gen-sets		Description	Total Running power within PM [kW]	Relative load of Gen-sets [%]
40	**5**			**100**	**40**
60	5			100	60
80	5	2 start	LDS Swap	300	26

System Load [kW]	Running Gen-sets		Description	Total Running power within PM [kW]	Relative load of Gen-sets [%]
	2 [0h]	5 stop			
100	2 [10h]			200	50
120	2 [20h]			200	60
120	2 [30h] 3 [10h]	3 start 2 stop	RHE Swap	400	30
120	3 [20h]			200	60
140	3 [30h]			200	70
180	3 [40h] 1	1 start 3 stop	LDS Swap	500	36
200	1			300	67
240	1			300	80
280	1 5	5 start	Gen#5 joins (LDS)	400	70
340	1 5			400	85
380	1 5 4 [20h]	4 start 5 stop	LDS + RHE Swap	600	63
400	1 4			500	80
440	1 4			500	88
480	1 4 5	5 start	Gen#5 joins (LDS)	600	80
540	1 4 5			600	90
580	1 4 5 2 [30h]	2 start 5 stop	LDS Swap	800	73
600	1 4 2			700	86
640	1 4 2			700	91
680	1	5 start	Gen#5 joins (LDS)	800	85

System Load [kW]	Running Gen-sets		Description	Total Running power within PM [kW]	Relative load of Gen-sets [%]
	4 2 5				
740	1 4 2 5			800	93
780	1 4 2 5 3 [40h]	3 start 5 stop	LDS Swap	1000	78
800	1 4 2 3			900	89
840	1 4 2 3			900	93
880	1 4 2 3 5	5 start	Gen#5 joins (LDS)	1000	88
940	1 4 2 3 5			1000	94

Minimal running power

Minimum Running Power function is used to adjust a minimum value of the sum of nominal power of all running Gen-sets. If the function is active, then the Gen-sets would not be stopped, although the reserve for stop is fulfilled. Function is activated via logical binary input **MIN RUN POWER ACTIVE** **(PAGE 728)**.

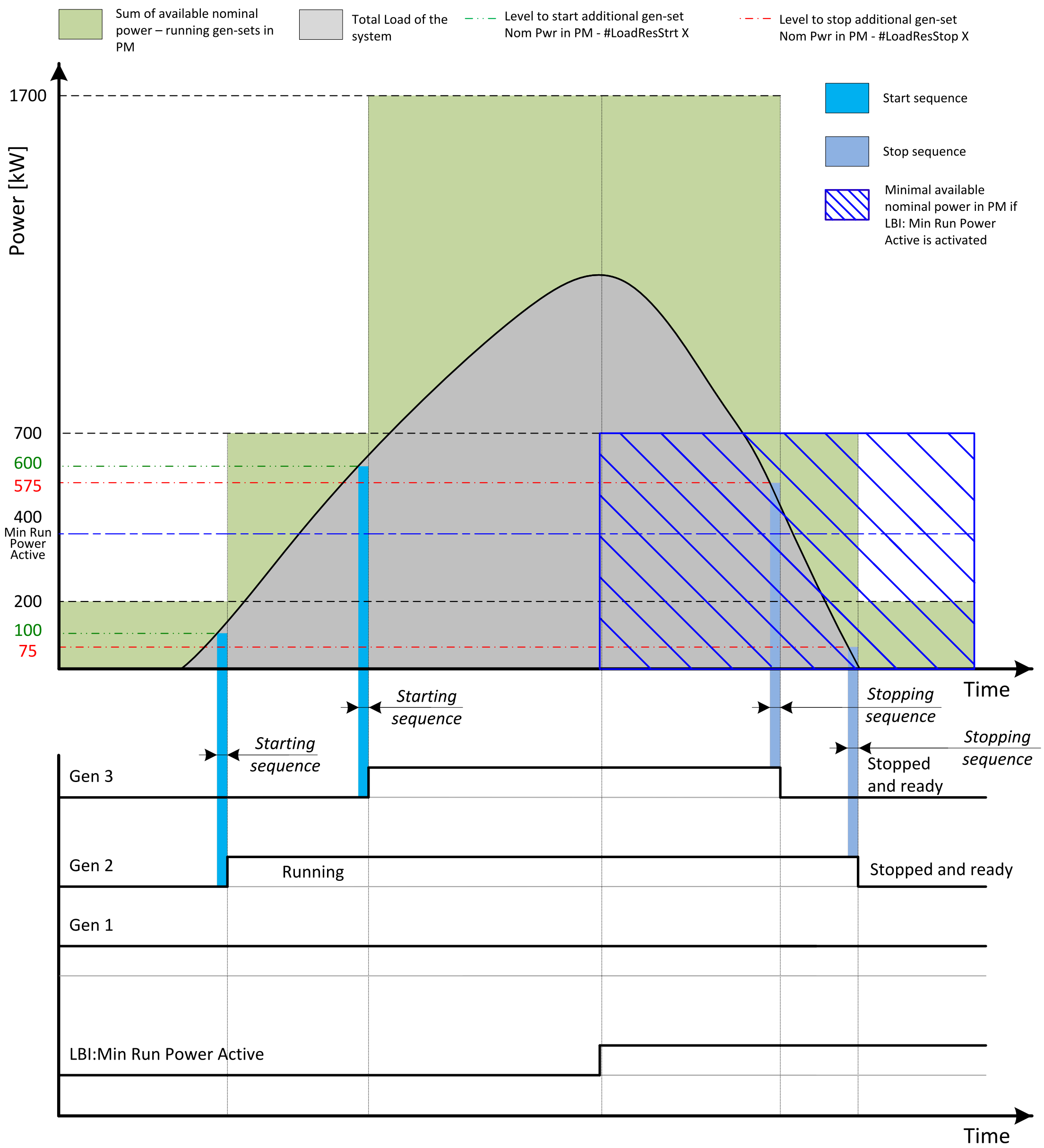


Image 5.76 Minimal running power

Setpoint **#Min Run Power (page 382)** is adjusted to 400 kW. Once the **MIN RUN POWER ACTIVE (PAGE 728)** is activated, the available nominal running power has to be equal or higher to 400 kW. Even if the load reserve is big enough to stop the Gen-set #2 (nominal power 500 kW), the Gen-set keeps running as at least 400 kW has to be available. The Gen-set#1 (nominal power 200 kW) is not enough.

5.5.12 Dynamic Spinning Reserves

Dynamic spinning reserves **Dynamic Spinning Reserve (page 640)** and **Dynamic Spinning Reserve Offset (page 641)** are used to affect power management operation in case of anticipated renewables output drop. It enables to increase **Start Reserve (page 640)** level and start additional Gen-set, which is not needed with immediate renewables output, but will be needed when anticipated renewables output drop occurs. It as well enables to increase **Stop Reserve (page 640)** level to prevent stopping of a Gen-set, which is not needed with immediate renewables output, but could be started again when the anticipated renewables output drop occurs.

Dynamic Spinning Reserve (page 640) is used to change both **Start Reserve (page 640)** and **Stop Reserve (page 640)** thresholds, while **Dynamic Spinning Reserve Offset (page 641)** changes the **Stop Reserve (page 640)** threshold only. IS-NTC HYBRID is the primary source of both **Dynamic Spinning Reserve (page 640)** and **Dynamic Spinning Reserve Offset (page 641)** for Gen-set controllers. It transmits both values via CAN2 bus and both are used automatically by a Gen-set controller, if valid values are associated with *LAI: DynSpinResReq* / *LAI: DynSpinResOfst* in the IS-NTC HYBRID controller.

Setpoint **Dynamic Spinning Reserve (page 374)** has to be set to ENABLED with every Gen-set controller, which is supposed to use the dynamic spinning reserves functionality. Setpoint **Dynamic Spinning Reserve (page 374)** setting to DISABLED with the IS-NTC HYBRID controller does not prevent transmitting of the *LAI: DynSpinResReq* / *LAI: DynSpinResOfst* values. It disables use of the values with the IS-NTC HYBRID power management functions, but the values are still transmitted via CAN2 bus to Gen-set controllers (if valid values are associated with corresponding LAI functions in the ISNTC HYBRID controller).

5.5.13 Control groups

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

- The group which the particular controller belongs to is adjusted by the setpoint **Control Group (page 387)**. Use the default setting 1 with all controllers, if there is no bus-tie breaker.
- The information which groups are currently linked together is being distributed via the CAN. Each controller can provide information about one BTB breaker. The breaker position is detected by the input function *GroupLink* (i.e. this input is to be connected to the breaker feedback).
- The two groups which are connected together by the BTB, are defined with parameters **Group Link L (page 387)** and **Group Link R (page 388)**.
- Controller sends via CAN2 bus information that controllers from groups *Group Link L* and *Group Link R* are linked together, if the *Group link* function (signal associated with the function) is active. It sends information that the groups are separated, if the *Group link* function is not active.

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

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

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

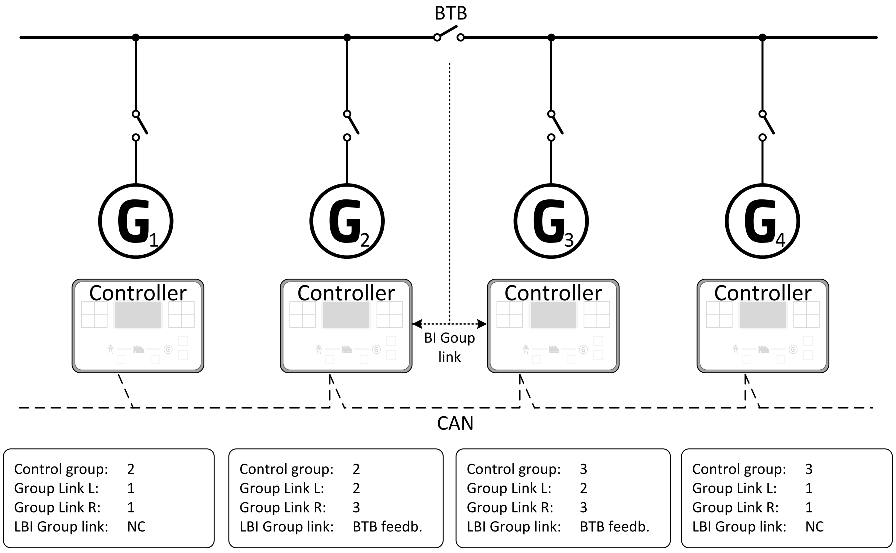


Image 5.77 Example of control groups

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

5.5.14 Distributed power management signals

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

These LBI functions are shared automatically:

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

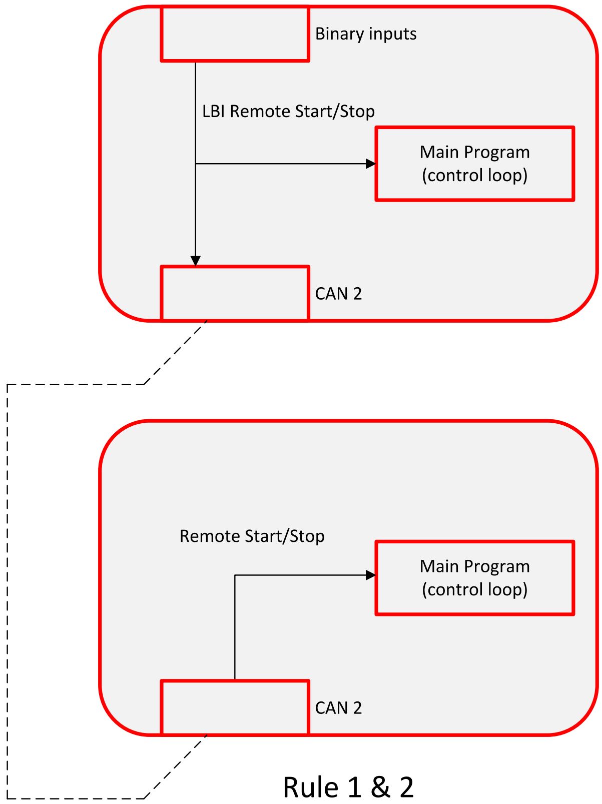
These rules applies to the automatic sharing of the selected signals:

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

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

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

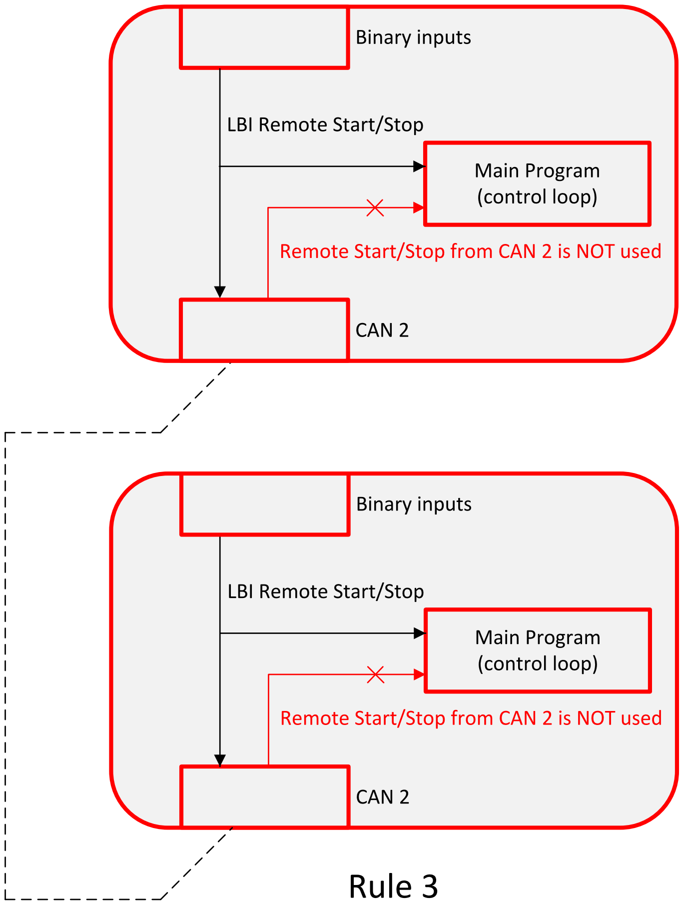
   Example: LBI Remote Start/Stop is not configured with a controller, but automatically shared System Start/Stop is received from CAN2 bus. Controller follows state of the shared LBI signal then.



Rule 1 & 2

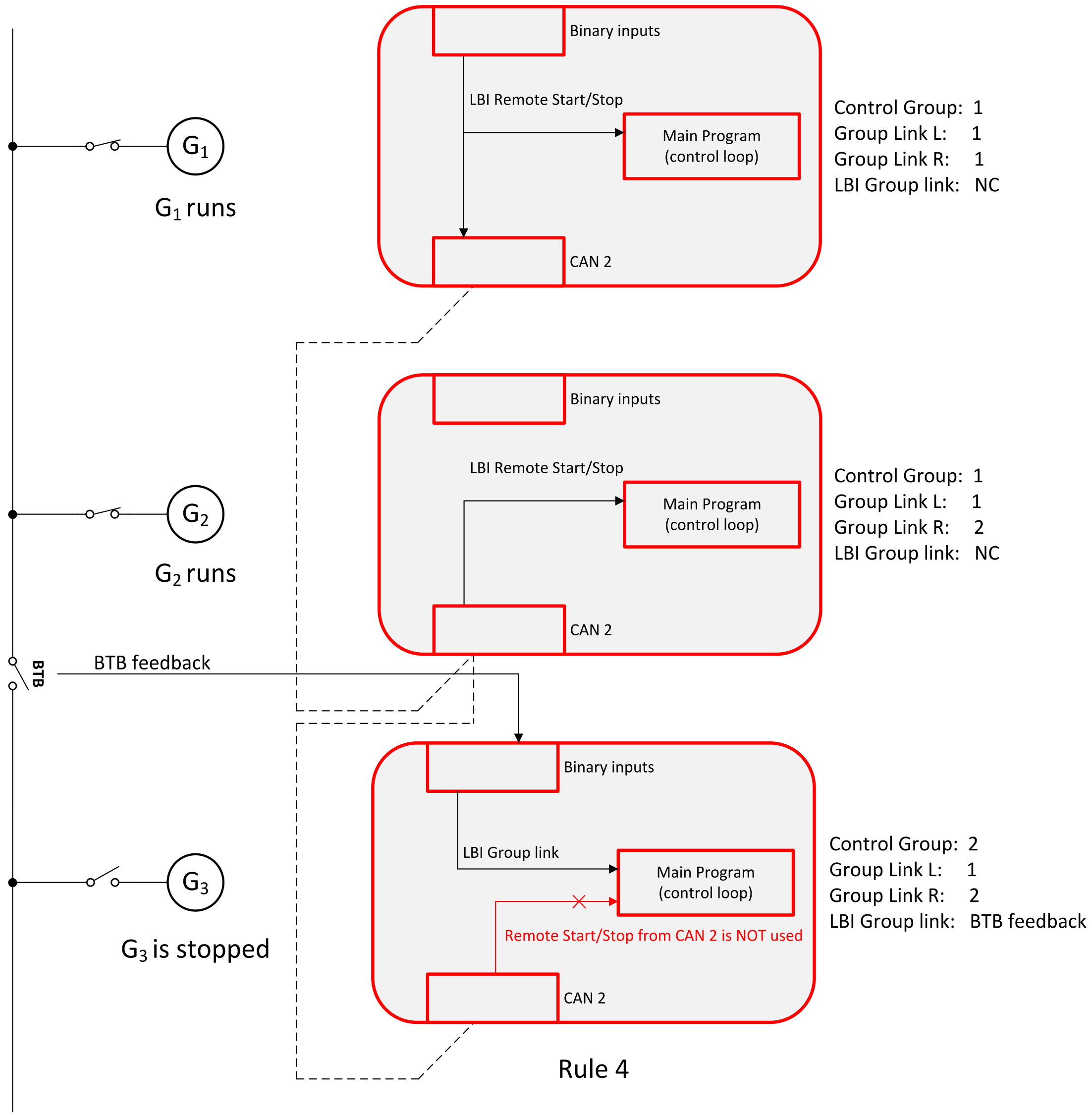
3. LBI state received from CAN2 bus is not used, if corresponding LBI function is configured in a controller.

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



Rule 3

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



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

5.5.15 Regulation loops

Regulation loops overview

Regulation loops overview

Loop type	Related applications	Related setpoints
Frequency	MINT, SPtM	**Frequency Gain (page 390)**, **Frequency Int (page 391)**
Load sharing	MINT	**Load Sharing Gain (page 393)**, **Load Sharing Int (page 393)**
Load	MINT, SPtM	**Load Gain (page 392)**, **Load Int (page 392)**

Loop type	Related applications	Related setpoints
Voltage	MINT, SPtMMGCB	**Voltage Gain (page 402)**, **Voltage Int (page 402)**
VAr sharing	MINT	**VAr Sharing Gain (page 403)**, **VAr Sharing Int (page 404)**
PF control	MINT, SPtM	**PF Gain (page 403)**, **PF Int (page 403)**
Angle regulation	MINT, SPtM	**Angle Gain (page 391)**

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

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

Each of the regulation loops is active in some certain time during the process, which is given by the state of the automat. If no regulation loop is active the speed governor output is kept on the level given by setpoint **Speed Governor Bias (page 389)** or **Voltage Regulator Bias (page 401)** in case of voltage regulator output.

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

MINT regulation loops

Loop type	Description
Frequency	After Idle timer elapses, the frequency loop is active to reach the nominal frequency. It is also activated in the first phase of synchronization when the generator frequency is regulated to match the mains/bus frequency.
Load sharing	The load sharing loop is active in multiple-island operation.
Load	The load regulation loop is active when single Gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa. This regulation loop is also active when multiple Gen-sets are running in parallel with Mains.
Voltage	The voltage regulation loop gets active after **Minimal Stabilization Time (page 304)**. The loop is deactivated at the beginning of cooling sequence. ***Note:*** *When the* ***Connection type (page 264)*** *is set to Autodetect, the voltage regulation loop continues also during the cooling phase.*
VAr sharing	The VAr sharing loop is active in multiple-island operation.
PF control	The PF control loop is active when single Gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa. This regulation loop is also active when multiple Gen-sets are running in parallel with Mains.
Angle regulation	The differential angle control loop is active during the synchronization when phase match type of synchronization is used.

SPtM regulation loop

Loop type	Description
Frequency	The frequency regulation loop gets active after **Minimal Stabilization Time (page 304)**. The loop is deactivated at the beginning of cooling sequence. Loop is not active in parallel operation. In parallel operation Load Regulation Loop is used.
Load	The load regulation loop is active when Gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa.
Voltage	The voltage regulation loop gets active after **Minimal Stabilization Time (page 304)**. The loop is deactivated at the beginning of cooling sequence. Loop is not active in parallel operation. In parallel operation PF control loop is used.
PF control	The PF control loop is active when Gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa.
Angle regulation	The differential angle control loop is active during the synchronization when phase match type of synchronization is used.

Adjustment of regulation loops

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

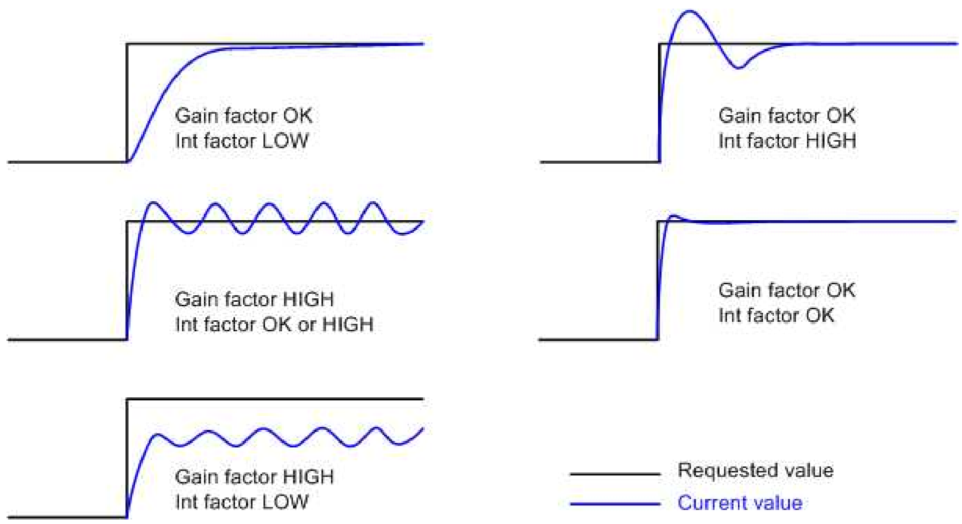


Image 5.78 Typical responses of PI regulator

For manual tuning of a control loop use following method:

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

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

5.5.16 Speed/Load control

The speed control output is used to control the speed or the power of the engine. The frequency regulation, load regulation and load sharing are realized through the speed control. The speed request is internal value of the regulator. This value is transformed to range -10 .. 10 V based on setpoints **Speed Governor Low Limit (page 389)** and **Speed Governor High Limit (page 389)**. This value of speed request is then transformed to request which comes out of the controller. There are several ways how to send this request to Gen-set:

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

Speed control outputs

Analog Output (speed governor output)

The speed regulator of the engine is controlled by the analog signal from controller. Please see the chapter **Speed governor interface (page 57)** for more information about speed governor.

he character of the AVR output interface of the controller is given by the setpoint **Speed Regulator Character (page 388)**. A full range change of the speed governor output (from **Speed Governor Low Limit (page 389)** to **Speed Governor High Limit (page 389)**) should cause 5-10% change of the engine speed (**Speed Governor Low Limit (page 389)** ~ 95% **Nominal RPM (page 272)**, **Speed Governor Bias (page 389)** ~ 100% **Nominal RPM (page 272)**, **Speed Governor High Limit (page 389)** ~ 105% **Nominal RPM (page 272)**).

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

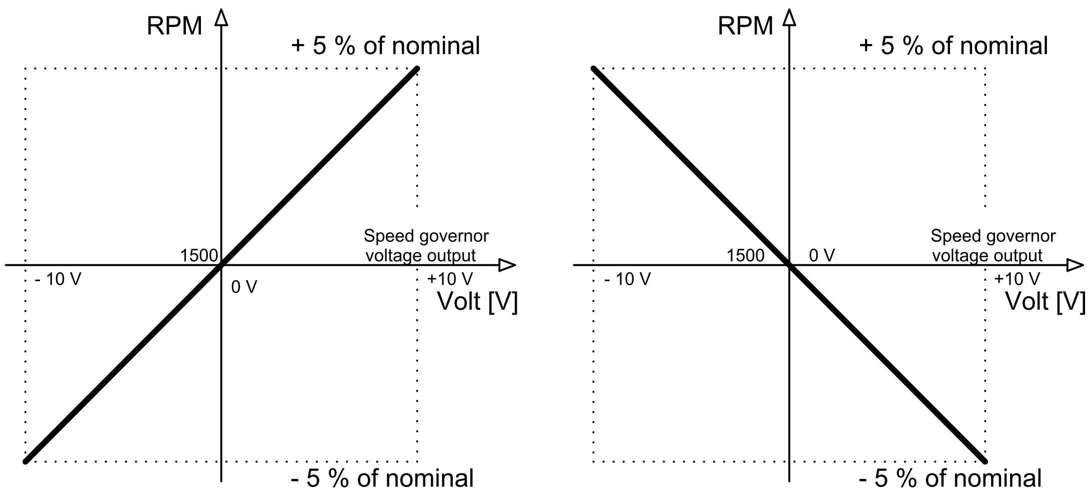


Image 5.79 Example of speed governor curve

ECU speed control

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

Binary pulse control

The internal speed request is transformed to Up/Down pulse control. These pulses get out of the controller via binary outputs **SPEED UP (PAGE 802)** and **SPEED DOWN (PAGE 801)**. Length of pulses **SPEED UP (PAGE 802)** and **SPEED DOWN (PAGE 801)** depends on the difference of actual RPM and requested RPM (actual power and requested power, actual frequency and requested frequency) and on the parameter **Tau Speed Governor Actuator (page 390)**. **Tau Speed Governor Actuator (page 390)** defines the pulse duration which is needed for the speed controller to travel from minimal position to the maximal position. The Maximum length of pulses is limited to 5 s, the minimal length of pulses is limited to 150 ms and minimal length between the pulses is 200 ms.

Speed/Load control adjustment

Synchronization adjustment

- Start the engine in MAN Mode.
- Set the engine RPM by speed trim on the speed governor or by **Speed Governor Bias (page 389)**, **Speed Governor Low Limit (page 389)** and **Speed Governor High Limit (page 389)** to achieve frequency according to setpoint **Nominal Frequency (page 271)**.
- To start the synchronization press GCB ON/OFF button. GCB LED starts to flash to indicate synchronization. To stop synchronization press again GCB ON/OFF .
- Adjust **Frequency Gain (page 390)** to unstable speed control and decrease value by 30 % to insure stable performance.
- Adjust **Frequency Int (page 391)** to stable (fast and smooth) slip control. Synchroscope movement on the controller measure screen should slow down and stop (in any position, because **Angle Gain (page 391)** control is off).
- Set **Angle Gain (page 391)**. Synchroscope on the controller measure screen should move slowly and stop in "up" position. Set **Angle Gain (page 391)** to unstable value (synchroscope swings) and decrease value by 30 % to insure stable performance.

Load control adjustment

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

MINT application

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

1. Set **#System BaseLoad (page 254)** setpoint to 30 % of one Gen-set.
2. Set **Load Gain (page 392)** to the same value as **Angle Gain (page 391)**. Set **Load Int (page 392)** to zero.
3. Start the Gen-set in MAN Mode, press GCB ON/OFF button to synchronize and close Gen-set to mains.
4. When GCB is closed, Gen-set load slowly increases to **#System BaseLoad (page 254)** value. Check that Gen-set power is positive (CT polarity).
5. Increase **Load Int (page 392)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 392)** factor is set to zero Gen-set load can differ from required **#System BaseLoad (page 254)**.
6. To adjust and optimize **Load Int (page 392)** change **#System BaseLoad (page 254)** several times between 30 and 70 % of **Nominal Power (page 261)**. Usually setting **Load Int (page 392)** to 100 % gives optimal performance.
7. When Gen-set is running under full load check if
   a. Speed governor output voltage value is not limited (it does not reach **Speed Governor Low Limit (page 389)** or **Speed Governor High Limit (page 389)**)

b. Speed governor actuator is not mechanically limited or operates in a small section of the throttle range.

SPtM application

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

1. Set **Load Control PTM (page 249)** = BASELOAD, set **Baseload (page 252)** setpoint to 30 % **Nominal Power (page 261)** of Gen-set.
2. Set **Load Gain (page 392)** to the same value as **Angle Gain (page 391)**. Set **Load Int (page 392)** to zero.
3. Start the Gen-set in MAN Mode, press GCB ON/OFF button to synchronize and close Gen-set to mains.
4. When GCB is closed, Gen-set load slowly increases to **Baseload (page 252)** value. Check that Gen-set power is positive (CT polarity).
5. Increase **Load Gain (page 392)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 392)** factor is set to zero Gen-set load can differ from required **Baseload (page 252)**.
6. To adjust and optimize **Load Int (page 392)** change **Baseload (page 252)** several times between 30 and 70 % of **Nominal Power (page 261)**. Usually setting **Load Int (page 392)** to 100 % gives optimal performance.
7. When Gen-set is running under full load check if
   a. Speed governor output voltage value is not limited (it does not reach **Speed Governor Low Limit (page 389)** or **Speed Governor High Limit (page 389)**)
   b. Speed governor actuator is not mechanically limited or operates in a small section of the throttle range.

5.5.17 Voltage/PF Control

The voltage control output is used to control the voltage or the power factor of the engine. The voltage regulation, PF regulation and VAr sharing are realized through the voltage control. The voltage request is internal value of the regulator. This value is transformed to range -10 .. 10 V based on setpoints **Voltage Regulator Low Limit (page 401)** limit and **Voltage Regulator High Limit (page 401)**. This value of voltage request is then transformed to request which comes out of the controller. There are several ways how to send this request to Gen-set:

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

Voltage control outputs

Analog output (integrated AVR interface)

The voltage regulator of the engine is controlled by the analog signal from controller. Please see the chapter **AVR Interface (page 57)** for more information about AVR.

The direction of speed regulation required by Speed regulator of the engine is given by the setpoint **Voltage Regulator Character (page 400)**. A full range change of the AVR output (from **Voltage Regulator Low Limit (page 401)** to **Voltage Regulator High Limit (page 401)**) should cause 5-10% change of the voltage (**Voltage Regulator Low Limit (page 401)** ~ 95% **Gen Nominal Voltage Ph-N (page 267)**, **Voltage Regulator Bias (page 401)** ~ 100% **Gen Nominal Voltage Ph-N (page 267)**, **Voltage Regulator High Limit (page 401)** ~ 105% **Gen Nominal Voltage Ph-N (page 267)**).

Binary pulse control

The internal voltage request is transformed to Up/Down pulse control. These pulses get out of the controller via binary outputs **AVR UP (PAGE 765)** and **AVR DOWN (PAGE 765)**. Length of pulses **AVR UP (PAGE 765)** and **AVR DOWN (PAGE 765)** depends on the difference of actual voltage and requested voltage (actual reactive power and requested reacted power, actual PF and requested PF) and on the parameter **Tau Voltage Governor Actuator (page 402)**. **Tau Voltage Governor Actuator (page 402)** defines the pulse duration which is needed for the voltage controller to travel from minimal position to the maximal position. The Maximum length of pulses is limited to 5 s, the minimal length of pulses is limited to 150 ms and minimal length between the pulses is 200 ms.

Voltage/PF control adjustment

Voltage adjustment

- Set **Voltage Gain (page 402)**, **Voltage Int (page 402)** to zero and **Voltage Regulator Bias (page 401)** to 50 %.
- Start the Gen-set in MAN Mode to without load.
- Adjust generator voltage to **Gen Nominal Voltage Ph-N (page 267)** by change of **Voltage Regulator Bias (page 401)**.
- Change **Voltage Regulator Bias (page 401)** to 0 % and 100 % to check generator voltage control range (typically ±10 % of **Gen Nominal Voltage Ph-N (page 267)**).
- Set **Voltage Regulator Bias (page 401)** to again reach **Gen Nominal Voltage Ph-N (page 267)** on the generator.
- When Gen-set is running unloaded increase carefully **Voltage Gain (page 402)** to unstable point and then decrease value by 30 % to insure stable performance.
- Adjust **Voltage Int (page 402)** (usually setting to 100 % gives optimal performance).

PF adjustment

MINT application

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

- Set the same values to **PF Gain (page 403)** and **PF Int (page 403)** as in the chapter **Voltage adjustment (page 159)** for parameters **Voltage Gain (page 402)** and **Voltage Int (page 402)**.
- Set **#System BaseLoad (page 254)** = 30 % of **Nominal Power (page 261)** and **#System Power Factor (page 255)** = 1.0.
- Start and synchronize the system in MAN Mode by pressing GCB ON/OFF (in case of MCB application press the GCB button on Gen-set controller).
- When running in parallel to mains loaded on 30 %, increase slowly **PF Gain (page 403)** to unstable point and then decrease the value by 30 % to insure stable performance.
- Adjust **PF Int (page 403)** (usually setting to 100 % gives optimal performance).

***Note:** To judge optimal adjusting of the power factor induce generator power jumps by **Voltage Regulator Bias (page 401)** change or by **#System BaseLoad (page 254)** change.*

SPtM application

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

- Set the same values to **PF Gain (page 403)** and **PF Int (page 403)** as in the chapter **Voltage adjustment (page 159)** for parameters **Voltage Gain (page 402)** and **Voltage Int (page 402)**.
- Set **Baseload (page 252)** = 30 % of **Nominal Power (page 261)** and **BasePower Factor (page 252)** = 1.0.
- Start and synchronize the Gen-set in MAN Mode by pressing GCB ON/OFF.
- When running in parallel to mains loaded on 30 %, increase slowly **PF Gain (page 403)** to unstable point and then decrease the value by 30 % to insure stable performance.
- Adjust **PF Int (page 403)** (usually setting to 100 % gives optimal performance).

Note: *To judge optimal adjusting of the power factor induce generator power jumps by* ***Voltage Regulator Bias (page 401)*** *change or by* ***Baseload (page 252)*** *change.*

5.5.18 Gen-set operation states

Engine state machine

Init	Autotest during controller power on.
Not ready	Gen-set is not ready to start. **Example:** When shutdown alarm is active or unit is in OFF mode.
Ready	Gen-set is ready to run.
Prestart	Prestart sequence in process, **PRESTART (PAGE 797)** output is active. **Example:** Usually used for preheating or processes executed prior Gen-set start.
Cranking	Engine is cranking, **STARTER (PAGE 803)** output is active.
Pause	Pause between start attempts.
Starting	Starting speed is reached and the Idle timer is running.
Running	Gen-set is running at nominal speed.
Soft Load	Gen-set power is ramping up.
Loaded	Gen-set is running at nominal speed and **GCB CLOSE/OPEN (PAGE 777)** is active.
Soft unld	Gen-set power is ramping down.
Stop	Stop. **Example:** Automatic or manual stop command was issued, engine is stopping.
Shutdown	Shut-down alarm activated.
Cooling	Gen-set is cooling before stop.
EmergMan	**EMERGENCY MAN (PAGE 718)** Gen-set operation. **Example:** Used for bypass the controller and engine manual start.

Engine started conditions

- Engine speed (RPM) > **Starting RPM (page 300)** or
- Oil pressure > **Starting Oil Pressure (page 301)** or
- Binary input **OIL PRESSURE (PAGE 729)** is in logical 0 or
- D+ terminal active (reached **D+ Threshold (page 333)** of supply voltage) for minimum 1 s or

- Generator voltage > 25 % of **Gen Nominal Voltage Ph-N (page 267)** or **Gen Nominal Voltage Ph-Ph (page 267)** (any phase)

Note: *Any of these condition will disconnect starter of the engine, however for transition to next state RPM needs to be higher than* ***Starting RPM (page 300)****.*

Engine running conditions

- Engine speed (RPM) > **Starting RPM (page 300)** or
- Oil pressure > **Starting Oil Pressure (page 301)** or
- Binary input **OIL PRESSURE (PAGE 729)** is in logical 0 or
- Generator voltage > 25 % of **Gen Nominal Voltage Ph-N (page 267)**

Still engine conditions

- Engine speed (RPM) < **Starting RPM (page 300)** and
- Oil pressure < **Starting Oil Pressure (page 301)** and
- Binary input **OIL PRESSURE (PAGE 729)** is in logical 1 and
- Generator voltage < 50 V (all phases)

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

When any engine running conditions are observed in still engine, then the **Wrn Stop Fail (page 892)** is activated with the following delays:

- For generator voltage from 10 V to < 50 % of nominal voltage, Wrn Stop Fail has delay 1 s
- For generator voltage > 50 % of nominal voltage, Wrn Stop Fail has delay 200 ms
- Oil pressure > **Starting Oil Pressure (page 301)**, Wrn Stop Fail has delay 1 s
- Binary input **OIL PRESSURE (PAGE 729)** is in logical 0, Wrn Stop Fail has delay 1 s
- For detected RPM, there is no delay.

Stop engine conditions

If no engine running conditions are validated, then the controller will wait extra 12 s before leaving the Machine Stop state and releasing the **STOP SOLENOID (PAGE 804)** output.

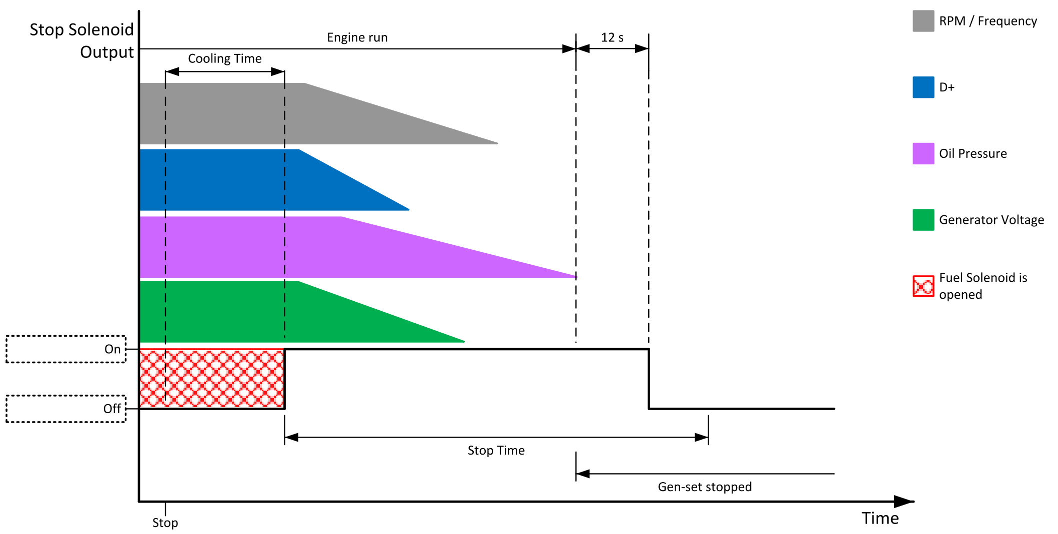


Image 5.80 Engine stops in **Stop Time (page 307)**

If the total stopping time will exceed setpoint **Stop Time (page 307)** then the **Wrn Stop Fail (page 892)** and binary outputs for stopping are activated. The controller will continuously try to stop the engine.

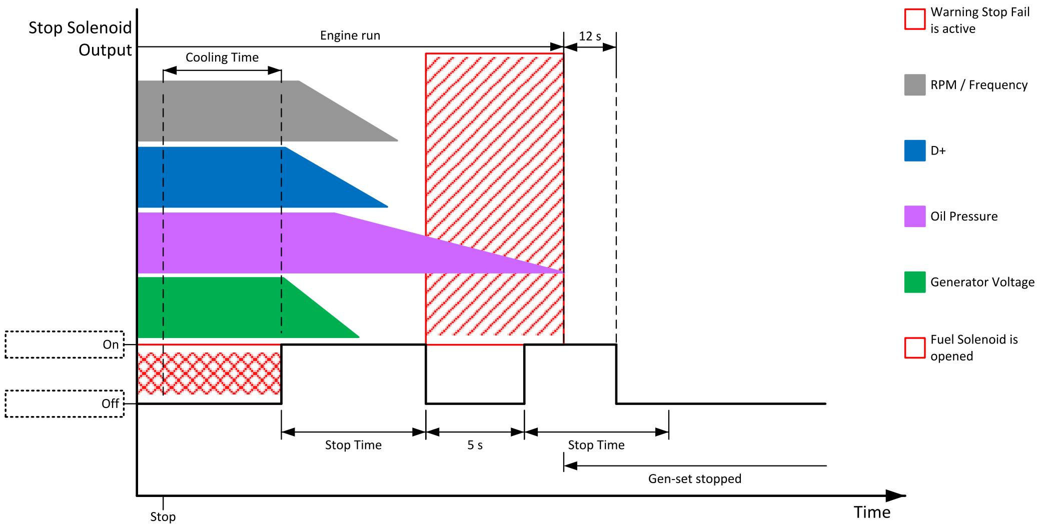


Image 5.81 Engine stops after first **Stop Time (page 307)**

Electric state machine

MainsOper	Mains is present and all its values are within limits. **Example:** MCB is closed, GCB is opened
MainsFlt	Mains fails
IslOper	Island operation **Example:** MCB is opened, GCB is closed
MainsRet	Mains recover
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)
BrksOff	GCB, MCB opened

5.5.19 Alarm management

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

- One alarm of any type can be assigned to each binary input.
- Two alarms (one yellow and one red type) can be assigned to each analog input.
- There are also **Built-in alarms (page 166)** with fixed alarm types.
- Each alarm is written to the **Alarm list (page 166)**.
- Each alarm causes a record to be written into the history log.
- Each alarm activates the Alarm and Horn output.
- Each alarm can cause an SMS message or an email to be sent.

Analog input alarm evaluation principle

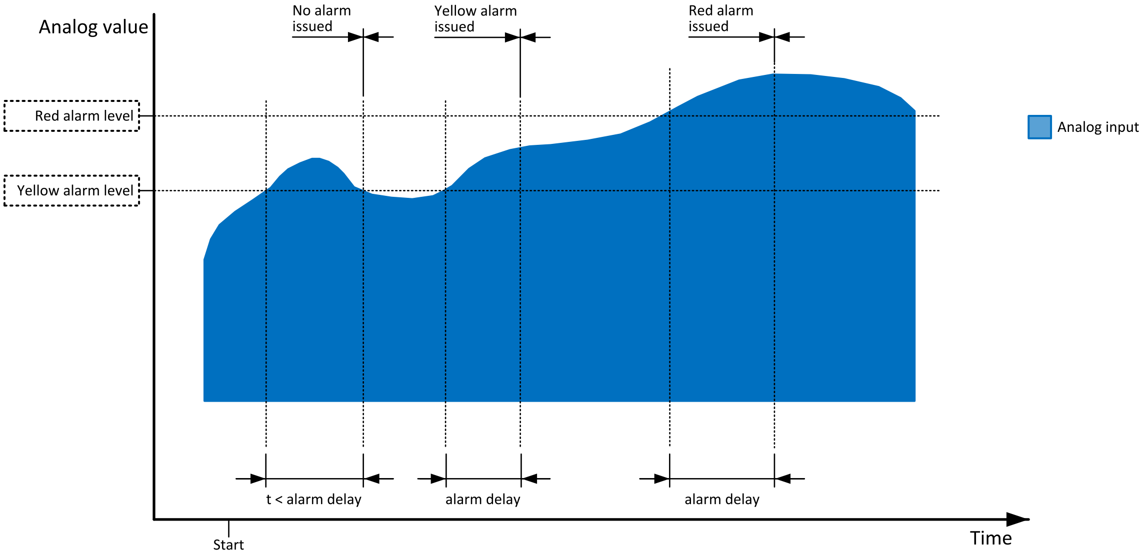


Image 5.82 Analog input alarm evaluation principle

Alarm handling

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

- The alarm is evaluated all the time the controller is switched on.
- The alarm is evaluated only when the engine is running. This type should be used for e.g. oil pressure. These alarms begin to be evaluated after the engine has been started with the delay given by the setpoint **Protection Hold Off (page 306)**.
- The alarm is evaluated only when the generator is excited. These alarms begin to be evaluated after the engine has been started and **Maximal Stabilization Time (page 305)** has elapsed or the GCB has been closed. They remain evaluated until cooling has finished. Only Generator under/overvoltage, Generator voltage unbalance and Generator under/overfrequency belong to this category. This category is not configurable to binary and analog input alarms.

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

After pressing the Fault reset button or activating the binary input **FAULT RESET BUTTON (PAGE 719)**, all active alarms change to confirmed state. Confirmed alarms will disappear from the Alarm list as soon as the respective condition dismisses. If the condition is dismissed before acknowledging the alarm, the alarm will remain in the Alarm list as Inactive.

Note: *The input **SD OVERRIDE (PAGE 734)** can be used for temporary disabling of red alarms to shutdown the engine. This input may be used in situations where providing the power is extremely important – e.g. if the Gen-set drives pumps for fire extinguishers (sprinklers).*

Alarm states

An alarm can have the following states:

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

Alarm types – Level 1

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

Warning (Wrn)

The alarm appears in the Alarm list and is recorded into the history log. Activates the output **AL COMMON WRN (PAGE 744)** as well as the standard alarm outputs (**HORN (PAGE 784)** and **ALARM (PAGE 753)**).

Alarm indication only (AL Indic)

The event is only indicated in the Alarmlist. It disappears for the alarmist automatically as soon as the cause disappears. Standard alarm outputs (**HORN (PAGE 784)** and **ALARM (PAGE 753)**) are not activated.

History record only (HistRecOnl)

The event is recorded into the history. Standard alarm outputs (**HORN (PAGE 784)** and **ALARM (PAGE 753)**) are not activated.

Alarm types – Level 2

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

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

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

Shutdown (Sd)

The alarm appears in the Alarm list and is recorded into the history log. It causes immediate stop of the Gen-set without unloading and cooling phase. Also GCB breaker will open. The Gen-set cannot be started again while there is a shutdown alarm in the Alarm list. Activates the output **AL COMMON SDMPR (PAGE 744)** as well as the standard alarm outputs (**HORN (PAGE 784)** and **ALARM (PAGE 753)**).

Breaker open and cool down (BOC)

The event appears in the Alarm list and is recorded into the history log. It causes immediate opening of the GCB (without unloading) and then the standard stop sequence with cooling follows. The Gen-set cannot be started again while there is a BOC alarm in the Alarm list. Activates the output **AL COMMON BOC (PAGE 743)** as well as the standard alarm outputs (**HORN (PAGE 784)** and **ALARM (PAGE 753)**).

> **IMPORTANT: In case there is no feedback from breakers configured Breaker open and cool down will be replaced by shutdown alarm type.**

Slow stop (Stp)

The alarm appears in the alarmlist and is recorded into the history log. It causes stop of the Gen-set by the standard stop sequence, i.e. including unloading and cooling phase. The Gen-set cannot be started again while there is a slow stop alarm in the alarmlist. Activates the output **AL COMMON WRN (PAGE 744)** as well as the standard alarm outputs (**HORN (PAGE 784)** and **ALARM (PAGE 753)**).

Sensor failure detection (FLS)

If the measured resistance on an analog input exceeds the valid range, a sensor failure will be detected and a sensor failure message will appear in the **Alarm list (page 166)**. The valid range is defined by the far left (RL) and far right (RH) points of the sensor characteristic ±12.5 % from RH-RL.

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

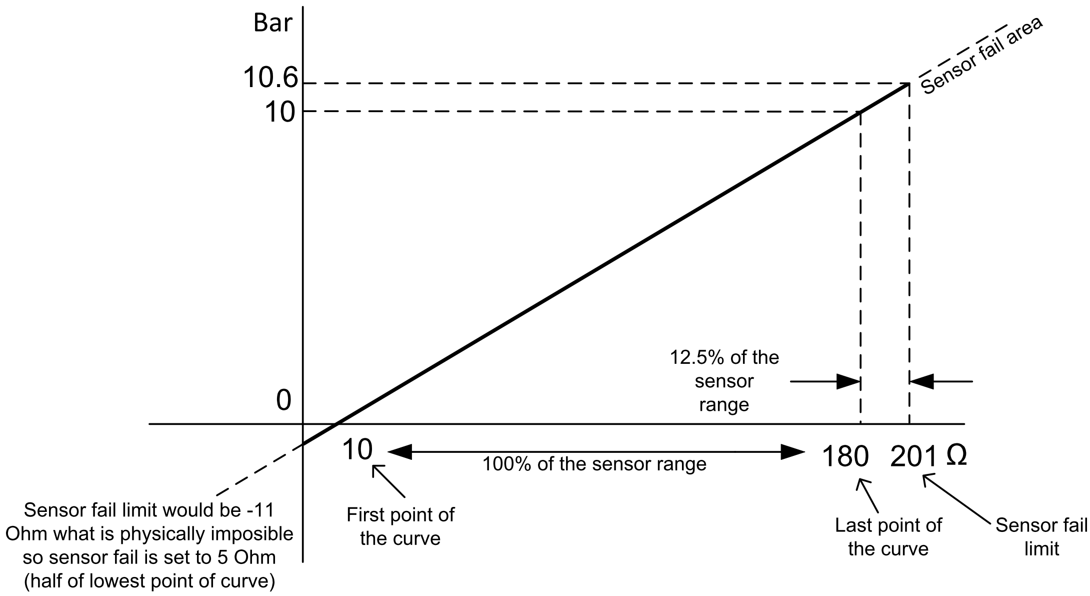


Image 5.83 Sensor failure detection principle

Remote alarm messaging

If the communication plug-in module is connected to the controller, the controller can send SMS messages and emails at the moment when a new alarm appears in the **Alarm list (page 166)** or new event is written in the **History log (page 169)**. The message will contain a copy of the **Alarm list (page 166)** or reasons from the **History log (page 169)**. To enable this function, adjust setpoints **Event Message (page 543)**, **Wrn Message (page 544)**, **BOC Message (page 544)** and **Sd Messages (page 545)** to ON. Also enter a valid GSM phone number or email address to the setpoints **Telephone Number 1 (page 545)**, **Telephone Number 2 (page 546)**, **Telephone Number 3 (page 546)**, **Telephone Number 4 (page 547)**, **Email Address 1 (page 538)**, **Email Address 2 (page 539)**,**Email Address 3 (page 539)**, and **Email Address 4 (page 540)**.

The list of all supported terminals shows the table below:

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

Note: * Only with enabled **Mode (page 536)**.

Alarm list

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

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

Alarm list contains three types of alarms:

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

Controller built-in alarms

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

User configured alarms

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

ECU alarms

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

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

Built-in alarms

Events specification	Protection type	Description
Analog Input 1 Wrn	WRN	Value measured on analog input 1 is </> than **Analog Protection 1 Wrn (page 414)** setpoint.
Analog Input 1 Sd	SD	Value measured on analog input 1 is </> than **Analog Protection 1 Sd (page 414)** setpoint.
Analog Input 2 Wrn	WRN	Value measured on analog input 2 is </> than **Analog**

Events specification	Protection type	Description
		Protection 2 Wrn (page 416) setpoint.
Analog Input 2 Sd	SD	Value measured on analog input 2 is </> than **Analog Protection 2 Sd (page 417)** setpoint.
Analog Input 3 Wrn	WRN	Value measured on analog input 3 is </> than **Analog Protection 3 Wrn (page 419)** setpoint.
Analog Input 3 Sd	SD	Value measured on analog input 3 is </> than **Analog Protection 3 Sd (page 420)** setpoint.
Analog Input 4 Wrn	WRN	Value measured on analog input 4 is </> than **Analog Protection 4 Wrn (page 422)** setpoint.
Analog Input 4 Sd	SD	Value measured on analog input 4 is </> than**Analog Protection 4 Sd (page 422)** setpoint.
Wrn Battery Voltage	WRN	Battery voltage is out of limits given by **Battery Undervoltage (page 329)** and **Battery Overvoltage (page 329)** setpoints.
Binary input		Configurable Warning/BOC/Shutdown alarms on the binary inputs.
Sd Battery Flat	SD	If the controller switches off during starting sequence (**STARTER (PAGE 803)** output is active) it doesn't try to start again and activates this protection (controller assumes bad battery condition).
Sd Start Fail	SD	Gen-set start failed. All crank attempts were tried without success.
Parameters Fail	NONE	Wrong check-sum of parameters. Happens typically after downloading new firmware or changing of the parameter. The controller stays in INIT mode. Check all parameters, change value of at least one parameter.
Sd Gen Lx Undervoltage BOC Gen Lx Overvoltage (where x=1,2,3)	SD BOC	The generator voltage is out of limits given by **Generator Undervoltage BOC (page 349)** and **Generator Overvoltage Sd (page 348)** setpoints.
BOC Gen V Unbalance	BOC	The generator voltage is unbalanced more than the value of **Voltage Unbalance BOC (page 350)** setpoint.
BOC Gen >, <Frequency	BOC	The generator frequency is out of limits given by **Generator Overfrequency BOC (page 351)** and **Generator Underfrequency BOC (page 351)** setpoints.
BOC Current Unbalance	BOC	The generator current is unbalanced more than the value of **Current Unbalance BOC (page 347)** setpoint.
BOC Current IDMT	BOC	Generator current exceeds the limit for IDMT protection given by **Nominal Current (page 262)** and **IDMT Overcurrent Delay (page 345)** setpoints.
BOC Overload	BOC	The load is greater than the value given by **Overload BOC**

Events specification	Protection type	Description
		(page 343) setpoint.
Sd Earth Fault	SD	This alarm is activated when Earth Fault value exceeds **Earth Fault Sd (page 550)** limit for at least **Earth Fault Delay (page 549)** period.
Sd Overspeed	SD	The protection comes active if the speed is greater than **Overspeed Sd (page 312)** setpoint.
Sd Underspeed	SD	During starting of the engine when the RPM reach the value of **Starting RPM (page 300)** setpoint the starter is switched off and the speed of the engine can drop under **Starting RPM (page 300)** again. Then the Underspeed protection is active. Protection evaluation starts 5 seconds after reaching **Starting RPM (page 300)**.
Emergency Stop	SD	If the input Emergency Stop is active shutdown is immediately activated.
E-Stop	SD	If the input E-Stop is active shutdown is immediately activated.
GCB Fail	SD	Failure of generator circuit breaker.
MCB Fail	WRN	Failure of mains circuit breaker.
Sd RPM Measurement Fail	SD	Failure of magnetic pick-up sensor for speed measurement. This alarm appears, if starter was disengaged for other reason than over-crossing **Starting RPM (page 300)** (like oil pressure or D+) and at the end of timer **Maximum Cranking Time (page 299)** there are no RPMs > **Starting RPM (page 300)** detected.
Wrn Stop Fail	WRN	Gen-set stop failed. See description at Gen-set Operation States chapter.
Wrn Maintenance 1	WRN	The period for servicing is set by the **Maintenance Timer 1 RunHours (page 339)** setpoint. The protection comes if counter reaches zero.
Wrn Maintenance 2	WRN	The period for servicing is set by the **Maintenance Timer 2 RunHours (page 340)** setpoint. The protection comes if counter reaches zero.
Wrn Maintenance 3	WRN	The period for servicing is set by the **Maintenance Timer 3 RunHours (page 342)**setpoint. The protection comes if counter reaches zero.
Charge Alternator Fail	WRN	Failure of alternator for charging the battery.
Sd Override	WRN	The protection is active if the output Sd Override is active.
Mains CCW Rot	WRN	Mains voltage phases are not wired correctly. MCB closing is prohibited by controller.
Generator CCW Rot	WRN	Gen-set voltage phases are not wired correctly. GCB closing is prohibited by controller.

Events specification	Protection type	Description
Stp Synchronization Fail	STP	If the synchronization timeout gets elapsed (forward synchronization).
Wrn Reverse synchro Fail	WRN	If the synchronization timeout gets elapsed (reverse synchronization).
BOC Reverse Power	BOC	The reverse power is higher than limit adjusted via setpoint **Reverse Power Level (page 352)**.
BOC Excitation Loss	BOC	The reactive power is higher than limit adjusted via setpoint **Excitation Loss Level (page 353)**.
Wrn Voltage Regulation Limit	WRN	The AVR output stays close to one of the limit values for more than 2 seconds.
Wrn Speed Regulation Limit	WRN	The speed governor output stays close to one of the limit values for more than 2 seconds.

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

5.5.20 History log

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

Each record has the same structure and contains:

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

Record structure

Name	Abbreviation	Description
Number	No.	Row number (0 corresponds to the last record, -1 to the previous one, etc.)
Reason	Reason	Reason for history record (any event or alarm related to the gen-set
Time	Time	Time
Date	Date	Date
RPM	RPM	Engine rotations per minute
Power	Pwr	Generator active power
Reactive power	Q	Generator reactive power
Power Factor	PF	Generator power factor
Load Character	LChr	Generator load character
Generator Frequency	Gfrq	Generator Frequency

Generator Voltage	Vg1	Generator voltage Ph1
Generator Voltage	Vg2	Generator voltage Ph2
Generator Voltage	Vg3	Generator voltage Ph3
Generator Voltage	Vg12	Generator voltage Ph12
Generator Voltage	Vg23	Generator voltage Ph23
Generator Voltage	Vg31	Generator voltage Ph31
Generator Current	Ig1	Generator current Ph1
Generator Current	Ig2	Generator current Ph2
Generator Current	Ig3	Generator current Ph3
Mains Frequency	Mfrq	Mains Frequency ***Note:*** *Only for SPtM application.*
Bus Frequency	Bfrq	Bus Frequency ***Note:*** *Only for MINT application.*
Mains Voltage	Vm1	Mains voltage Ph1
Mains Voltage	Vm2	Mains voltage Ph2
Mains Voltage	Vm3	Mains voltage Ph3
Mains Voltage	Vm12	Mains voltage Ph12
Mains Voltage	Vm23	Mains voltage Ph23
Mains Voltage	Vm31	Mains voltage Ph31
Mains Current	IL1	Mains current Ph1
Mains Current	IL2	Mains current Ph2
Mains Current	IL3	Mains current Ph3
Voltage Battery	VBat	Voltage of battery
Analog Input 1	Ain1	Analog input 1
Analog Input 2	Ain2	Analog input 2
Analog Input 3	Ain3	Analog input 3
Analog Input 4	Ain4	Analog input 4
Binary Inputs	BIN	Controller binary inputs
E-Stop	E-Stop	State of dedicated E-Stop input
Binary Outputs	BOUT	Controller binary outputs
Speed regulator	SRO	Speed regulator output
Voltage regulator	VRO	Voltage regulator output
Running nominal power	TRPN	Nominal power of all running Gen-sets
Available nominal power	APN	Available nominal power of all Gen-sets
Controller Mode	Mode	Controller mode

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

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

5.5.21 Breaker control

The following power switches are controlled by the controller:

- The master generator circuit breaker or contactor – MGCB
- The Mains circuit / Bus Tie breaker or contactor – MCB

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

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

Breaker control outputs

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

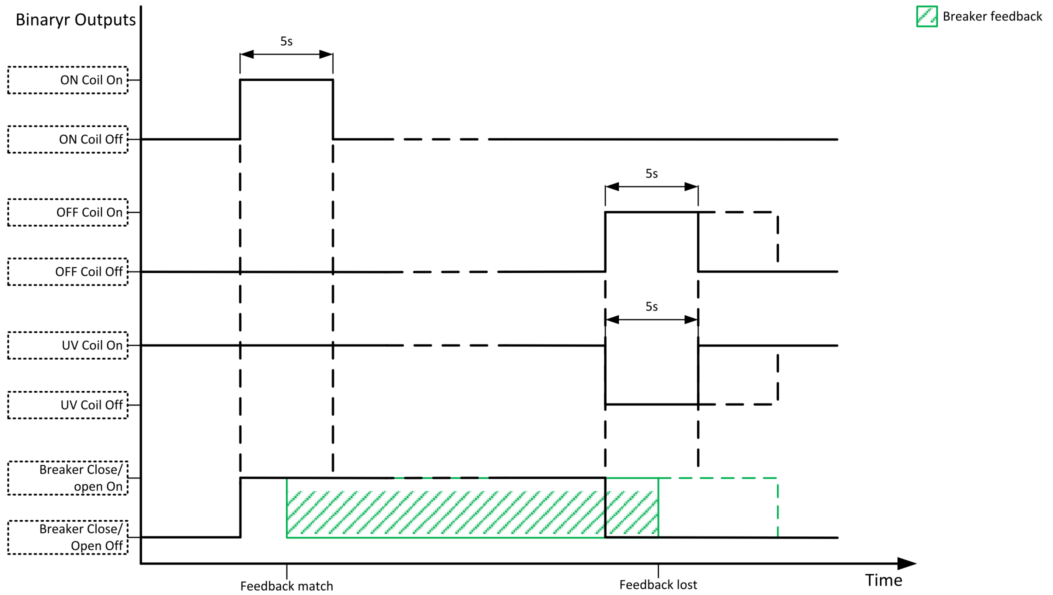


Image 5.84 Breaker control outputs

MCB special requirements

- If a contactor is used on the MCB position, it is recommended that the wiring be provided in such a way that the contactor will be normally closed and will open if the logical binary output **MCB Close/Open (page 789)** is activated. This behavior is called "negative logic" and can be adjusted by the setpoint **MCB Logic (page 363)**. The negative logic will prevent accidental opening of the MCB when the controller is switched off.
- If a contactor is used on the MCB position, it will open itself immediately after the mains have failed, because it will lose power to the coil. That is why the following adjustment is necessary to prevent triggering the **Wrn MCB Fail (page 891)** alarm: **MCB Opens On (page 366)** = Mains Fail, **Mains <> Voltage Delay (page 361)** ≤1.
- If a 230 V motor driven circuit breaker is used on the MCB position and an undervoltage coil is not fitted, it is not possible to open the breaker after the mains have failed, because there is no power for the motor drive until the Gen-set is started and providing voltage. Adjusting the setpoint **MCB Opens On (page 366)** = Gen Run will prevent triggering the **Wrn MCB Fail (page 891)** alarm.

Breaker failure detection

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

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

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

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

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

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

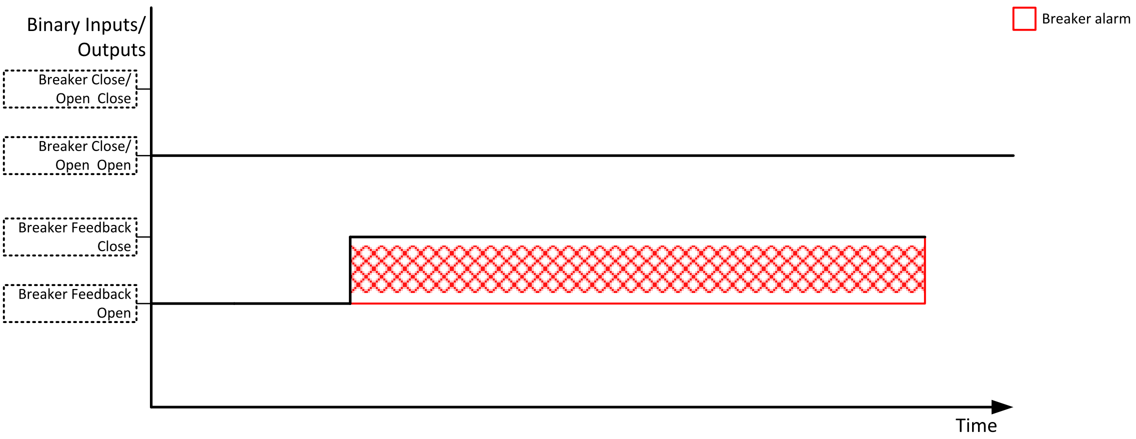


Image 5.85 Breaker failure – breaker close/open in steady position – open

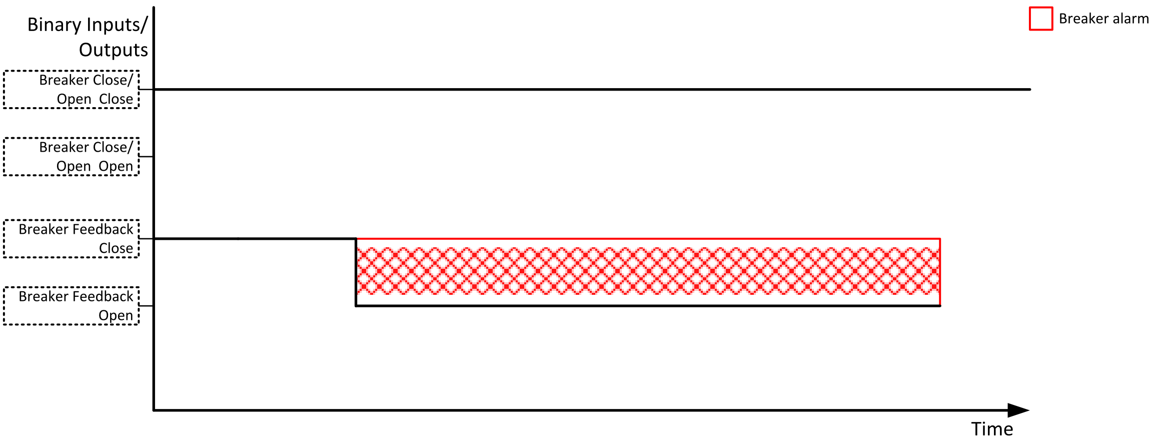


Image 5.86 Breaker failure – breaker close/open in steady position – close

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

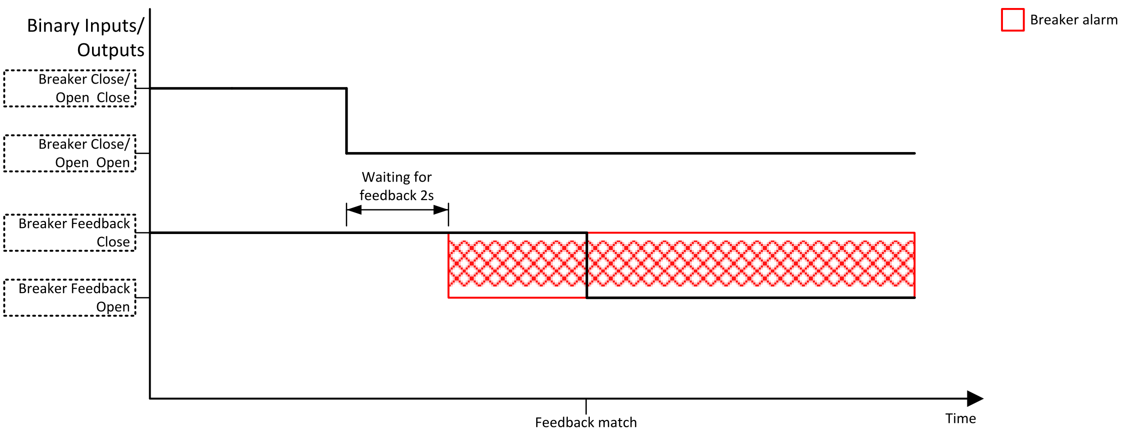


Image 5.87 Breaker failure – breaker close/open opens

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

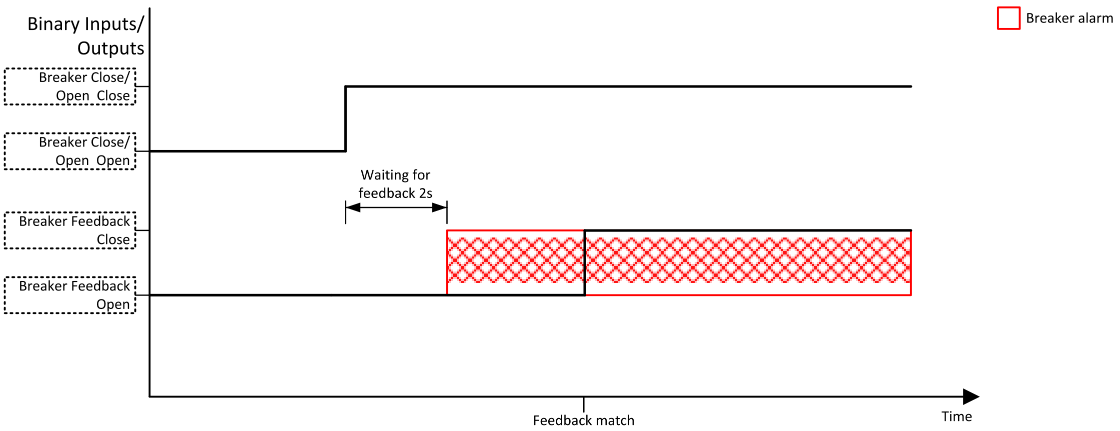


Image 5.88 Breaker failure – breaker close/open closes

5.5.22 Exercise timers

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

Related setpoints for timer 1 are:

- **Timer 1 Function (page 476)**
- **Timer 1 Repetition (page 477)**
- **Timer 1 First Occur. Date (page 478)**
- **Timer 1 First Occur. Time (page 478)**
- **Timer 1 Duration (page 478)**
- **Timer 1 Repeated (page 479)**
- **Timer 1 Repeat Day (page 482)**
- **Timer 1 Day (page 481)**
- **Timer 1 Repeated Day In Week (page 482)**
- **Timer 1 Repeat Day In Month (page 482)**
- **Timer 1 Repeat Week In Month (page 483)**
- **Timer 1 Refresh Period (page 480)**
- **Timer 1 Weekends (page 481)**

Related setpoints for timer 2 are:

- **Timer 2 Function (page 483)**
- **Timer 2 Repetition (page 484)**
- **Timer 2 First Occur. Date (page 485)**
- **Timer 2 Setup (page 484)**
- **Timer 2 Duration (page 485)**
- **Timer 2 Repeated (page 486)**
- **Timer 2 Repeat Day (page 489)**
- **Timer 2 Day (page 488)**
- **Timer 2 Repeated Day In Week (page 489)**
- **Timer 2 Repeat Day In Month (page 489)**
- **Timer 2 Repeat Week In Month (page 490)**
- **Timer 2 Refresh Period (page 487)**
- **Timer 2 Weekends (page 488)**

Available modes of each timer:

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

Once mode

Set-up via InteliConfig

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

***Note:** First, the timer functions must be adjusted via setpoint **Timer 1 Function (page 476)**.*

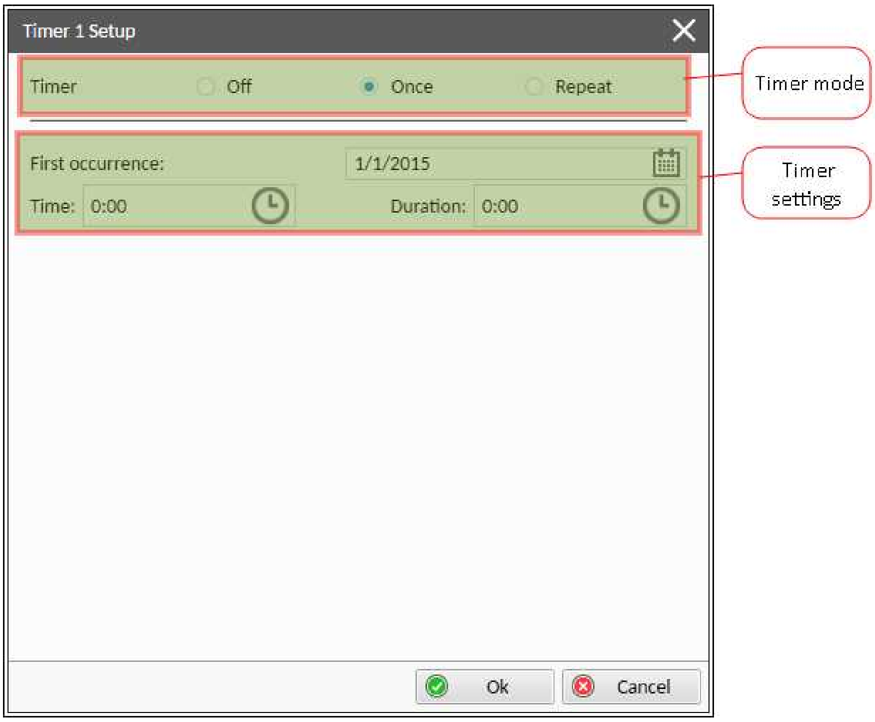


Image 5.89 Once mode – InteliConfig

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

Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 476)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 477)** setpoint select Once mode. Then adjust **Timer 1 First Occur. Date (page 478)**, **Timer 1 First Occur. Time (page 478)** and **Timer 1 Duration (page 478)**.

Note: *Use the Left and the Right buttons to move between timer setpoints.*

Daily mode

Set-up via InteliConfig

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

Note: *First, the timer functions must be adjusted via setpoint* ***Timer 1 Function (page 476)****.*

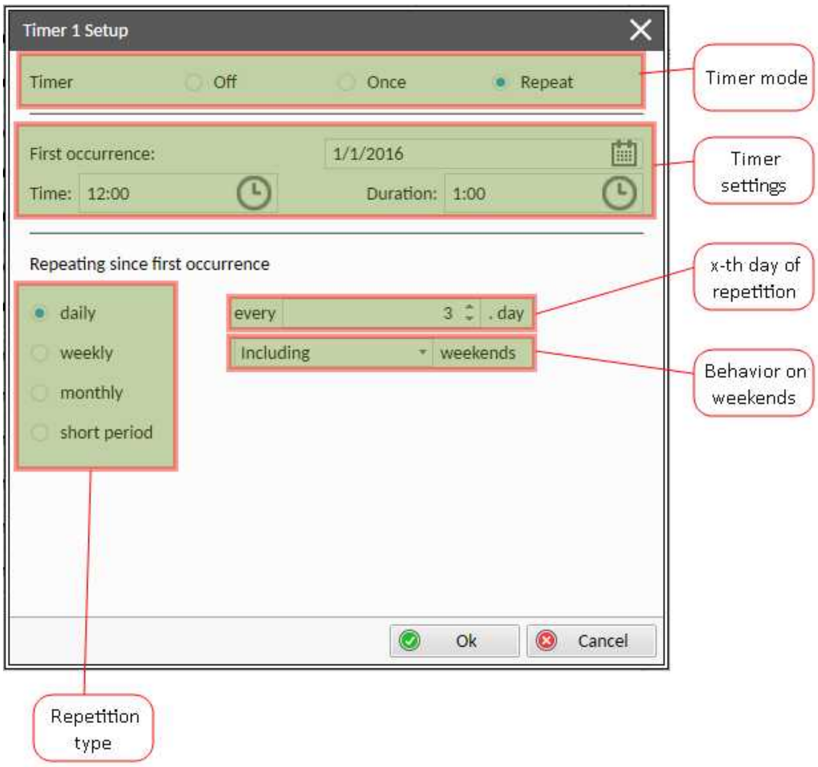


Image 5.90 Daily mode – InteliConfig

In timer mode select Repeat. In repetition type select Daily. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the xth day of repetition (**Timer 1 Refresh Period (page 480)**) and behavior of timer on weekends (**Timer 1 Weekends (page 481)**).

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

Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 476)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 477)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 478)**, **Timer 1 First Occur. Time (page 478)** and **Timer 1 Duration (page 478)**. In setpoint **Timer 1 Repeated (page 479)** select Daily and adjust **Timer 1 Refresh Period (page 480)** (xth day of repetition) and **Timer 1 Weekends (page 481)** (behavior of timer on weekends).

Note: *Use the Left and the Right buttons to move between timer setpoints.*

Weekly mode

Set-up via InteliConfig

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

Note: *First, the timer functions must be adjusted via setpoint* ***Timer 1 Function (page 476)****.*

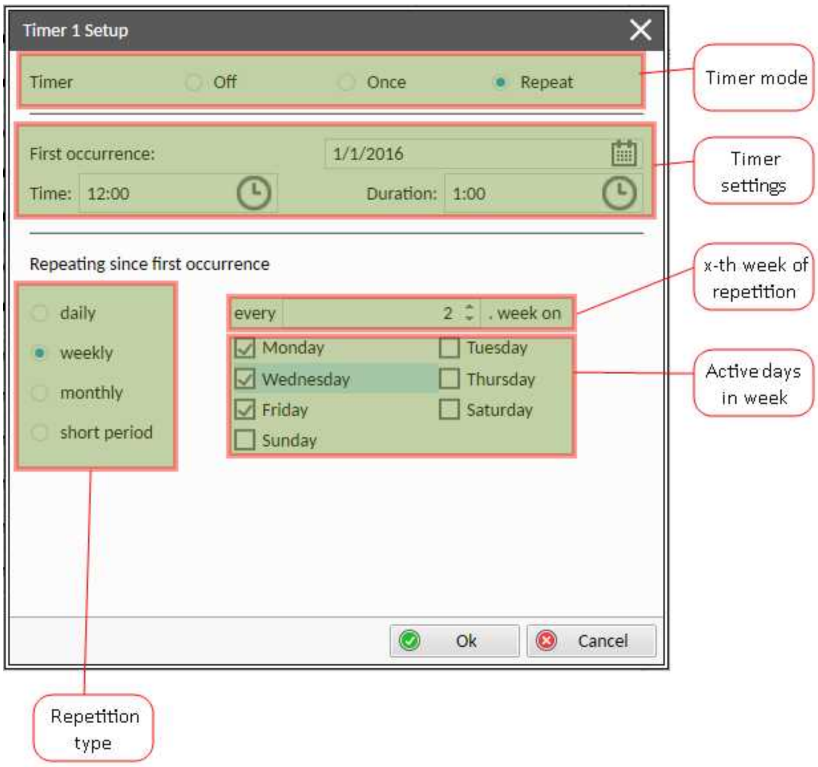


Image 5.91 Weekly mode – InteliConfig

In timer mode select Repeat. In repetition type select Weekly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the xth week of repetition (**Timer 1 Refresh Period (page 480)**) and days when timer should be active (**Timer 1 Day (page 481)**).

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

Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 476)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 477)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 478)**, **Timer 1 First Occur. Time (page 478)** and **Timer 1 Duration (page 478)**. In setpoint **Timer 1 Repeated (page 479)** select Weekly and adjust **Timer 1 Day (page 481)** (days when timer should be active) and **Timer 1 Refresh Period (page 480)** (xth week of repetition).

Note: *Use the Left and the Right buttons to move between timer setpoints.*

Monthly mode

Set-up via InteliConfig

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

Note: *First, the timer functions must be adjusted via setpoint* ***Timer 1 Function (page 476)****.*

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

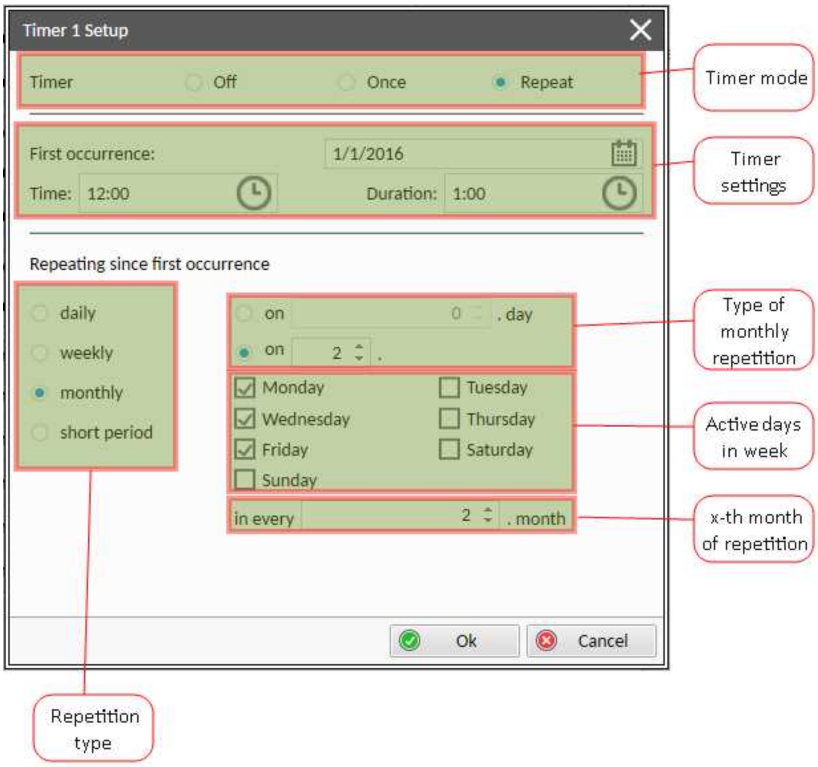


Image 5.92 Monthly mode – InteliConfig

In timer mode select Repeat. In repetition type select Monthly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the type of monthly repetition and the xth day of repetition (**Timer 1 Repeat Day In Month (page 482)**). Than select the xth month of repetition.

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

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

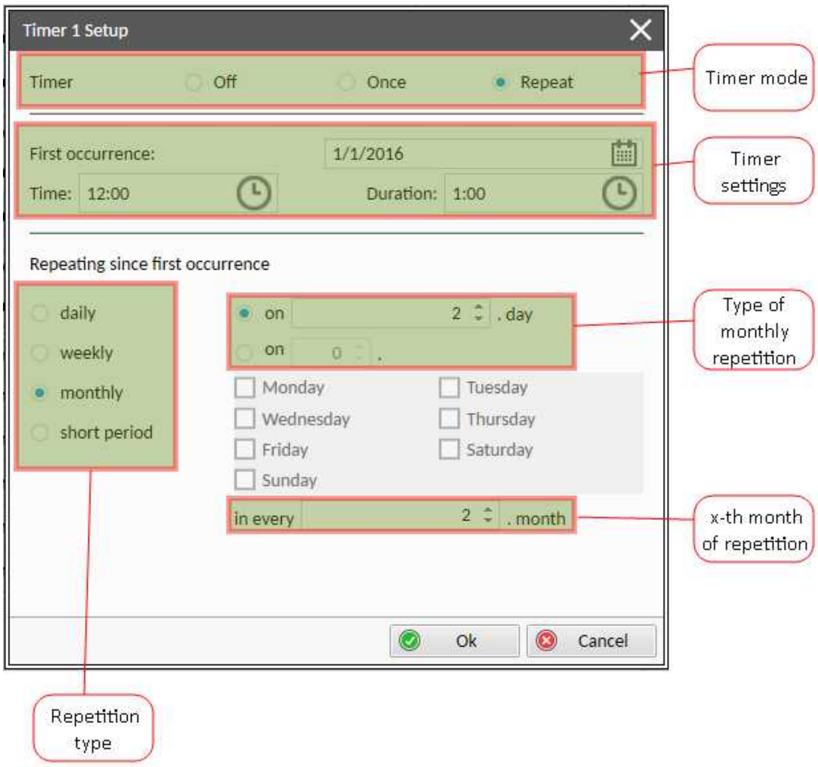


Image 5.93 Monthly mode – InteliConfig

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

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

Set-up via controller interface

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

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 476)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 477)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 478)**, **Timer 1 First Occur. Time (page 478)** and **Timer 1 Duration (page 478)**. In setpoint **Timer 1 Repeated (page 479)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 482)**, **Timer 1 Refresh Period (page 480)** (xth month of repetition) and **Timer 1 Repeat Day In Month (page 482)** (concrete day in repeated months).

The second type of monthly repetition is based on repeating on certain days of the week in a month.

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 476)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 477)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 478)**, **Timer 1 First Occur. Time (page 478)** and **Timer 1 Duration (page 478)**. In setpoint **Timer 1 Repeated (page 479)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 482)**, **Timer 1 Refresh Period (page 480)** (xth month of repetition), **Timer 1 Repeated Day In Week (page 482)** (days in week when timer is active) and **Timer 1 Repeat Week In Month (page 483)** (concrete week in repeated months).

***Note:** Use the Left and the Right buttons to move between timer setpoints.*

Short period mode

Set-up via InteliConfig

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

Note: *First, the timer functions must be adjusted via setpoint* ***Timer 1 Function (page 476)****.*

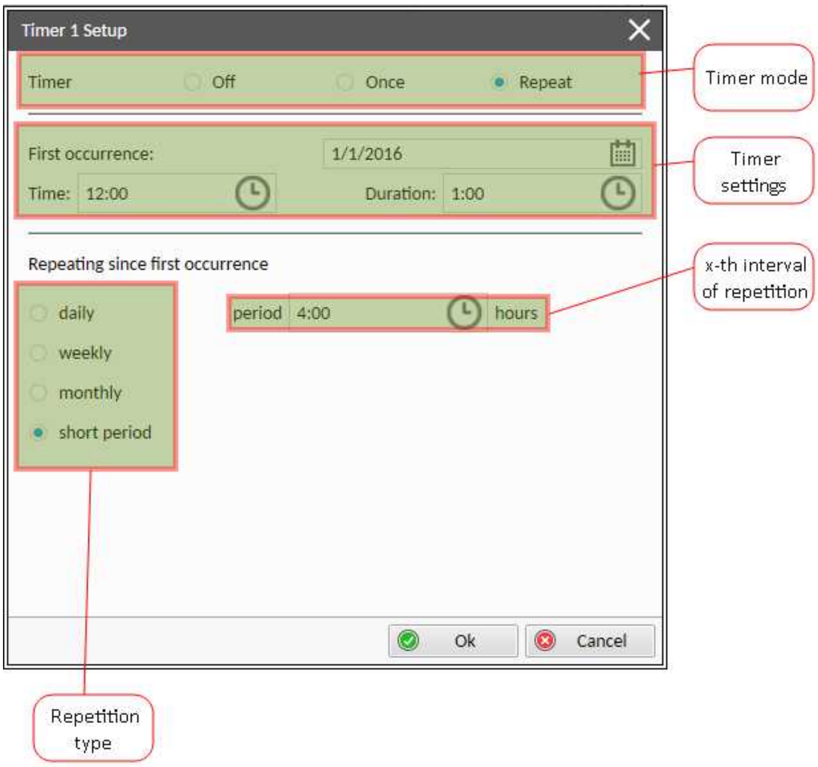


Image 5.94 Short period mode – InteliConfig

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

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

Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 476)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 477)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 478)**, **Timer 1 First Occur. Time (page 478)** and **Timer 1 Duration (page 478)**. In setpoint **Timer 1 Repeated (page 479)**, select Short Period and adjust **Timer 1 Refresh Period (page 480)** (interval of repetition).

Note: *Use the Left and the Right buttons to move between timer setpoints.*

5.5.23 Rental Timers

In controller, there are two timers which are designed like rental timers. Rental timers will stop the Gen-set after their elapse.

How to set-up rental timer

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

- Choose the type of rental timer
  - **Rental Timer 1 (page 490)** (based on engine running hours)
  - **Rental Timer 2 (page 492)** (based on date)
- Adjust the length of chosen timer
- Adjust the warning for user **Rental Timer 1 Wrn (page 492)** or **Rental Timer 2 Wrn (page 494)** (warning will be displayed in Alarm list before elapsing of rental timer)
- Adjust **Rental Timer BOC (page 494)** – common for both timers (if engine is still running after rental timer counts down, this timer will start tocount down. After the time has elapsed, the Gen-set will be cooled down and stop).

5.5.24 Service timers

Running hours counters

Service timers are used as maintenance interval counters. Counters can be set by setpoints – **Maintenance Timer 1 RunHours (page 339)**, **Maintenance Timer 2 RunHours (page 340)** and **Maintenance Timer 3 RunHours (page 342)**. All of them work the same way – their values are decremented every hour when the Gen-set is running.

Actual values of the counters are available as values **Maintenance Timer 1 Runhours (page 622)**, **Maintenance Timer 2 Runhours (page 622)** and **Maintenance Timer 3 Runhours (page 623)**.

When the value of counter reaches 0, the alarm**Wrn Maintenance 1 (page 890)** or **Wrn Maintenance 2 (page 890)** or **Wrn Maintenance 3 (page 891)** or **BOC Maintenance 1 (page 899)** or **BOC Maintenance 2 (page 899)** or **BOC Maintenance 3 (page 900)** is active until the respective counter reset is done.

Alarm type depends on **Maintenance Timer 1 Protection (page 340)**, **Maintenance Timer 2 Protection (page 341)** or **Maintenance Timer 3 Protection (page 343)** setting. Counter reset can be done either by setting the counter setpoint to a new valid setting or using corresponding reset command – **MAINTENANCE TIMER 1 RESET (PAGE 725)** or **MAINTENANCE TIMER 2 RESET (PAGE 726)** or **MAINTENANCE TIMER 3 RESET (PAGE 726)**.

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

Date counters

Service timers are used as maintenance interval counters. Counters can be set by setpoints – **Maintenance Timer 1 Interval (page 339)**, **Maintenance Timer 2 Interval (page 341)** and **Maintenance Timer 3 Interval (page 342)**. All of them work in the same way – timer is set in months, but count down is done in days.

Remaining value of the counters is located as value **Maintenance Timer 1 Interval (page 623)**, **Maintenance Timer 2 Interval (page 623)** and **Maintenance Timer 3 Interval (page 623)**.

When the counter value reaches 0 days, alarm **Wrn Maintenance 1 (page 890)** or **Wrn Maintenance 2 (page 890)** or **Wrn Maintenance 3 (page 891)** or **BOC Maintenance 1 (page 899)** or **BOC Maintenance 2 (page 899)** or **BOC Maintenance 3 (page 900)** is active until the respective counter reset is done.

Alarm type depends on **Maintenance Timer 1 Protection (page 340)**, **Maintenance Timer 2 Protection (page 341)** or **Maintenance Timer 3 Protection (page 343)** setting. Counter reset can be done either by setting the counter setpoint to a new valid setting or using corresponding reset command – **MAINTENANCE TIMER 1 RESET (PAGE 725)** or **MAINTENANCE TIMER 2 RESET (PAGE 726)** or **MAINTENANCE TIMER 3 RESET (PAGE 726)**.

Unused counter has to be adjusted to the maximal value 37 (Disabled).

5.5.25 Analog switches

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

Analog switch	Setpoints	Binary output
AIN SWITCH 01 (PAGE 832)	**Analog Switch 1 On (page 415)** **Analog Switch 1 Off (page 416)**	**AIN SWITCH01 (PAGE 753)**
AIN SWITCH 02 (PAGE 832)	**Analog Switch 2 On (page 418)** **Analog Switch 2 Off (page 419)**	**AIN SWITCH02 (PAGE 754)**
AIN SWITCH 03 (PAGE 832)	**Analog Switch 3 On (page 421)** **Analog Switch 3 Off (page 422)**	**AIN SWITCH03 (PAGE 754)**
AIN SWITCH 04 (PAGE 833)	**Analog Switch 4 On (page 424)** **Analog Switch 4 Off (page 425)**	**AIN SWITCH04 (PAGE 755)**
AIN SWITCH 05 (PAGE 833)	**Analog Switch 5 On (page 427)** **Analog Switch 5 Off (page 428)**	**AIN SWITCH05 (PAGE 755)**
AIN SWITCH 06 (PAGE 833)	**Analog Switch 6 On (page 430)** **Analog Switch 6 Off (page 431)**	**AIN SWITCH06 (PAGE 756)**
AIN SWITCH 07 (PAGE 834)	**Analog Switch 7 On (page 433)** **Analog Switch 7 Off (page 434)**	**AIN SWITCH07 (PAGE 756)**
AIN SWITCH 08 (PAGE 834)	**Analog Switch 8 On (page 436)** **Analog Switch 8 Off (page 437)**	**AIN SWITCH08 (PAGE 757)**
AIN SWITCH 09 (PAGE 834)	**Analog Switch 9 On (page 439)** **Analog Switch 9 Off (page 440)**	**AIN SWITCH09 (PAGE 757)**
AIN SWITCH 10 (PAGE 835)	**Analog Switch 10 On (page 442)** **Analog Switch 10 Off (page 443)**	**AIN SWITCH10 (PAGE 758)**
AIN SWITCH 11 (PAGE 835)	**Analog Switch 11 On (page 445)** **Analog Switch 11 Off (page 446)**	**AIN SWITCH11 (PAGE 758)**
AIN SWITCH 12 (PAGE 835)	**Analog Switch 12 On (page 448)** **Analog Switch 12 Off (page 449)**	**AIN SWITCH12 (PAGE 759)**
AIN SWITCH 13 (PAGE 836)	**Analog Switch 13 On (page 451)** **Analog Switch 13 Off (page 452)**	**AIN SWITCH13 (PAGE 759)**
AIN SWITCH 14 (PAGE 836)	**Analog Switch 14 On (page 454)** **Analog Switch 14 Off (page 455)**	**AIN SWITCH14 (PAGE 760)**
AIN SWITCH 15 (PAGE 836)	**Analog Switch 15 On (page 457)** **Analog Switch 15 Off (page 458)**	**AIN SWITCH15 (PAGE 760)**
AIN SWITCH 16 (PAGE 837)	**Analog Switch 16 On (page 460)** **Analog Switch 16 Off (page 461)**	**AIN SWITCH16 (PAGE 761)**
AIN SWITCH 17 (PAGE 837)	**Analog Switch 17 On (page 463)** **Analog Switch 17 Off (page 464)**	**AIN SWITCH17 (PAGE 761)**

Analog switch	Setpoints	Binary output
AIN SWITCH 18 (PAGE 837)	Analog Switch 18 On (page 466) Analog Switch 18 Off (page 467)	AIN SWITCH18 (PAGE 762)
AIN SWITCH 19 (PAGE 838)	Analog Switch 19 On (page 469) Analog Switch 19 Off (page 470)	AIN SWITCH19 (PAGE 762)
AIN SWITCH 20 (PAGE 838)	Analog Switch 20 On (page 472) Analog Switch 20 Off (page 473)	AIN SWITCH20 (PAGE 763)

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

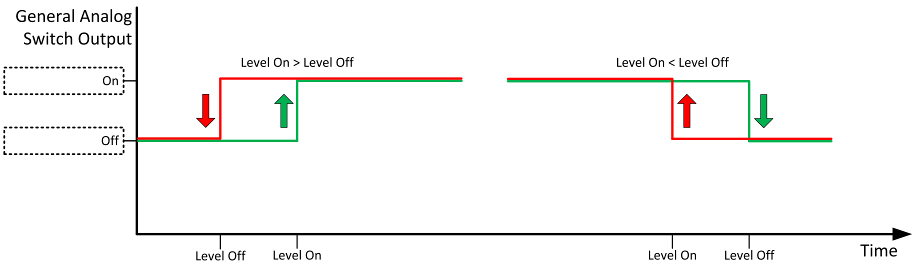


Image 5.95 Principle of analog switch

5.5.26 Additional running engine indications

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

The following conditions are evaluated as additional running engine indication:

- Voltage on the D+ input is higher than the **D+ Threshold (page 333)** of battery voltage. Connect this input to the D+ (L) terminal of the charging alternator and enable the D+ function by the setpoint **D+ Threshold (page 333)** D+ Treshold. If D+ terminal is not available, leave the input unconnected and disable the function.
- The pickup is not used and frequency is not detected on the pickup input. Connect the pickup input to the W terminal of the charging alternator if you do not use pickup and the W terminal is available. If not, leave the input unconnected.
- Oil pressure > **Starting Oil Pressure (page 301)** setpoint. The oil pressure is evaluated from the analog input or from the ECU if an ECU is configured.
- Binary input **OIL PRESSURE (PAGE 729)** is in logical 0.
- At least one phase of generator voltage is >25 % of nominal voltage.

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

5.5.27 Voltage phase sequence detection

The controller detects phase sequence voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. There is fix defined phase sequence in controller L1, L2, L3. When the phases are connected in different order (e.g. L1,L3,L2 or L2,L1,L3) the following alarms are detected:

- **Mains CCW Rotation**
- **Bus CCW Rotation**

5.5.28 Sensor curves

Background of the sensor calibration

To correct measuring error of each analog input (pressure, temperature, level, etc.), calibrating constants should be set. Calibration is made by adding the value of setpoint **CU AIN1 Calibration (page 501)**, or **CU AIN2 Calibration (page 502)**, or **CU AIN3 Calibration (page 502)**, or **CU AIN4 Calibration (page 503)** directly to the calculated value at analog input.

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

Default sensor curves

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

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

Note: *Curves can be modified via InteliConfig. Some standard curves are also prepared in InteliConfig.*

IMPORTANT: For right behavior of function Total Fuel Consumption, curve for analog input FUEL LEVEL (PAGE 840) **has to be in percentage and setpoint** Fuel Tank Volume (page 325) **has to be adjusted correctly.**

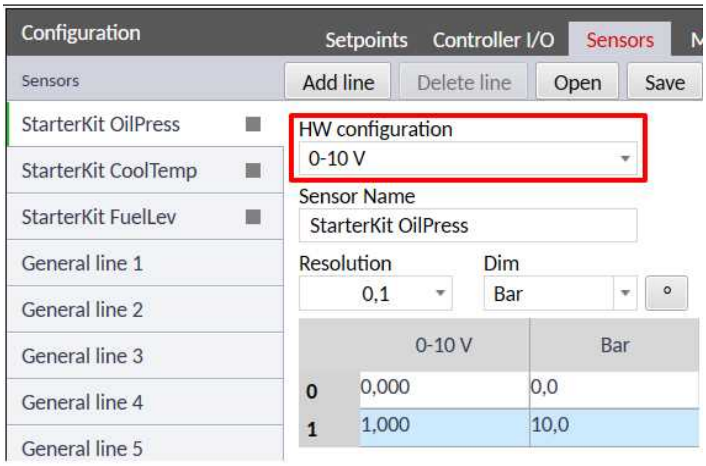
Sensor curve HW configuration

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

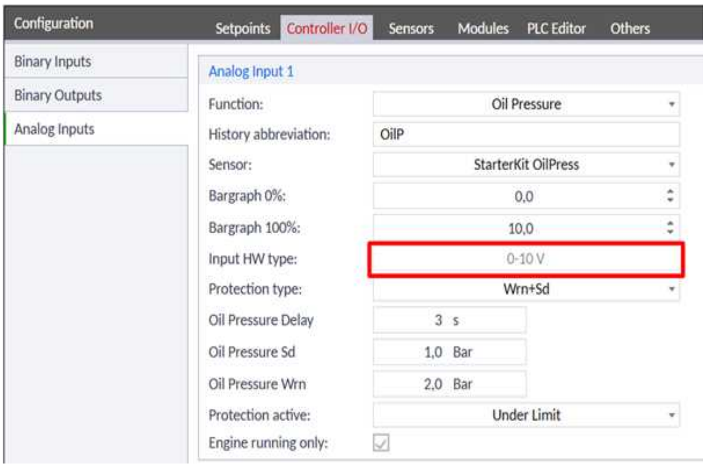
- 0-15 kΩ
- 0-10 V
- 0-20 mA passive

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

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



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



5.5.29 PLC

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

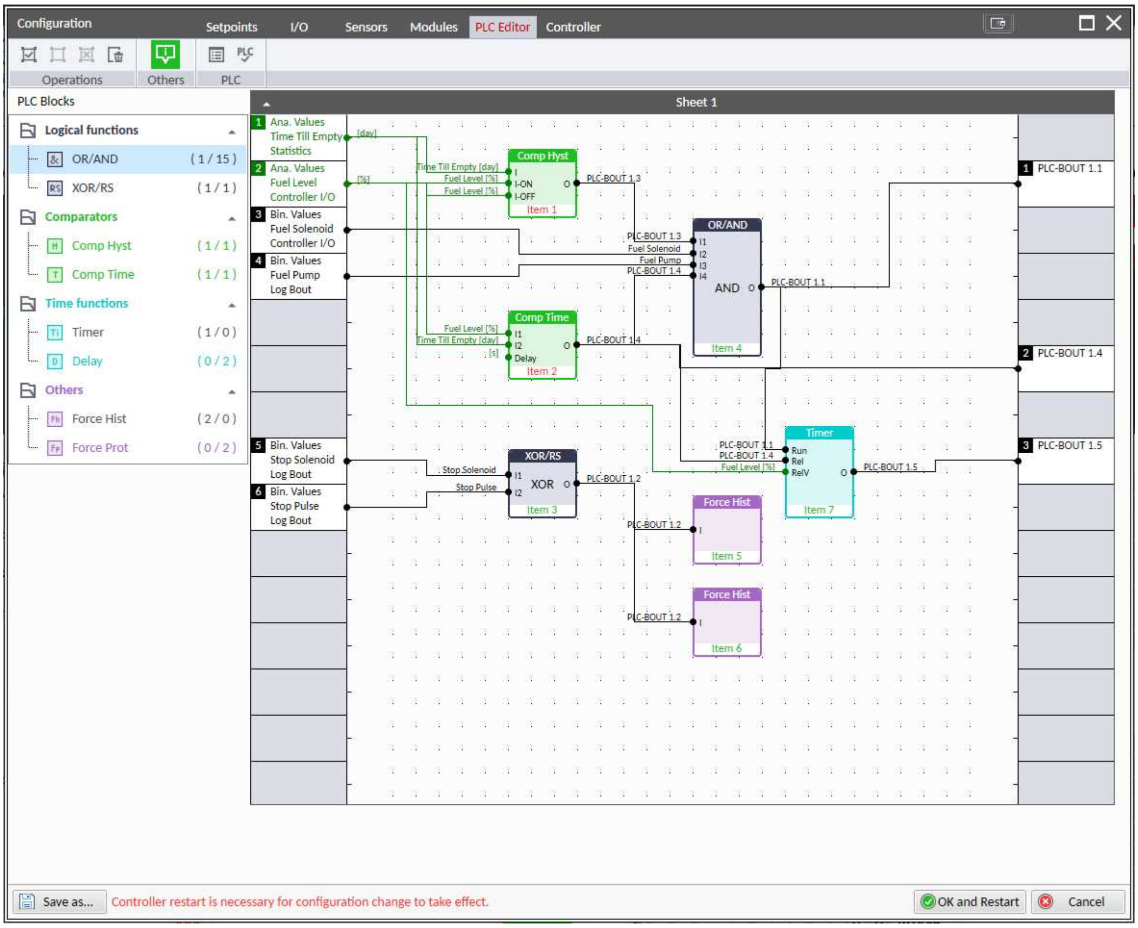


Image 5.96 PLC Editor main page

List of available PLC blocks

PLC block	Number of blocks
OR/AND	32
XOR/RS	8
Comparator with hysteresis (Comp Hyst)	4
Comparator with delay (Comp Time)	18
Timer	1
Delay	8
Force history record (Force Hist)	4
Force protection (Force Prot)	8
Counter	1
Decomposer	4

Working with the editor

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

- Adjust the sheet to your needs. See **Working with sheets (page 188)** for more information.
- Add PLC blocks into the sheets. See **Adding PLC blocks (page 188)** for more information.
- Define inputs and outputs of the PLC program. See **Define inputs and outputs (page 189)** for more information.
- Create connections between inputs, blocks and outputs. See **Creating wires (page 191)** for more information.
- Adjust properties of the blocks. See **List of PLC blocks (page 844)** for more information about blocks.

Working with sheets

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

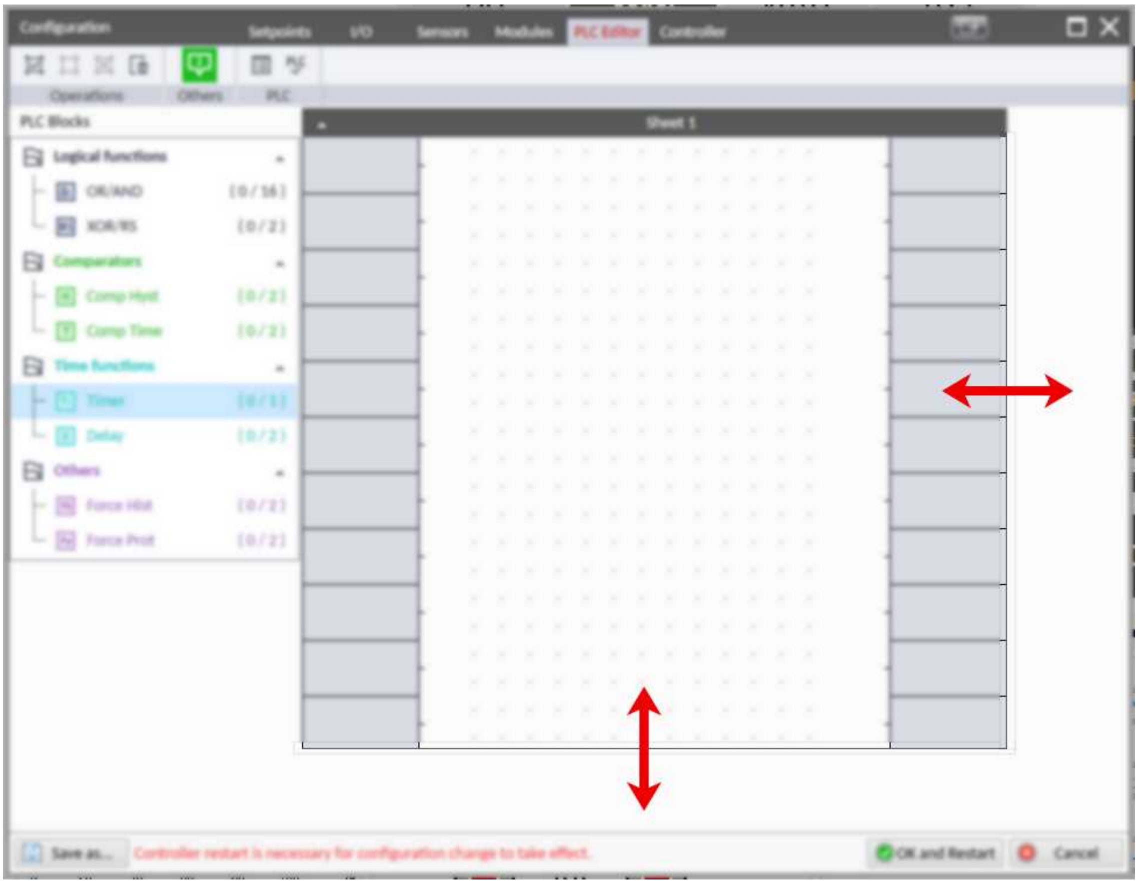


Image 5.97 Adjusting PLC sheet

Adding PLC blocks

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

- Select the required block from the list of available PLC blocks at the left and drag it into the sheet.
- Double-click on the block and adjust the properties of the block. See **List of PLC blocks (page 844)** for more information about blocks.

- Connect the block inputs and outputs by drawing wires in the sheet. See **Define inputs and outputs (page 189)** for more information. It is also possible to connected inputs and outputs via properties of selected PLC block.

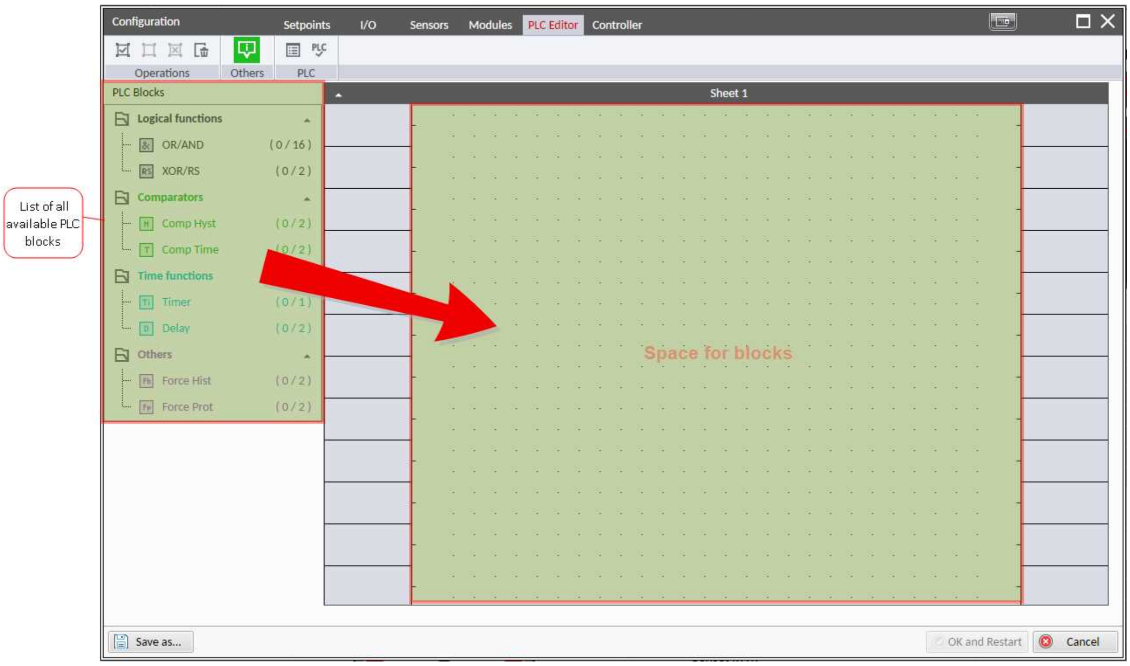


Image 5.98 Adding PLC blocks

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

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

Define inputs and outputs

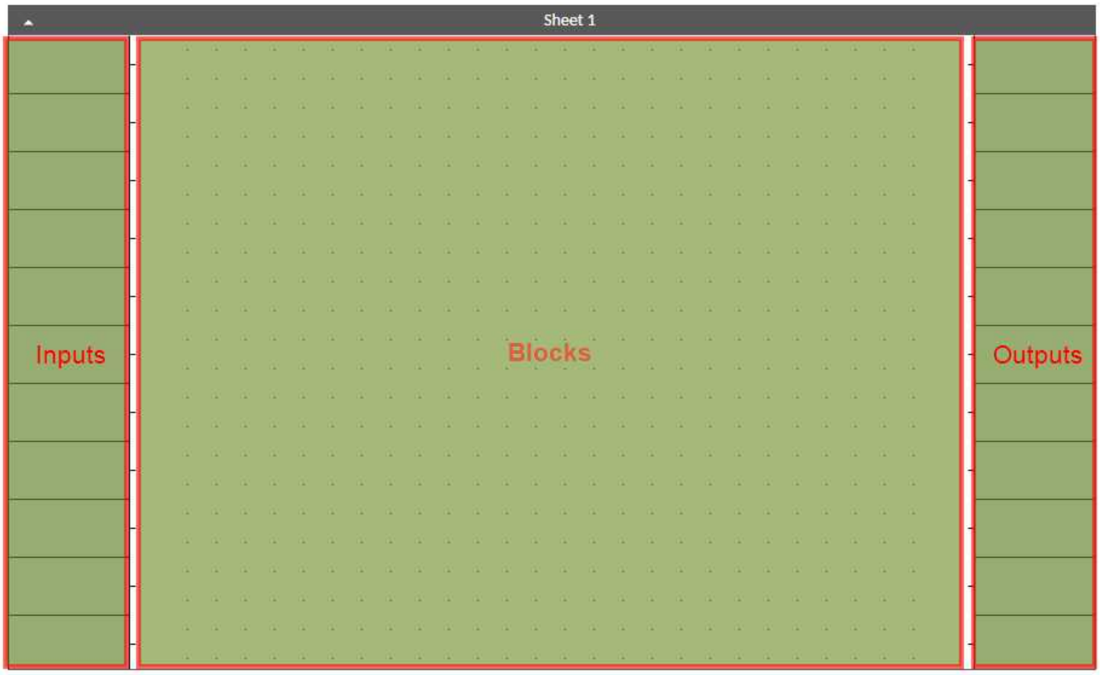
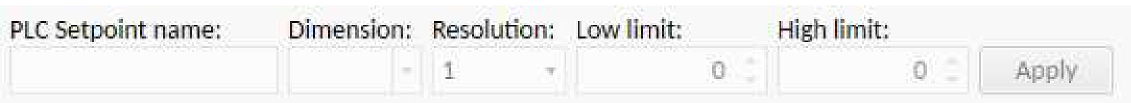


Image 5.99 Blank sheet of PLC Editor

Inputs

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

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



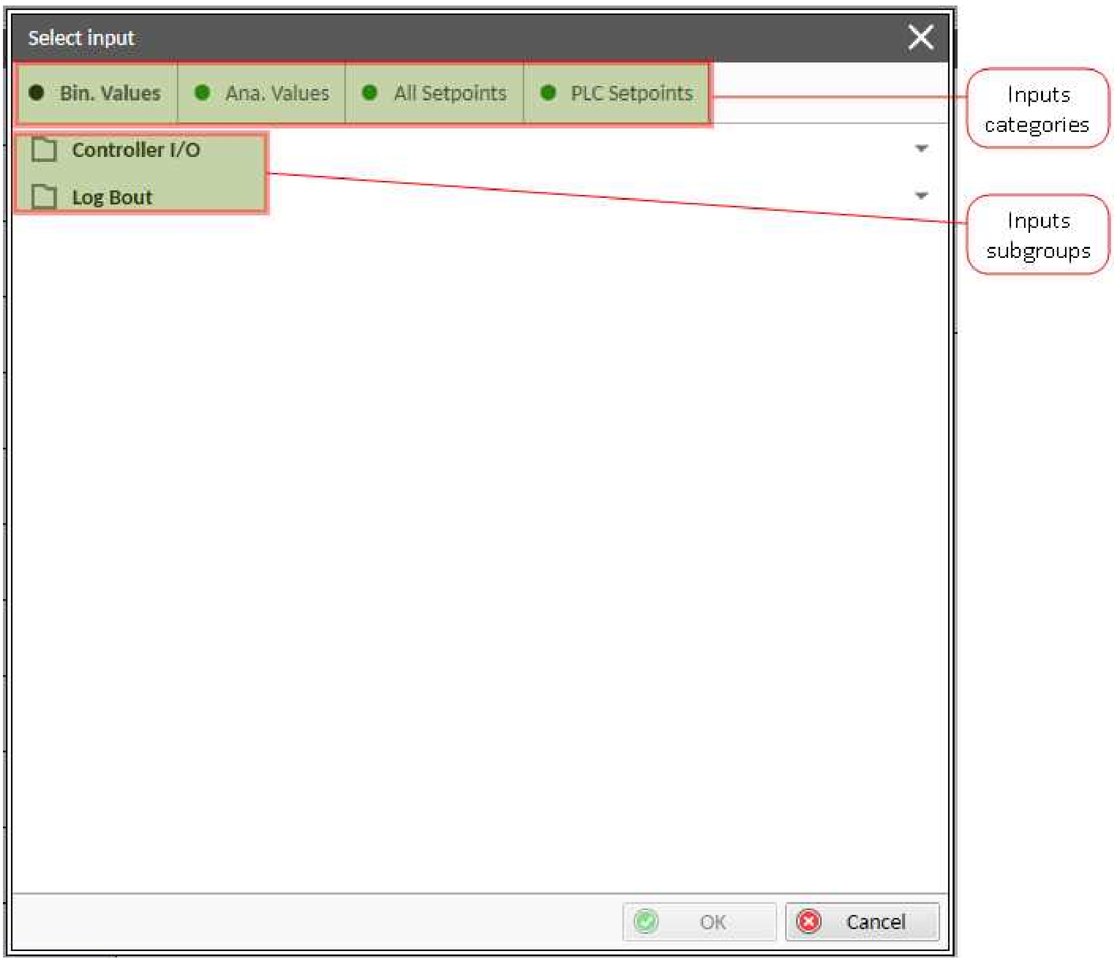


Image 5.100 PLC inputs

Outputs

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

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

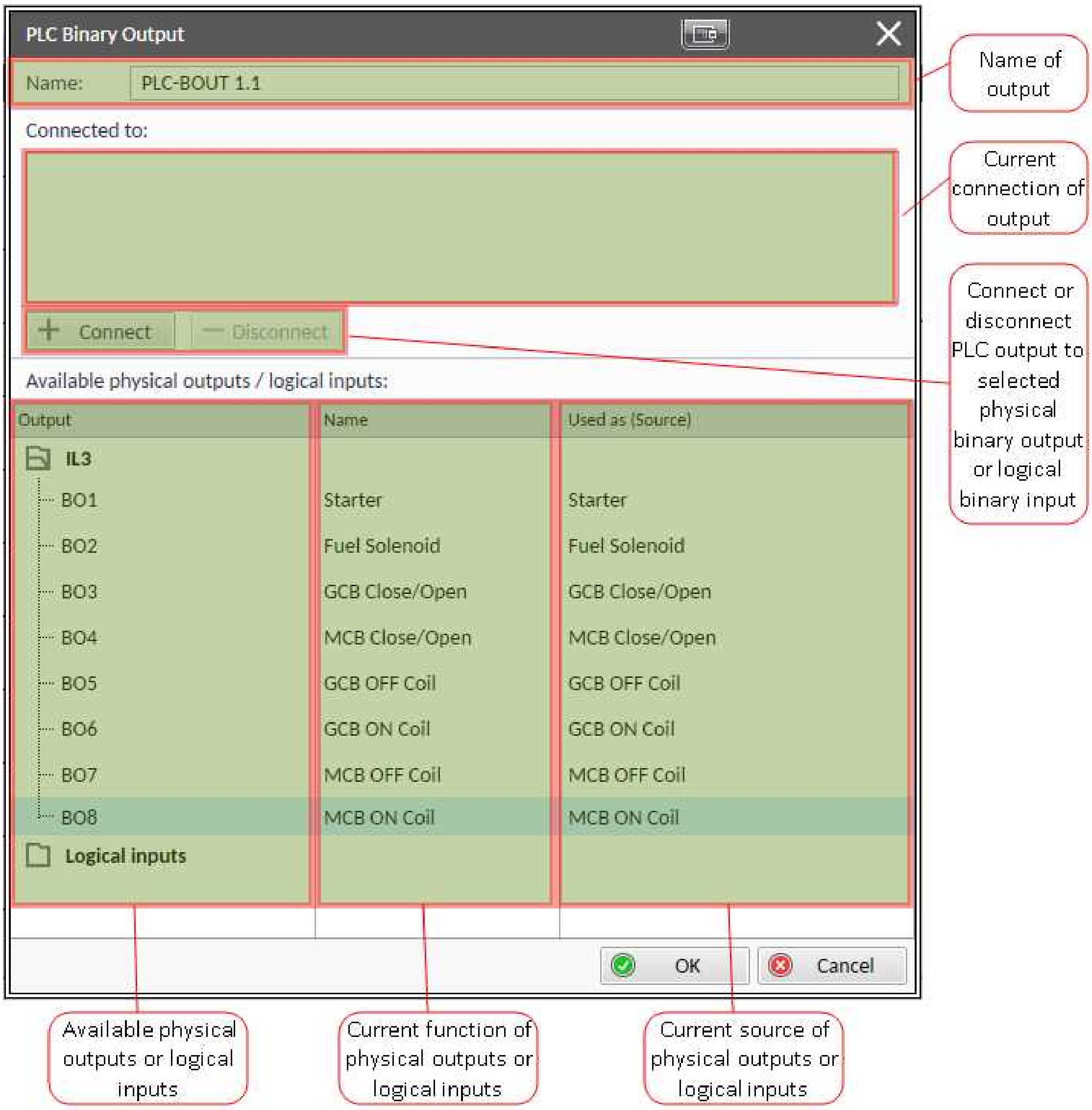


Image 5.101 PLC outputs

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

Creating wires

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

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

Follow the procedure below to create wire:

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

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

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

PLC logic execution rules

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

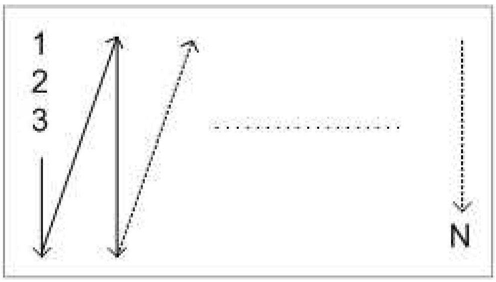
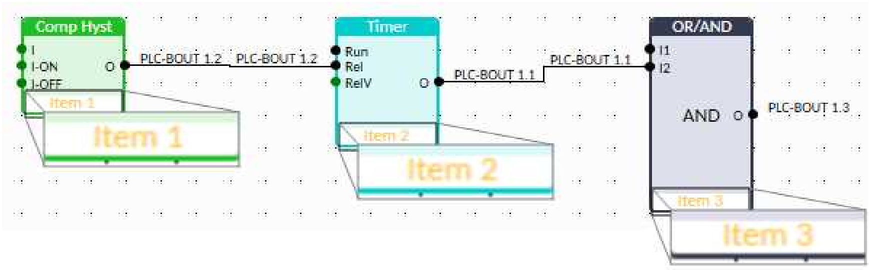
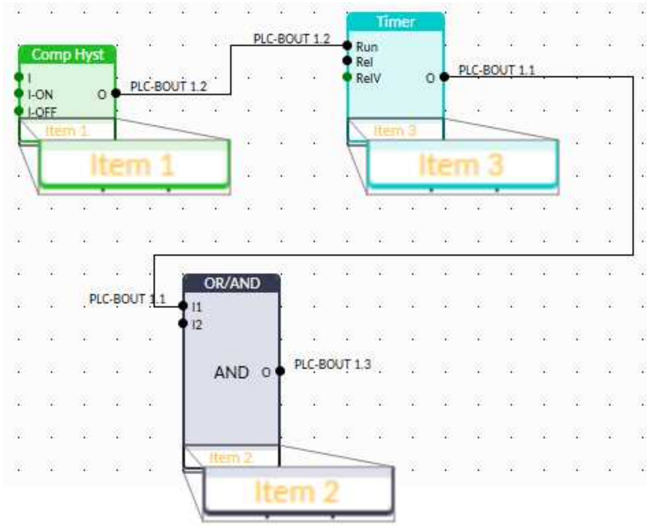


Image 5.102 PLC execution logic

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

✓	
✗	

Other functions

Consistency check

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

Delete whole content of sheet

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

Hints

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

PLC monitor

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

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

5.5.30 After-treatment Support

Afer-treatment support generally provides monitoring and control of the after-treatment system installed on generators engine. The requirements are defined as:

- Providing After-Treatment status information by
  - Displaying universal lamps (icons)
  - Displaying analog and binary values

- Control of After-Treatment regeneration function by
  - Transmitting commands to the ECU

Providing After-treatment status information

After-Treatment screen

This screen is shown with configured ECU which supports Tier 4 Final. The After-Treatment screen is automatically shown, once any of the selected lamps gets active or change status. Deactivation of the lamp will not trigger showing the screen. The screen is then shown until the operator switches it to another one. Alarm list screen has lower priority so even if a new alarm appears, the After-treatment screen is still displayed. To avoid displaying a blank screen, inactive lamps are represented by "dotted" icons. For no active lamp the screen shows all dotted icons. Please see examples below:

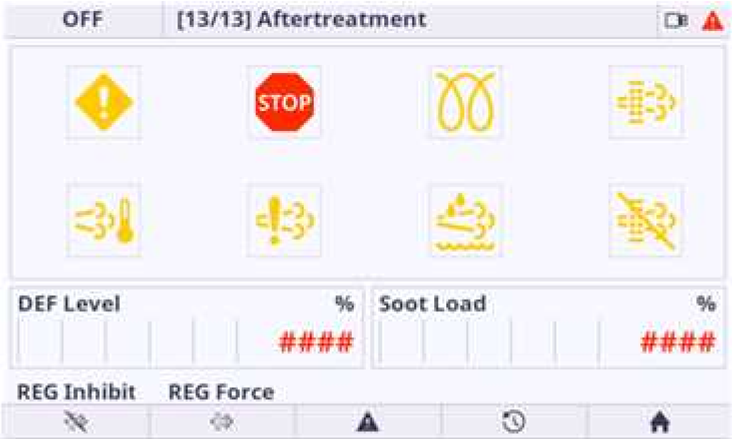


Image 5.103 Example of active Tier 4 Final screen

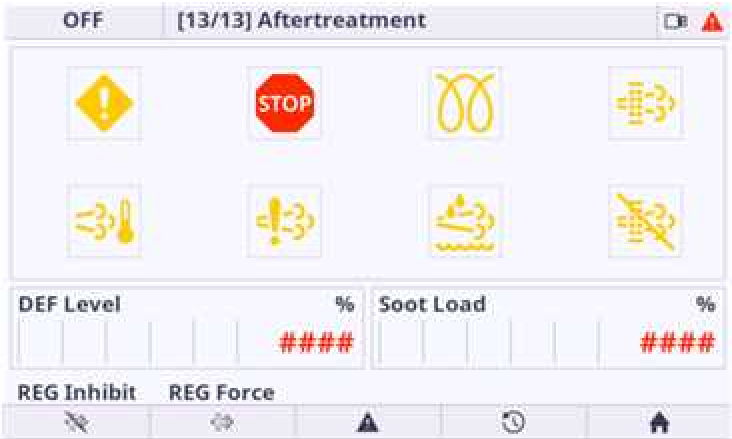


Image 5.104 Example of inactive Tier 4 Final screen

Universal lamps (icons)

Universal lamp icons are shown on the After-Treatment screen. Based on specific value read in specific frame with specific SPN, every lamp icon is either:

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

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

Lamp name	Active icon	Inactive icon	Notes
Amber warning lamp			***Note:*** *This value can light or blink on both frequencies.*
Red stop lamp			***Note:*** *This value can light or blink on both frequencies.*
Engine wait to start			
ATT filter lamp			***Note:*** *DPF = Diesel Particulate Filter; SCR = Selective Catalytic Reduction.*
Exhaust system high temperature lamp			***Note:*** *Indicates High exhaust system temperature.*
SCR error lamp			***Note:*** *Indicates SCR system problems.*
DEF low level lamp			***Note:*** *Indicates DEF fluid low level.*
Regeneration inhibit lamp			***Note:*** *Indicates Aftertreatment regeneration is inhibited.*

Note: *ECU Yellow Lamp, ECU Red Lamp, ECU Wait To Start Lamp can be disabled during prestart phase. Checkbox: Ignore ECU lamps during prestart is located in InteliConfig -> Controller Configuration -> Modules -> ECU module -> Electronic control unit settings.*

Note: *Aftertreatment support can be disabled. Aftertreatment HMI Screen is hidden and alarms related to aftertreatment are not shown. Use the checkbox: Disable aftertreatment support located in InteliConfig -> Controller Configuration -> Modules -> ECU module -> Electronic control unit settings.*

Analog values

Supported analog values:

- **DPF Ash Load (page 618)**
- **DPF Soot Load (page 618)**
- **DEF Level (page 618)**

Changing behavior of Aftertreatment lamps using PLC

The behavior of lamps can be changed using PLC logic. For this reason there is group of LBI introduced which directly controls each lamp state. These LBIs can be used for control of the lamps the way the user wants. PLC Decomposer block should be used in a case the signal from ECU is analog one.

Example:

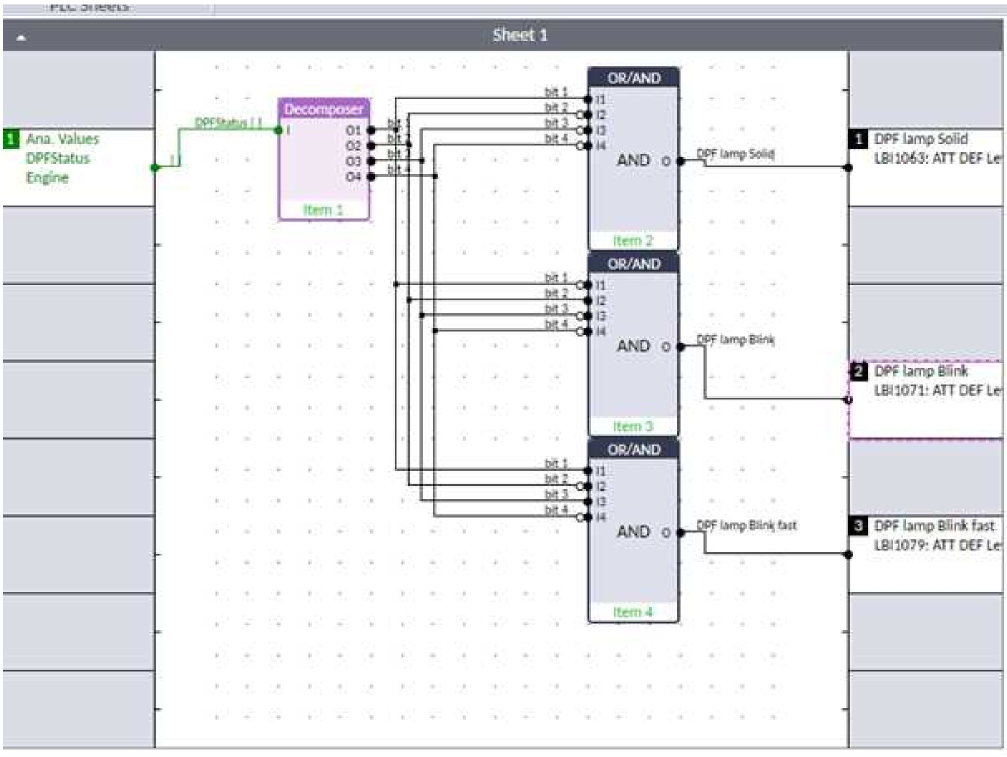


Image 5.105 The lamp state will be solid when signal is value 1, 2 = blink, 5 = blink fast

Control of After-Treatment regeneration function

Control of the non-mission regeneration is dependent on several conditions:

- Controller is in MAN mode
- GCB is open
- State Running
- LBI GCB Disable = 1

When these conditions are met, user can either switch LBI **ATT INTERLOCK (PAGE 689)** which acts as acknowledgment for the ECU that everything is prepared for the DPF regeneration, after that user can start regeneration by closing LBI **ATT FORCE REGEN (PAGE 688)**. Some ECUs however do not include LBI **ATT INTERLOCK (PAGE 689)** and closing just LBI **ATT FORCE REGEN (PAGE 688)** is enough to start the regeneration process.

Some engines may require the regeneration to run on higher RPM than is normally expected. For this reason we recommend to adjust Overspeed Limit setpoint.

The exact process and conditions for each particular engine should be studied carefully from the engine documentation issued by the manufacturer.

User can also inhibit regeneration process by:

- **ATT INHIBIT REGEN (PAGE 689)**

By doing so, the process of regeneration will be postponed until user switches the LBI back to open position. The Regeneration Inhibit lamp should be usually on solid when the LBI is closed. If the LBI is closed during regeneration, the process stops and it will have to start over if the ECU allows it.

General procedure of non-mission DPF regeneration

This is procedure from user standpoint, and its general idea of non-mission regeneration. There might be variations depends on specific engine manufacturer.

Regeneration start:

- *State:* lamps signals DPF regeneration is needed
- *User action:* open GCB, prepare Gen-set for regeneration (go to manual mode, turn on LBI GCB Disable, LBI Force Protections Override, set Overspeed Limit SP)
  - *CU action:* turn off protections and change limit for overspeed
- *User action:* close interlock (if interlock is available)
  - *State:* Regeneration conditions achieved
- *User action:* activate force regeneration

Regeneration end:

- *State:* lamps stop indicating, regeneration ended (engine now runs in Idle or Nominal speed)
- *User action:* turn of force regeneration (if its not pulse)
- *User action:* interlock open (if its available)
- *User action:* Turn off LBI GCB Disable, LBI Force Protection Override, SP Speed Override Limit
- *User action:* stop engine
  - Then user can do what he wants.

5.5.31 Geo-fencing

Geo-fencing function is kind of protection that evaluates whether the actual GPS location is within a predefined area, then based on this evaluation takes an action (sends SMS message, stops engine, make history record etc.). This function is enabled by setpoint **Geo-Fencing (page 498)** or by logical binary input **GEO-FENCING ENABLE (PAGE 724)**.

Using InteliConfig, it is possible to set two concentric geo-circles within which the unit is allowed to be located. Each geo-circle is defined as a circular geographic area with its center (common for both geo-circles) named Home Position. This point is adjusted via setpoints **Home Latitude (page 495)** and **Home Longitude (page 495)** and radius named Fence Radius adjusted via setpoints **Fence Radius 1 (page 496)** and **Fence Radius 2 (page 496)**.

The Protection can be different for both circles and are adjusted via setpoints **Fence 1 Protection (page 499)** and **Fence 2 Protection (page 500)**.

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

5.5.32 Mains decoupling protections

Vector shift

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

Protection is enabled via setpoint **Vector Shift Protection (page 367)**. Limit of protection is adjusted via setpoint **Vector Shift Limit (page 367)**. When protection is activated, the breaker is opened. Which breaker is opened is adjusted via setpoint **Vector Shift CB Selector (page 369)**. Maximal value of vector shift is represented by value **Max Vector Shift (page 638)**.

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

The settings can lead to these situations:

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

If a vector shift is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is then closed again (synchronized) after **Mains Return Delay (page 359)** as the mains is evaluated as healthy.

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

__Note:__ If the MCB application is chosen in case VectorShift is detected, the MCB breaker is released even if there are some Gen-set controllers connected on the bus.

ROCOF

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

Protection is enabled via setpoint **ROCOF Protection (page 368)**. Limit of protection is adjusted via setpoints **ROCOF df_dt (page 369)** and **ROCOF Windows Length (page 368)**. When protection is activated, the breaker is opened. Which breaker is opened is adjusted via setpoint **Vector Shift CB Selector (page 369)**.

5.5.33 Droop

IMPORTANT: Droop is relevant only for MINT application.

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

Function is activated via setpoint **Load/Var Sharing Regulation Type (page 409)**. There are two droop modes – emergency droop and droop.

Frequency droop

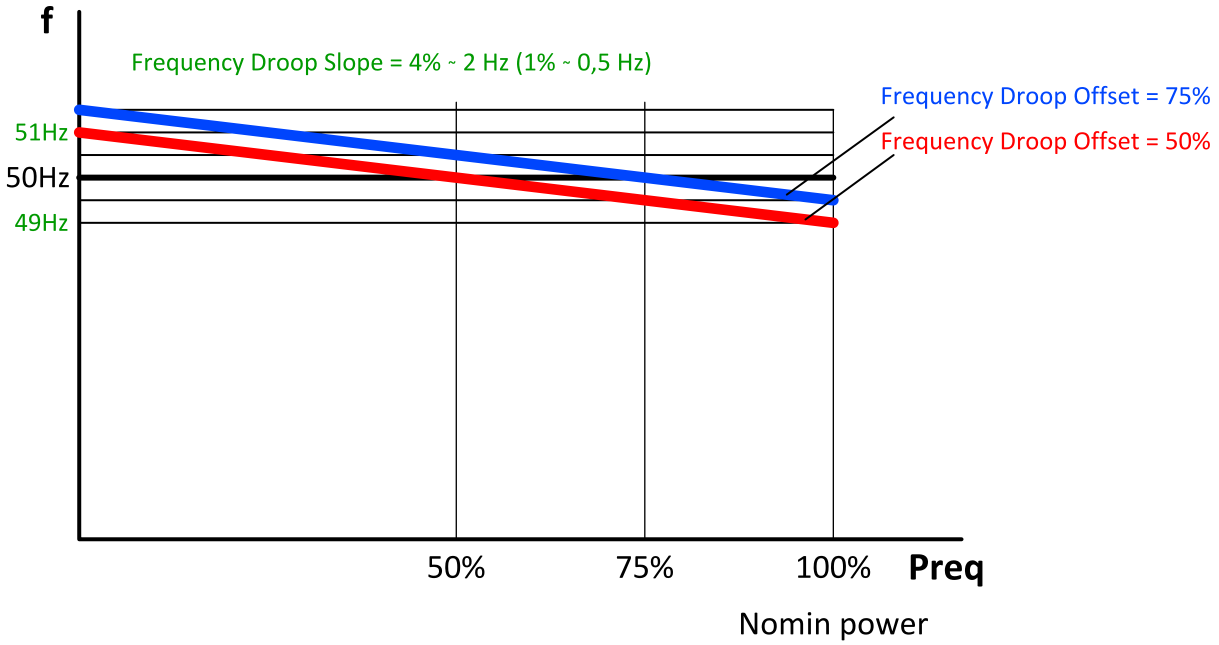


Image 5.106 Frequency droop

Equation:

Required frequency = Nominal frequency - [(Nominal frequency * **Frequency Droop Slope (page 410)** / 100) * (Active power / Nominal power - **Frequency Droop Offset (page 411)** / 100)).

Voltage droop

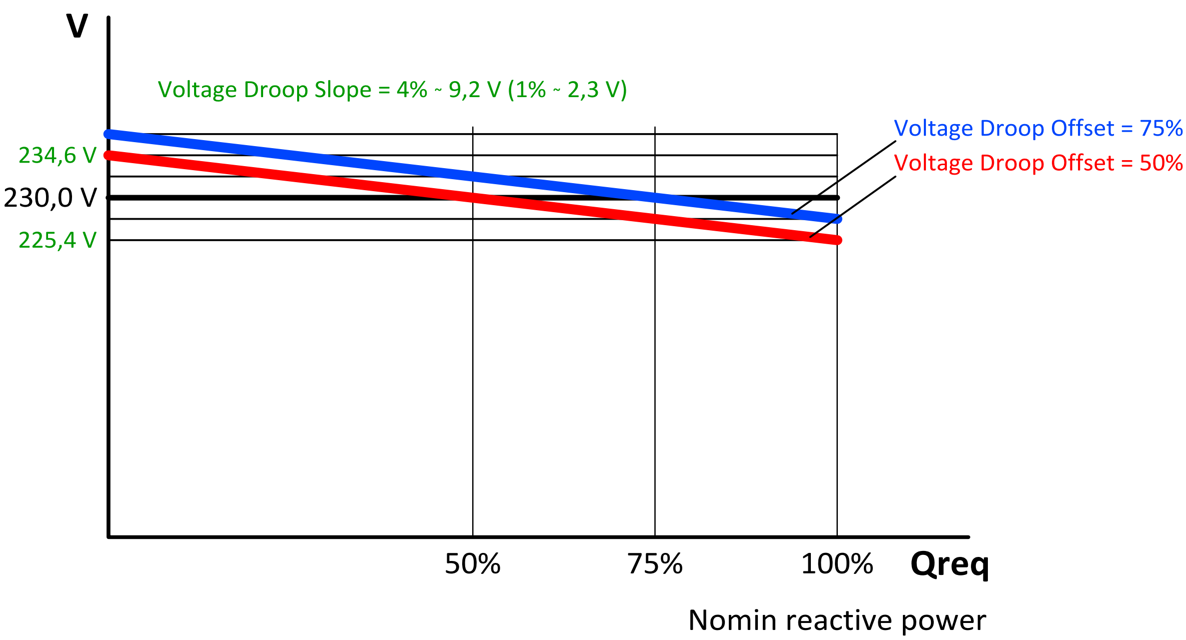


Image 5.107 Voltage droop

Equation

Required voltage = Nominal voltage - [(Nominal voltage * **Voltage Droop Slope (page 411)** / 100) * (Reactive power / Nominal reactive power - **Voltage Droop Offset (page 412)** / 100))

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

Principle of droop operation

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

- Start command is received – start button in MAN mode or LBI **Remote Start/Stop (page 732)** in AUTO mode gets active
  - The gen-set operating in droop is not calculated in the load reserve.
  - LBI **Remote Start/Stop (page 732)** is not influenced by power management and Gen-set starts if it gets active.
- Gen-set is starting – voltage and speed regulation are set to **Voltage Regulator Bias (page 401)** and **Speed Governor Bias (page 389)** (droop regulation is not active when GCB is opened).
- Connecting to bus
  - Dead bus – controller is prohibited to close it's GCB because of safety reasons (controller does not know about other controllers). Only controller with setpoint **Dead Bus GCB Close Master (page 410)** = ENABLED is allowed to close it's GCB to the dead bus. Otherwise it must be done manually in MAN mode.
  - Energized bus – controller starts synchronization (standard isochronous regulation).
  - GCB closes when synchronized – Now the droop regulation gets active

Disconnecting of loaded Gen-set from common bus bar in droop

- Gen-set is operating in droop and is loaded. Stop command is received – stop button in MAN mode or LBI **Remote Start/Stop (page 732)** in AUTO mode gets inactive.
- Controller starts soft unload of loaded Gen-set
  - Soft unload can be disabled via LBI **Droop Unload Disl (page 715)** in case when there is the last Gen-set on the common bus bar and it is not possible to unload it. Then the GCB is opened immediately.
- GCB opens when the active power drops under **Generator Unload GCB Open Level (page 399)**, latest when timer **Load Ramp (page 400)** elapses.

Transition from droop to iscochronous regulations

- The speed request during the transition from droop (or emergency droop) to is ochronous regulation is changed smoothly (not in step). It prevents the system against overshoot of the frequency.
- Frequency is changed by 2 Hz per **Load Ramp (page 400)**.

Forcing of the regulation to droop

- Droop regulation can be forced by LBI **Force Droop Oper (page 719)**.

Principle of emergency droop

When **Load/Var Sharing Regulation Type (page 409)** = Emrg Droop, Isonchronous regulation is used until the conditions for activation of emergency droop are fulfilled. After activation, emergency droop regulation is used until the conditions for deactivation are fulfilled.

Conditions for activation

- The number of controllers detected by the controller on can is lower than the number in the setpoint **#Number Of Controller On CAN (page 412)**.
- **Emergency Droop On Delay (page 413)** has count down.

Conditions for deactivation

- The number of controllers detected by the controller on can is equal or higher than the number in the setpoint **#Number Of Controller On CAN (page 412)**.
- **Emergency Droop Off Delay (page 413)** has count down.

5.5.34 Alternate configuration

In controller are 3 sets of configuration.

Configuration set 1	Configuration set 2	Configuration set 3
Nominal Power Split Phase 1 (page 506)	**Nominal Power Split Phase 2 (page 512)**	**Nominal Power Split Phase 3 (page 518)**
Nominal Power 1 (page 506)	**Nominal Power 2 (page 512)**	**Nominal Power 3 (page 518)**
Nominal RPM 1 (page 507)	**Nominal RPM 2 (page 513)**	**Nominal RPM 3 (page 519)**
Nominal Frequency 1 (page 507)	**Nominal Frequency 2 (page 513)**	**Nominal Frequency 3 (page 519)**
Gen Nominal Voltage Ph-N 1 (page 508)	**Gen Nominal Voltage Ph-N 2 (page 514)**	**Gen Nominal Voltage Ph-N 3 (page 520)**
Gen Nominal Voltage Ph-Ph 1 (page 508)	**Gen Nominal Voltage Ph-Ph 2 (page 514)**	**Gen Nominal Voltage Ph-Ph 3 (page 520)**
Nominal Current 1 (page 507)	**Nominal Current 2 (page 513)**	**Nominal Current 3 (page 519)**
Connection Type 1 (page 503)	**Connection type 2 (page 509)**	**Connection type 3 (page 515)**

Configuration sets can be changed via logical binary inputs **ALTERNATE CONFIG 2 (PAGE 686)** and **ALTERNATE CONFIG 3 (PAGE 686)**.

5.5.35 USB host

USB host is a function for programming the controller from the USB Flash Drive. The following functions are supported:

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

IMPORTANT: Do not unplug USB Flash Drive during programming!

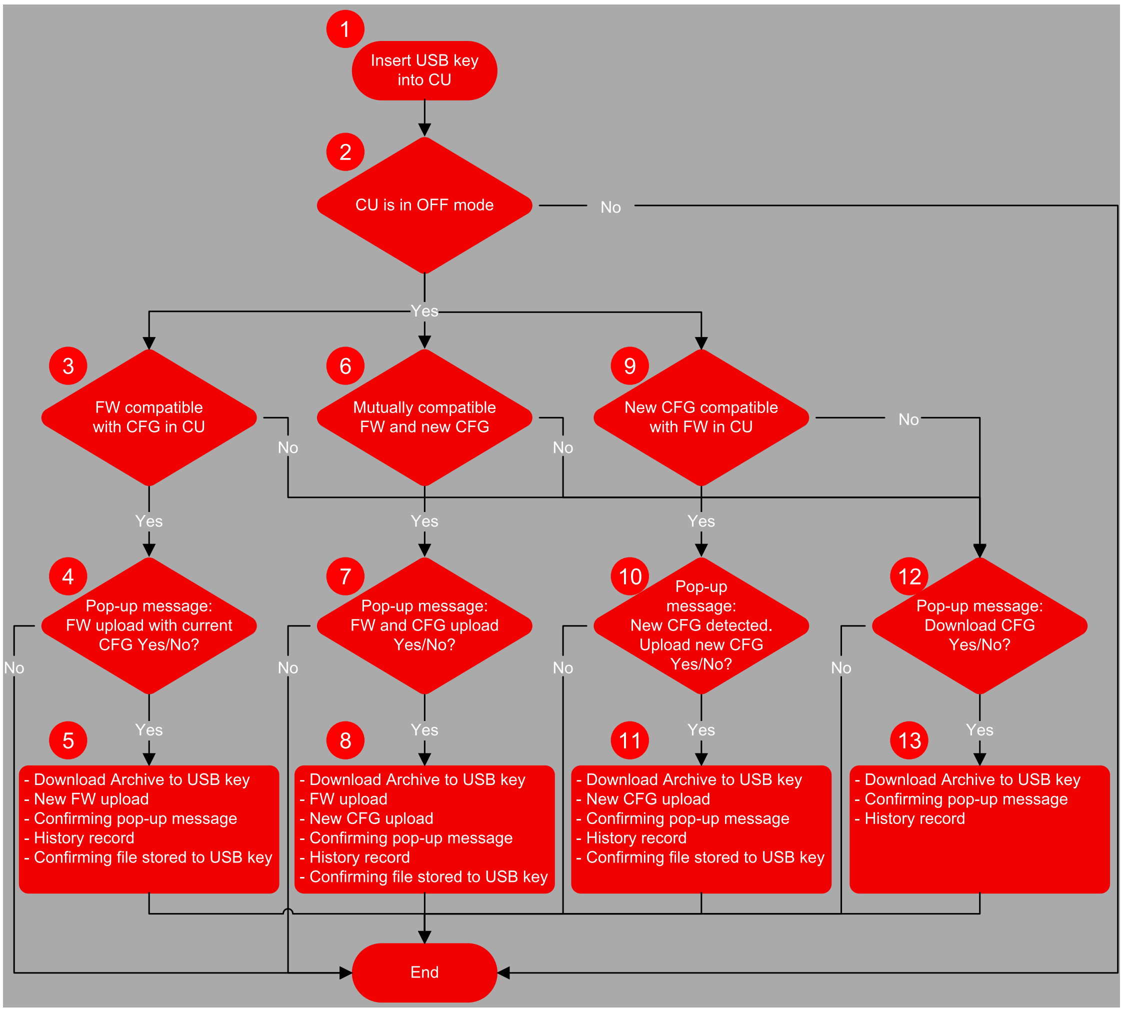


Image 5.108 USB host flowchart

Terminology:

- The Archive = the native file of InteliConfig, including the complete Configuration + History + Statistic + Values (at time of download) + Alarm list.
- Configuration = the part of Archive, in the terms of Configuration + Setpoints + PLC + IO definitions + Languages (for more information **see Configuration download on page 204**).
- New configuration = the configuration created in InteliConfig for the purpose of uploading it into the controller using the USB memory stick. The new configuration is recognized due to its name. The name must contain the specific string ="InteliGen 500-Genset name-M.N.P.B.aig3".

  Note: *M.N.P.B stands for number 0 – 9.*

- Compatible firmware = the firmware version compatible with the configuration in the controller. The name of file including the firmware is "InteliGen 500-M.N.P.B.bin".

Abbreviations:

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

Firmware upload

- Point 1 – controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running, the controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.
- Point 2 – controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- Point 3 – Conditions for firmware upload with current configuration
  - The new firmware compatible with the version of the configuration in the controller has been detected (and there is no new configuration file).
  - Detection is based on the name of firmware – required name: "InteliGen 500-M.N.P.B.bin"

    Note: *M.N.P.B stands for number 0 – 9.*

  - More firmware can be stored on the USB Flash Drive. Controller automatically selects the compatible firmware with the highest version.
- Point 4 – Pop-up message
  - Confirmation of firmware upload with current configuration
- Point 5 – Firmware upload
  - Current archive is downloaded to USB Flash Drive (Name = SN_YYMMDDHHMM).
  - New firmware is uploaded into the controller without the change of the configuration
  - History record "USB Flash Drive FW upgrade" is made
  - Confirming file (.txt) on USB Flash Drive is made (Name = SN_YYMMDDHHMM)
    - Content: Serial number, Year/Date/Time, Upgrade to the FW "Name of the new FW" successful.
  - Confirmation pop-up message: "FW upgrade success"

Configuration upload

- Point 1 – controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running, the controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.
- Point 2 – controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- Point 9 – conditions for new configuration upload
  - The new configuration compatible with the version of the firmware in the controller has been detected (and there is no new firmware file).
  - Detection is based on name of configuration – required name: "InteliGen 500-Genset name-M.N.P.B.aig3

    Note: *M.N.P.B stands for number 0 – 9."*

  - There can be only one configuration file
- Point 10 – Pop-up message
  - Confirmation of configuration upload with current firmware

- Point 11 – Configuration upload
  - Current archive is download to USB key (Name = SN_YYMMDDHHMM).
  - New configuration is uploaded into the controller without the change of the firmware
  - History record "USBkey CFG upload" is made
  - Confirming file (.txt) on USB key is made (Name = SN_YYMMDDHHMM)
    - Content: Serial number, Year/Date/Time, Upgrade to the FW "Name of the new CFG" successful.
  - Confirmation pop-up message: "CFG upgrade success"

Firmware and configuration upload

- Point 1 – controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running, the controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.
- Point 2 – controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- Point 6 – conditions for new firmware and configuration upload
  - The new configuration has been detected. Also there is a firmware file compatible with detected new configuration
  - Detection is based on name of configuration – required name: "InteliGen 500-Genset name-M.N.P.B.aig3" and on name of firmware – required name: "InteliGen 500-M.N.P.B.bin"

    Note: *M.N.P.B stands for number 0 – 9.*
  - There can be only one configuration file
  - More firmware can be stored on the USB key. Controller automatically selects the compatible firmware with the highest version.
- Point 7 – Pop-up message
  - Confirmation of configuration and firmware upload
- Point 8 – Configuration and firmware upload
  - Current archive is download to USB key (Name = SN_YYMMDDHHMM).
  - New firmware is uploaded into the controller
  - New configuration is uploaded into the controller
  - History record "USB key FW and CFG upload" is made
  - Confirming file (.txt) on USB key is made (Name = SN_YYMMDDHHMM)
    - Content: Serial number, Year/Date/Time, Upgrade to the FW "Name of the new FW" successful, Upgrade to the FW "Name of the new CFG" successful.
  - Confirmation pop-up message: "FW and CFG upgrade success"

Configuration download

- Point 1 – controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running, the controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.

- Point 2 – controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- Points 3, 6, 9 – conditions for configuration download
  - There is no firmware or configuration with required name
- Point 12 – Pop-up message
  - Confirmation of configuration download
- Point 11 – Configuration download
  - Current archive is download to USB key (Name = SN_YYMMDDHHMM).
  - History record "USB key Archive download" is made
  - Confirmation pop-up message: "Archive download successful"

5.5.36 E-Stop

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

- The emergency stop circuit must be secured.
- The power supply of the associated binary outputs (BOUT1 and BOUT2) is supplied by the E-STOP input, not by the + battery voltage.

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

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

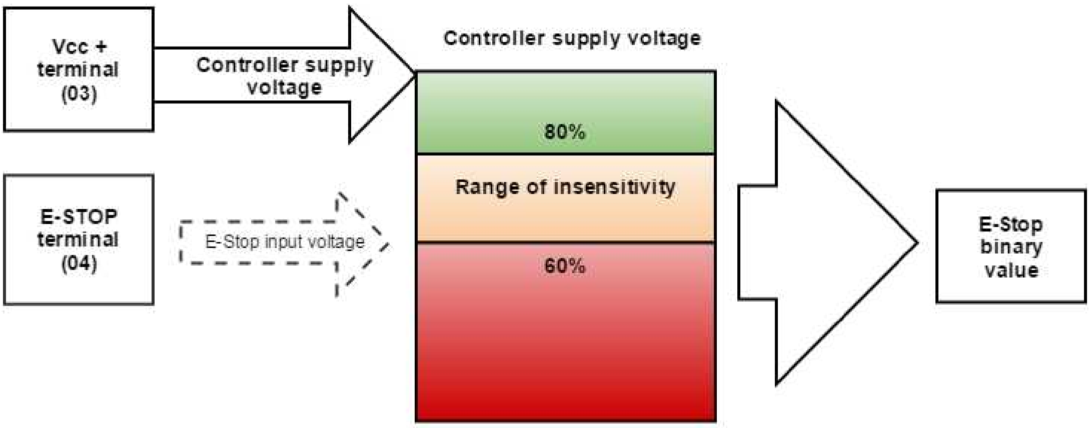


Image 5.109 SW principle of E-STOP

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

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

Visualization on CU screen

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

For more information about connection **see Emergency stop on page 50**.

5.5.37 ECU Frequency selection

Setpoint *ECU Freq Select* is no longer in use. However **ECU Frequency Select (page 621)** value was kept and the value can be calculated from **Nominal Frequency (page 271)** setpoint. The sequence for frequency change is executed automatically (engine must be in still condition and ECU is powered on) in the following steps:

This sequence does not control LBO **ECU POWER RELAY (PAGE 772)** anyhow.

Note: *If LBO **ECU POWER RELAY (PAGE 772)** is used, this change can be made only in prestart phase. So prestart has to be set up for enough long time.*

1. Starting of the engine is blocked (state: Not Ready)
2. LBO: *ECU Power relay* is activated
3. Wait 5 s
4. LBO: *Stop Pulse* is set for 1 s (standard Stop Pulse duration)
5. Wait 3 s
6. Frequency selection is changed to a new value
7. Wait 2 s
8. LBO: *Stop Pulse* is set for 1 s (standard Stop Pulse duration)
9. Wait 2 s
10. LBO: *ECU Power relay* is deactivated
11. Return from start blocking state

5.5.38 Mains import measurement

This functionality is available only with the SPtM mode (**Application Mode Select (page 248)** is set to SPtM). Mains import measurement enables the import/export control when Gen-set operates in parallel with mains (**Load Control PTM (page 249)** is set to Imp/Exp). It as well enables mains import based soft load transfer from Mains to Generator when the **REM TEST ON LOAD (PAGE 733)** function is used.

If mains import measurement is not available and **Transfer Mains To Gen (page 397)** is set to SoftTransf, soft load transfer from Mains to Generator depends on **Close Transfer Max Duration (page 393)**, **Load Ramp (page 400)** and **Baseload (page 252)** setting (it does not make sense to use the Imp/Exp control without the mains import measurement).

Note: *When mains current is not measured using a CT (**Mains Import Measurement (page 258)** is set to None or Analog Input), requested generator PF is **BasePower Factor (page 252)** even with **PF Control PTM (page 250)** set to PF Imp/Exp.*

5.5.39 Load shedding

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

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

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

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

How the Load shedding controls the Load shedding outputs

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

Load shedding has 3 steps and each step is linked with its own binary output, **Load Shedding Stage 1 (page 788)**, **Load Shedding Stage 2 (page 788)**, **Load Shedding Stage 3 (page 788)**.

The Load shedding outputs can be activated one by one in the order 1, 2, 3. The conditions for activation are defined by setpoints **Load Shedding Level (page 371)** and **Load Shedding Delay (page 371)**.

The Load shedding outputs are deactivated one by one according to the conditions given by the setpoints **Load Reconnection Level (page 371)**, **Load Reconnection Delay (page 372)**, **Auto Load Reconnection (page 372)**.

If manual reconnection of the load is desired the **Auto Load Reconnection (page 372)** setpoint must be disabled and the **Manual Load Reconnection (page 726)** digital input must be configured.

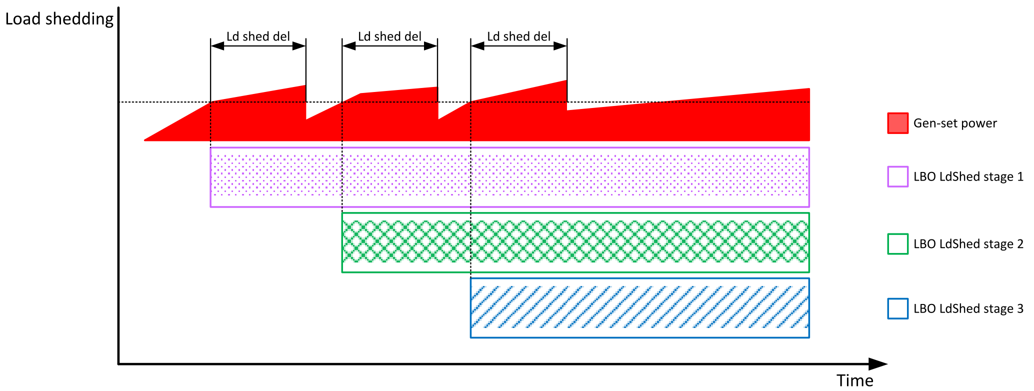


Image 5.110 Load shedding

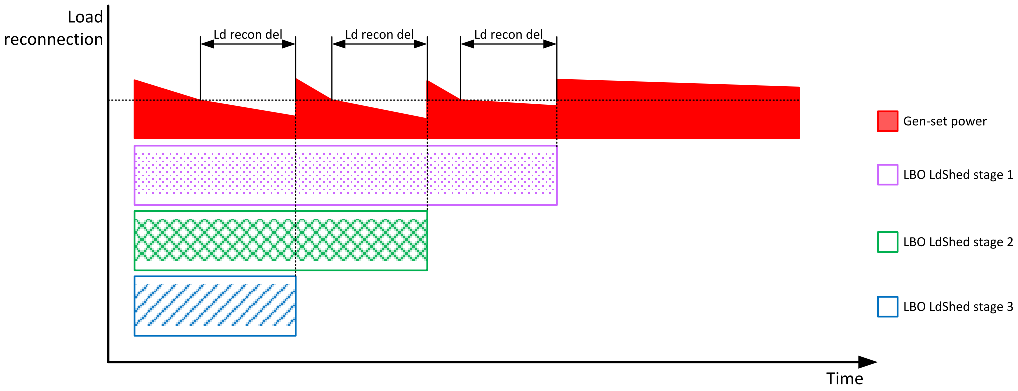


Image 5.111 Load reconnection

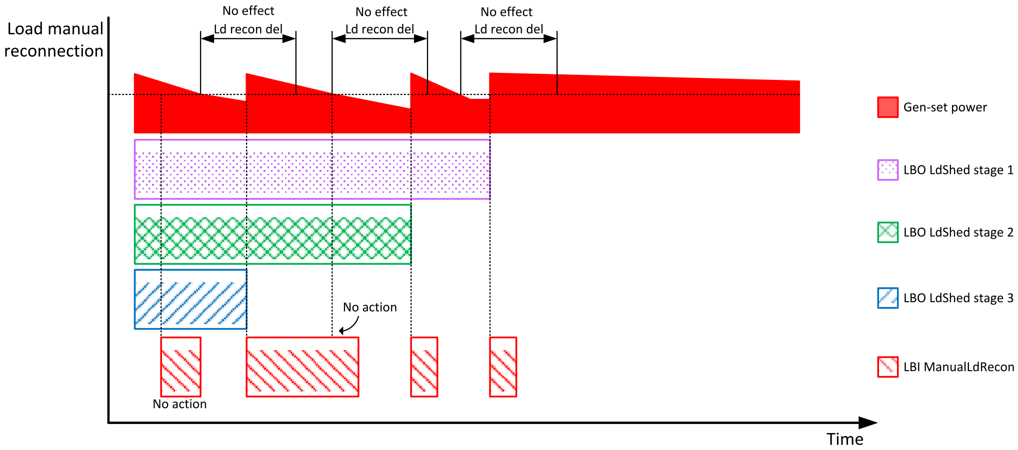


Image 5.112 Load manual reconnection

5.5.40 Peak shaving

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

The Peak shaving function is active only in AUT mode in parallel to mains operation. Peak shaving is based on active power only. If load consumption increases over **Peak Shaving Start Level (page 259)** and for period longer than **Peak Shaving Start/Stop Delay (page 260)** the Gen-set is started. If load consumption decreases below **Peak Shaving Stop Level (page 259)** and period longer than**Peak Shaving Start/Stop Delay (page 260)** the Gen-set is stopped. The activation of the function is indicated by LBO: **PEAK SHAVING ACTIVE (PAGE 797)**.

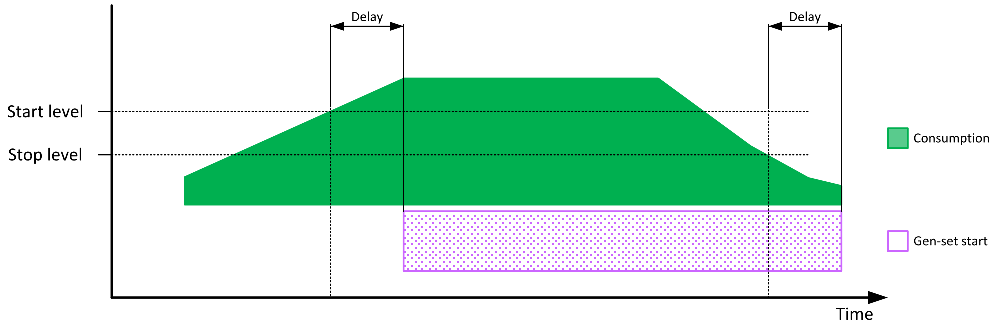


Image 5.113 Peak shaving

5.5.41 Cybernetic security

The cybernetic security is formed by:

- Protection against a brute-force attack to the password
- Secure method to reset the password
- A new technology of encryption of the remote communication
- Web interface can be disabled

Hardening the storage of a credentials

The user credentials (passwords and access code) have been moved to a hardened storage to prevent the credentials to leak out of the hardware.

> **IMPORTANT: If a firmware rollback is inevitable, please keep in mind, when the firmware is first time updated to the new firmware (which uses hardened storage) a seamless transfer of the credentials into the hardened storage is performed. However, if the rollback to any previous firmware (which does not use hardened storage) is performed the credentials are NOT transferred back, so the previous firmware will not "see" any change of the credentials made through the new firmware. Moreover, as the transfer of the credentials into the hardened storage is performed only during very first update from an "old" to a "new" firmware, no change of the credentials performed in the "old" firmware after the rollback will be visible in the "new" firmware after a next update to the "new" firmware.**

Protection against the brute force attack

Protection against a brute force attack will take place when an invalid password is entered repeatedly.

- If the invalid password is entered 5 times, the controller gets blocked from entering the password for a predetermined amount of time.
- Each further entering of the invalid password cause the consequent blocking time is to be increased.
- If the invalid password is entered repeatedly the controller gets blocked for entering the password permanently and the password must be reset to a default value as described below.

Note: *Blocking of the controller for entering the password has no influence on controller / Gen-set operation*

Note: *Permanent blocking cannot occur accidentally, just by user mistake. It can be practically triggered only by a focused activity.*

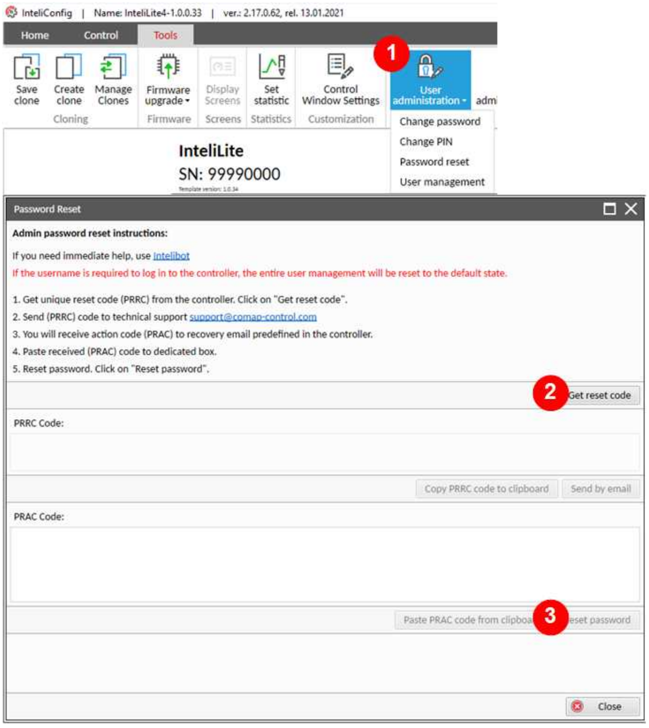
Resetting the administrator password

If **the administrator password is lost or controller is permanently locked** due to brute-force attack protection, proceed according to a procedure described below:

> **IMPORTANT: There is a backup e-mail address defined in the controller to which and only which ComAp will send the "password reset action code". Please be sure, that you have adjusted this e-mail address correctly. Use InteliConfig to adjust the backup e-mail address**

Reset password procedure

1. Connect InteliConfig. You may connect remotely if you know Access Code.
2. Get the password reset request code and send it via e-mail to support@comap-control.com



3. Once you receive the reply from ComAp, copy the code from the e-mail (all characters inside the box as indicated below)

Dear customer,

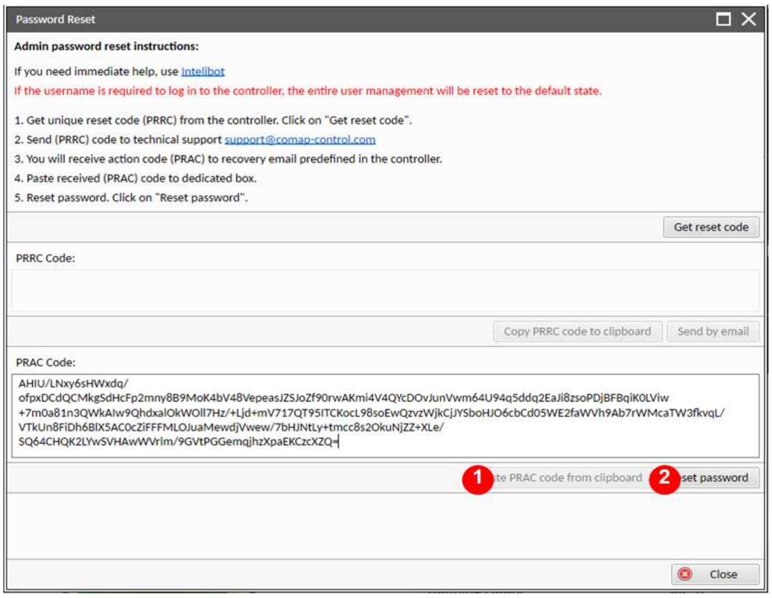
ComAp has received your request for resetting the password in the controller **N/A**, serial n umber **99990000**. Please perform following steps to finish the action.

1) Connect your PC application to the controller
2) Copy the action code stated below to the clipboard
3) Paste the clipboard content into the appropriate field in the PC application and press the "Reset" button. Password will be reset to the default value.
4) Adjust and remember new password

Code:


```
AHIU/LNxy6sHWxdq/ofpxDCdQCMkgSdHcFp2mny8B9MoK4bV48VepeasJZSJoZf90rwA
Kmi4V4QYcDOvJunVwm64U94q5ddq2EaJi8zsoPDjBFBqiK0LViw+7m0a81n3QWkAIw9Q
hdxal0kWOl17Hz/+Ljd+mV717QT95ITCKocL98soEwQzvzWjkCjJYSboHJO6cbCd05WE
2faWVh9Ab7rWMcaTW3fkvqL/VTkUn8FiDh6BlX5AC0cZiFFFMLOJuaMewdjVwew/7bHJ
NtLy+tmcc8s2OkuNjZZ+XLe/SQ64CHQK2LYwSVHAwWVrlm/9GVtPGGemqjhzXpaEKCzc
XZQ=
```

4. Paste the code into the password reset window



Encryption of the communication

New technology "CCS v.1" is used for an authentication and an encryption of the ComAp protocol via Internet/ethernet/AirGate. This technology is based on strong and proven cryptographic algorithms and has successfully passed penetration tests and cybersecurity audit.

back to Controller setup

6 Communication

back to Table of contents

6.1 PC

6.1.1 Direct communication

A RS232, USB, RS485 or ethernet interface can be used for direct cable connection to a PC.

Connection via RS232

A plug-in communication module CM-RS232-485 is necessary for communication via RS232 connection.

The module is plugged into the slot located on the rear side of the controller. To find more information about installation of the modules **see Plug-in module installation on page 58**.

RS232 interface uses **COM1 Mode (page 521)** port of the controller. Use a cross-wired serial communication cable with DB9 female connectors and signals Rx, Tx, GND.

Note: *Also USB-RS232 convertor can be used.*

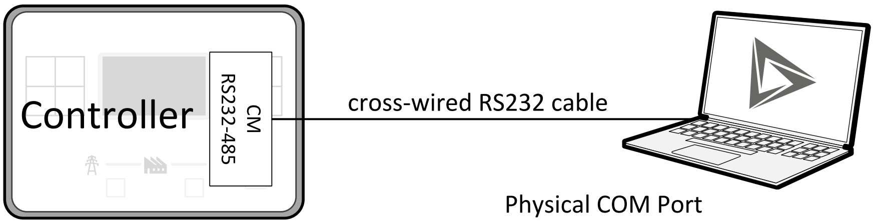


Image 6.1 Cross-wired RS232 cable is used

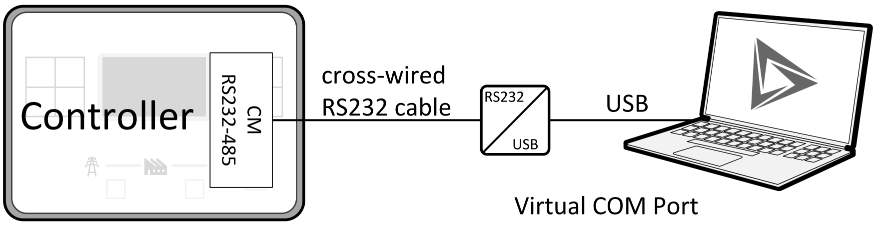


Image 6.2 Cross-wired RS232 cable and USB is used

Connection via RS485

Plug-in module CM-RS232-485 or on board RS485 connector can be used for communication via RS485 connection.

A plug-in communication module CM-RS232-485 is necessary for communication via RS485 connection.

The module is plugged into the slot located on the rear side of the controller. To find more information about installation of the modules **see Plug-in module installation on page 58**.

RS485 interface uses **COM2 Mode (page 523)** port of the controller.

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

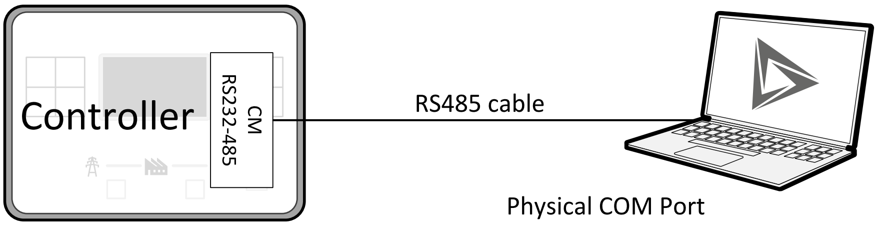


Image 6.3 Plug-in module CM RS232-485 is used

Connection via Ethernet

This connection type is used for communication with the controller from InteliConfig or any other PC tool. Eight remote clients can be connected at the same time (six direct IP clients and two AirGate clients).

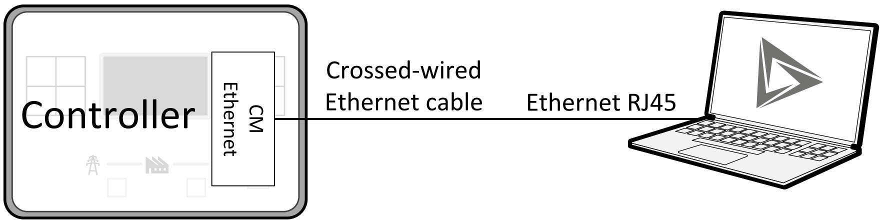


Image 6.4 Ethernet cable is used

Connection via USB

USB interface uses HID profile.

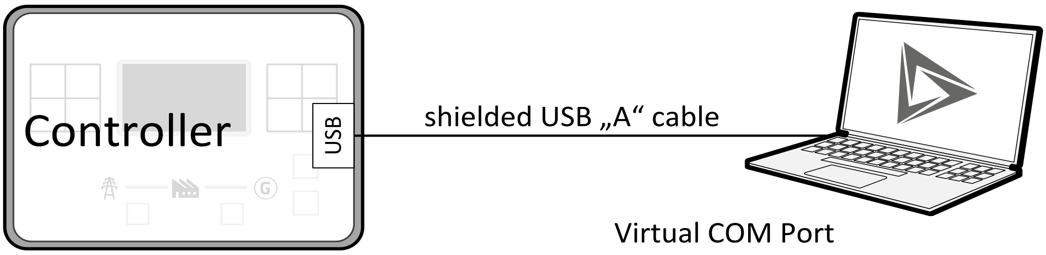


Image 6.5 Shielded USB type A cable is used

6.1.2 Remote communication

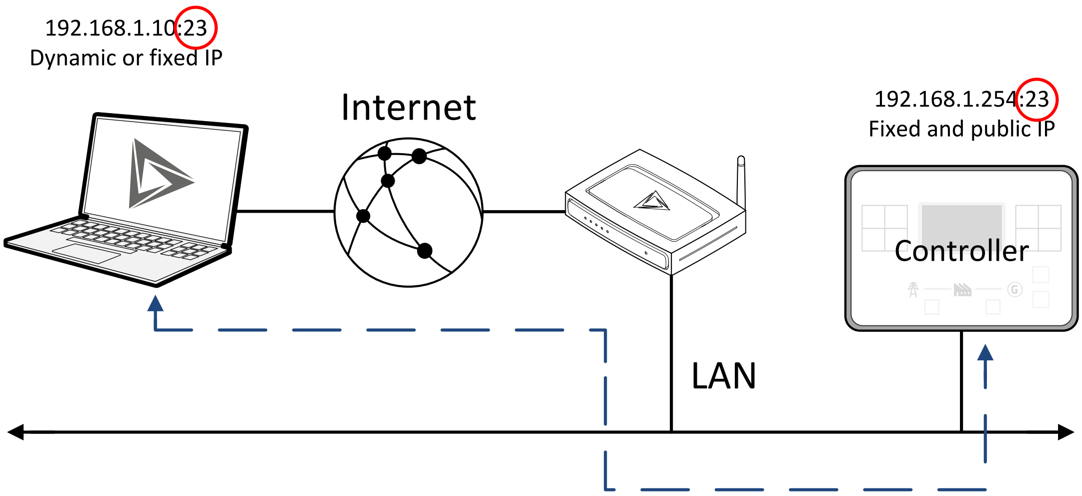
> **IMPORTANT: Factory default password and access code are "0". It is highly recommended to change these parameters.**

Internet connection

Public static IP

If public static IP connection is to be used from the Internet, the IP address, which is entered into the client computer, must be static and public in scope of the Internet.

- If CM-Ethernet is connected to the Internet via a local Ethernet network then in the most cases port forwarding must be created from the public IP address of the network gateway to the local IP address of CM-Ethernet at the port specified for ComAp protocol. Different port numbers can be used to create multiple port forwarding rules in the same local network.



AirGate

This connection type is intended for remote connection from InteliConfig, or any other ComAp PC tool over the Internet in situations, where obtaining fixed public IP address is not possible. Only two remote clients can be connected at the same time.

This connection type is active if AirGate connection is enabled. Setpoint **AirGate Address (page 286)** must contain AirGate server address. It can be entered in text form as well as numeric form. There is a public AirGate server available at the address "airgate.comap.cz".

Once the controller is connected to the Internet and the AirGate server address is properly adjusted then the controller registers automatically to the server and an identification string AirGate ID is given to a controller, which is visible at the controller screen.

To connect your PC tool to the controller use the AirGate connection, put the same AirGate address as in the controller into the AIRGATE ADDRESS field and use the AirGate ID displayed on the controller.

SMS

Event SMS

The InteliGen 500 controller equipped with the CM-GPRS or CM-4G-GPS communication module is able to send Event SMS according to the setting of setpoint:

- **Event Message (page 543)**

Note: *First, the setpoint* ***Telephone Number 1 (page 545)*** *must be adjusted to enable this function.*

The following events can be received by mobile phone:

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

Message structure:

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

Alarm SMS

The InteliGen 500 controller equipped with the CM-GPRS or CM-4G-GPS communication module is able to send Alarm SMS according to the setting of setpoints:

- **Wrn Message (page 544)**
- **Sd Messages (page 545)**
- **BOC Message (page 544)**

Note: *First, the setpoint* ***Telephone Number 1 (page 545)*** *must be adjusted to enable this function.*

Message structure:

- Gen-set Name
- AL=(Alarm 1, Alarm 2, Alarm x)

Note: *An asterisk means that alarm is unconfirmed and an exclamation mark means that alarm is active.*

SMS commands

To control the gen-set equipped with InteliGen 500 controller and CM-GPRS or CM-4G-GPS communication module (or modem) via SMS requests, send an SMS in the structure of:

xxxx, yyyy, zzzz, etc.

SMS send to the telephone number of the SIM card in your CM-GPRS module. Where the "#" mark means the controller access code, "xxxx" means the Command 1, "yyyy" is Command 2, "zzzz" is Command 3, etc.

Note: *Access code is set up via InteliConfig.*

IMPORTANT: If wrong controller access code is set, then only help command is working.

start	Start the engine in MAN mode.
stop	Stop the engine in MAN mode.
fault reset	Acknowledging alarms and deactivating the horn output.
gcb close	Closing GCB in MAN and TEST mode.
gcb open	Opening GCB in MAN and TEST mode.
mcb close	Closing MCB in MAN and TEST mode
mcb open	Opening MCB in MAN and TEST mode
off	Switching to OFF mode.
man	Switching to MAN mode.
auto	Switching to AUTO mode.
test	Switching to TEST mode.
status	Get status information from controller unit.
help	Get a list of available SMS requests.

***Note:** Between commands are internal delays adjusted due to system requirements.*

> **Example:** When the controller, in AUTO mode, with a controller name of "InteliGen 500-Test", with the CM-GPRS module and access code "0" receives the SMS:
> 0 man, start, gcb close, gcb open, stop, auto
> Controller mode will be changed to MANUAL mode. The engine will be started and GCB will close. Then GCB will open, the engine will stop and it will go into AUTO mode again.
> The controller will send back the SMS (controller will respond to SMS after every command has been finished, not sooner.):
> #InteliGen 500-Test: <OK>,<OK>,<OK>, <OK>,<OK>, <OK>
> The value <OK> or <ERROR> means if the command has been performed successfully or not.

Emails

Event Email

The InteliGen 500 controller equipped with the CM-Ethernet communication module is able to send an Event Email according to the setting of setpoint:

- **Event Message (page 543)**

***Note:** Setpoints **Email Address 1 (page 538)** and **SMTP Sender Address (page 293)** (for CM-GPRS) or **SMTP Sender Address (page 293)** (for CM-Ethernet) must be adjusted to enable this function.*

***Note:** **#Summer Time Mode (page 475)** and **Time Zone (page 543)** must be adjusted for correct time in emails.*

Message structure:

Controller

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

Alarm 1

Alarm 2

Alarm 3

Events

----

hh:mm:ss Event 1

hh:mm:ss Event 2

hh:mm:ss Event 3

Alarm Email

The InteliGen 500 controller equipped with the CM-Ethernet communication module is able to send Alarm Emails according to the setting of setpoints:

- **Wrn Message (page 544)**
- **Sd Messages (page 545)**
- **BOC Message (page 544)**

Note: *Setpoints* ***Email Address 1 (page 538)*** *and* ***SMTP Sender Address (page 293)*** *(for CM-GPRS) or* ***SMTP Sender Address (page 293)*** *(for CM-Ethernet) must be adjusted to enable this function.*

Note: #Summer Time Mode (page 475) *and* ***Time Zone (page 543)*** *must be adjusted for correct time in emails.*

Message structure:

Controller

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

Alarm 1

Alarm 2

Alarm 3

History events

----

0 dd/mm/yyyy hh:mm:ss.0 Event 1

-1 dd/mm/yyyy hh:mm:ss.0 Event 2

-2 dd/mm/yyyy hh:mm:ss.0 Event 3

Note: *An asterisk means that alarm is unconfirmed and an exclamation mark means that alarm is active.*

6.2 Connection to 3rd party systems

back to Communication

6.2.1 SNMP

SNMP is an UDP-based client-server protocol used for providing data and events into a supervisory system (building management system). The controller plays the role of a "SNMP Agent" while the supervisory system plays the role of a "SNMP Manager".

- CM-Ethernet module is required for SNMP function
- Supported versions – SNMP v1 and SNMP v2

The SNMP Agent function is to be enabled by the setpoint **SNMP Agent (page 294)** in the CM-Ethernet setpoint group. The setpoints **SNMP RD Community String (page 294)** and **SNMP WR Community String (page 294)** in the same group can be used to customize the "community strings" for the read and write operations which function like "passwords". All requests sent from the SNMP Manager must contain a community string which matches with the community string adjusted in the controller otherwise the controller will refuse the operation.

MIB table

The "MIB table" (Management Information Base) is a table which gives to the Manager a description of all objects provided by the Agent.

- The MIB table is specific for each controller type and configuration
- The MIB table is to be exported from the controller configuration using InteliConfig
- Controllers with identical firmware and configuration also share identical MIB table, however if the configuration and/or firmware is not identical the MIB table is different and must be exported separately for each controller.

The root node of the MIB table of the InteliGen 500 controller is enterprises.comapProjekt.il, which is 1.3.6.1.4.1.28634.14. Under this node can be found following sub-nodes :

- Notifications group (SMI v2 only) contains definitions of all notification-type objects that the Agent may send to the Manager.
- GroupRdFix contains read-only objects that exist in all controllers regardless of the firmware version/type and configuration.
- GroupRdCfg contains read-only objects that depend on the firmware version/type and configuration.
- GroupWrFix contains read-write objects that exist in all controllers regardless of the firmware version/type and configuration.
- GroupWrCfg contains read-write objects that depend on the firmware version/type and configuration.
- GroupW contains write-only objects.
- NotificationData group contains objects that are accessible only as bindings of the notification messages.

SMI version

In InteliConfig the MIB table may be exported in two different formats – SMI v1 and SMI v2. The format which shall be used for export depends on the SNMP Manager and the SMI version that it supports.

Typically, SMI v1 is used for SNMP v1 and vice versa, but it is not a rule. SMI v2 may also be used for SNMP v1.

SNMP reserved objects

Name	OID	Access	Data type	Meaning
pfActionArgument	groupWrFix.24550	read,write	Gauge32	Writing: command argument Reading: command return value
pfActionCommand	groupW.24551	write	Integer32	Command code *)
pfPassword	groupW.24524	write	Integer32	Password

Note: **)*
For list of commands, arguments and description of the procedure of invoking commands see the description of the Modbus protocol.

SNMP notifications

Except for the request-response communication model, in which the communication is controlled by the Manager, there are also messages that the Agent sends without any requests. These messages are called "Notifications" and inform the Manager about significant events which occurred in the Agent.

The controller can send notifications to two different SNMP Managers (two different IP addresses). The addresses are to be adjusted in the CM-Ethernet setpoint group by the setpoints **SNMP Traps IP Address 1** **(page 295)** and **SNMP Traps IP Address 2** **(page 295)**. If the Manager address is not adjusted the particular notification channel is off. The controller will send the notifications in the format adjusted by the setpoint SNMP Trap Format.

- Each notification (kind of event) is identified by a unique identifier (Trap ID in SNMPv1 or Notification OID in SNMPv2). This unique identifier gives the specific meaning to the notification message, e.g. Protection 1st level – Fuel Level – alarm activated.
- All possible notifications and their identifiers are listed in the MIB table.
- The notification message also contains controller name, serial number and textual description of the event.

Operational events

This events are used for SNMP traps. See the list below:

- Start commands of Gen-set
  - Start button
  - AMF start
  - Remote start
- Stop commands of Gen-set
  - Stop button
  - AMF stop
  - Remote stop

- Breaker records
  - Load on Gen-set
  - Load on mains
- Others
  - Test on load
  - Mains fail
  - Mains returned

6.2.2 MODBUS-RTU, MODBUS/TCP

MODBUS protocol is used for integration of the controller into a building management system or for remote monitoring via 3rd party monitoring tools.

- MODBUS-RTU can be used on serial interfaces (CM-RS232-485 module is requiredvia on board RS485 connector or via CM-RS232-485 communication module). The MODBUS-RTU server must be activated by switching the setpoint **COM1 Mode (page 521)** or **COM2 Mode (page 523)** into the Modbus position. The serial speed for MODBUS-RTU communication is adjusted by the setpoint **COM1 MODBUS Communication Speed (page 522)** or **COM2 MODBUS Communication Speed (page 524)**.
- MODBUS/TCP can be used on the Ethernet interface (CM-Ethernet module is required). Up to 2 clients can be connected simultaneously. The MODBUS/TCP server must be activated by the setpoint **MODBUS Server (page 296)**.

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

IMPORTANT: Do not write setpoint repeatedly (e.g. power control form a PLC repeated writing of baseload setpoint via Modbus). The setpoints are stored in EEPROM memory. which can be overwritten up to 10^5 times without risk of damage or data loss, but may become damaged, when the allowed number of writing cycles is exceeded!

Note: *Modbus-RTU serial communication mode is 8-N-1 – startbit 1, 8 data bits, no parity and 1 stopbit.*

Address space

The object address space is separated into several areas as described in the table below. The actual mapping of specific controller data objects to specific Modbus addresses, which depends on configuration, can be exported into a text file from the appropriate controller archive using InteliConfig. There are several special registers with fixed meaning (reserved registers) which are listed in a separate table in this chapter.

MODBUS address	Meaning	Access	MODICON object type	MODBUS function
0000 .. 0999	Binary objects	Read only	Discrete Inputs	Read: 01, 02
1000 .. 2999	Values	Read only	Input Registers	Read: 03, 04
3000 .. 3999	Setpoints	Read/Write	Holding Registers	Read: 03, 04 Write: 06, 16
4200 .. 7167	Reserved registers	Read/Write, depends on each specific register	Input Registers Holding Registers	Read: 03, 04 Write: 06, 16

Configurable part of the map

The contents of the configurable part of the map is specified in the configuration table. It can be changed by the customer as well as exported in a human-readable format using the configuration tool.

Discrete inputs

The discrete inputs are read-only objects located in the address range 0-999. The source ComAp objects for discrete inputs can be:

- Single bit of any value of any binary type.
- Protection (e.g. 2nd-level protection of the state "xyz"). The input is high if the protection is active regardless of if it is configured or not.

Input registers

The input registers are read-only numeric values located in the address range 1000-2999. The source ComAp objects can be:

- Any controller value of any data type. The mapping of the particular data type into registers is described in **Mapping data types to registers (page 224)**.

Holding registers

The holding registers are read-write numeric values located in the address range 3000-3999. The source ComAp objects can be:

- Any controller setpoint of a primitive data type. The mapping of the particular data type into registers is described in **Mapping data types to registers (page 224)**.

Default contents of the configurable part

The default map of Modbus objects contain following items. This map expects the PC tool does have the function allowing the user to modify the map.

Object type	Starting object address	Controller object
Discrete inputs	0000	Physical binary inputs CU + configured *) modules Logical binary outputs Protections on binary inputs CU + configured *) modules Protections on analog inputs CU + configured *) modules All Built-in fixed protections
Input registers	1000	All configured *) visible values
Holding registers	3000	None

Note: **)*
Present in the default configuration.

IMPORTANT: The default map of a particular firmware branch and application must not change when a new version of the firmware is created. If new objects are added they must be added to free positions so, that the previous content is not affected.

IMPORTANT: The default map of a particular firmware branch must not contain different values in different applications at the same Modbus address. It means if a ComAp object does not make sense in some application type the respective Modbus address must be left unassigned.

Mapping data types to registers

As there are multiple data types in the controller but only one data type in MODBUS (the register, which is 2 byte long), a mapping table is necessary to compose and decompose the MODBUS messages correctly.

Data type	Meaning	Number of registers	Data maping
Integer8	1-byte signed integer	1	MSB = sign extension LSB = value
Unsigned8	1-byte unsigned integer	1	MSB = 0 LSB = value
Integer16	2-byte signed integer	1	MSB = value, MSB LSB = value, LSB
Unsigned16	2-byte unsigned integer	1	MSB = value, MSB LSB = value, LSB
Integer32	4-byte signed integer	2	MSB1 = value, byte 3 (MSB) LSB1 = value, byte 2 MSB2 = value, byte 1 LSB2 = value, byte 0 (LSB)
Unsigned32	4-byte unsigned integer	2	MSB1 = value, byte 3 (MSB) LSB1 = value, byte 2 MSB2 = value, byte 1 LSB2 = value, byte 0 (LSB)
Binary8	8-bit binary value	1	MSB = 0 LSB = value, bits 0-7
Binary16	16-bit binary value	1	MSB = value, bits 8-15 LSB = value, bits 0-7
Binary32	32-bit binary value	2	MSB1 = value, bits 24-31 LSB1 = value, bits 16-23 MSB2 = value, bits 8-15 LSB2 = value, bits 0-7
Char	1-byte ASCII character	1	MSB = 0 LSB = ASCII value of the character
StrList	Index into a list of strings	1	MSB = 0 LSB = index into the list
ShortStr	Zero-terminated string of max 15 ASCII characters.	8	MSB1 = ASCII value of the 1. character LSB1 = ASCII value of the 2. character MSB2 = ASCII value of the 3. character LSB2 = ASCII value of the 4. character …
LongStr	Zero-terminated string of	16	MSB1 = ASCII value of the 1. character

Data type	Meaning	Number of registers	Data maping
	max 31 ASCII characters.		LSB1 = ASCII value of the 2. character MSB2 = ASCII value of the 3. character LSB2 = ASCII value of the 4. character …
Date	Date (dd-mm-yy)	2	MSB1 = BCD (dd) LSB1 = BCD (mm) MSB2 = BCD (yy) LSB2 = 0
Time	Time (hh-mm-ss)	2	MSB1 = BCD (hh) LSB1 = BCD (mm) MSB2 = BCD (ss) LSB2 = 0
Alarm	An item of the Alarmlist	27	MSB1 = reserved for future use LSB1 = reserved for future use MSB2 = Alarm level *) LSB2 = Alarm status **) MSB3 = alarm string ***) LSB3 = alarm string MSB4 = alarm string LSB5 = alarm string …

Note:
**) 1 .. level 1 (yellow), 2 .. level 2 (red), 3 .. sensor fail*
***) Bit0 – alarm is active, Bit1 – alarm is confirmed*
****) String encoding is UTF-8*

Error codes (exception codes)

An exception code is returned by the controller (server) if the query sent from the client could not be completed successfully.

The controller responds with the error codes in as follows:

- 01 – Illegal function is returned if an incompatible type of operation is applied for a specific object, e.g. if function 03 is applied to a binary object.
- 02 – illegal address is returned if the client tries to perform an operation with an object address that is not related to any existing object or that is located inside an object which is composed by multiple addresses (registers).
- 04 – device error is returned in all other erroneous situations. More detailed specification of the problem can be obtained by reading the registers 4205 – 4206.

Reserved registers

There are several registers with specific meanings. These registers are available in all controllers regardless of the configuration.

Register addresses	Number of registers	Access	Data type	Meaning
4200 - 4201	2	read/write	Time	RTC Time in BCD code
4202 - 4203	2	read/write	Date	RTC Date in BCD code
4204	1	read/write	Unsigned8	Index of the language that is used for text data provided by MODBUS (e.g. alarmlist messages).
4205 - 4206	2	read	Unsigned32	Last application error. To be read after the device returns the exception code 04. It contains specific information about the error.
4207 - 4208	2	read/write	Unsigned32	Writing:command argument Reading: command return value
4209	1	write	Unsigned16	Command code
4010	1	-	-	Not implemented
4211	1	write	Unsigned16	Password
4212 - 4213	2	read	Unsigned32	Communication status
4214	1	read	Unsigned8	Number of items in the Alarmlist
4215 - 4241	27	read	Alarm	1. record in alarm list
4242 - 4268	27	read	Alarm	2. record in alarm list
4269 - 4295	27	read	Alarm	3. record in alarm list
4296 - 4322	27	read	Alarm	4. record in alarm list
4323 - 4349	27	read	Alarm	5. record in alarm list
4350 - 4376	27	read	Alarm	6. record in alarm list
4377 - 4403	27	read	Alarm	7. record in alarm list
4404 - 4430	27	read	Alarm	8. record in alarm list
4431 - 4457	27	read	Alarm	9. record in alarm list
4458 - 4484	27	read	Alarm	10. record in alarm list
4485 - 4511	27	read	Alarm	11. record in alarm list
4512 - 4538	27	read	Alarm	12. record in alarm list
4539 - 4565	27	read	Alarm	13. record in alarm list
4566 - 4592	27	read	Alarm	14. record in alarm list
4593 - 4619	27	read	Alarm	15. record in alarm list
4620 - 4646	27	read	Alarm	16. record in alarm list

List of commands and arguments

"Commands" are used to invoke a specific action in the controller via the communication channel. The list of available actions is in the table below. The general procedure of writing a command via Modbus is as follows:

1. (Optional) Write required level of password into the register 44212 (register address 4211). Use function 6. If the password is required or not depends on configuration of access rules. It can be adjusted/modified by InteliConfig.
2. Write the command argument into the registers 44208-44209 (register addresses 4207-4208). Use function 16.
3. Write the command code into the register 44210 (register address 4209). Use function 6.
4. (Optional) Read the command return value from the registers 44208-44209 (register addresses 4207-4208). Use function 3.
5. If the command was executed the return value is as listed in the table. If the command was accepted but there was an error during execution the return value indicates the reason:
    a. 0x00000001 – invalid argument
    b. 0x00000002 – command refused (e.g. controller not in MAN, breaker cannot be closed in the specific situation etc.)

Action	Command code	Argument	Return value
Engine start *)	0x01	0x01FE0000	0x000001FF
Engine stop *)	0x01	0x02FD0000	0x000002FE
Fault reset *)	0x01	0x08F70000	0x000008F8
Horn reset *)	0x01	0x04FB0000	0x000004FC
GCB toggle *)	0x02	0x11EE0000	0x000011EF
GCB on	0x02	0x11EF0000	0x000011F0
GCB off	0x02	0x11F00000	0x000011F1
MCB toggle *)	0x02	0x12ED0000	0x000012EE
MCB on	0x02	0x12EE0000	0x000012EF
MCB off	0x02	0x12EF0000	0x000012F0

Note: **)*
This action is an equivalent of pressing the front panel button

MODBUS examples

Modbus RTU examples

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

Table: Values									
Allowed Modbus functions: 03, 04									
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01083	8213	**Battery Volts**	**V**	Integer	2	**1**	0	360	Controller I/O

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

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

We read a value 240 from register 01083. From the table of Modbus registers we get the dimension of read value and "Dec". Dec=1 means shift one decimal place to the right. So the battery voltage is **24.0 V**.

- Reading Nominal power
  - Export table of values from InteliConfig

Table: Values									
Allowed MODBUS functions: 03, 04									
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01227	9018	**Nominal Power**	**kW**	Integer	2	**0**	0	32767	Generator

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

Response: (Numbers in Hex)						
01	03	02	00	C8	B9	D2
Controller address	Modbus function	Length of data 02_{hex} = 2 bytes read	Data $00C8_{hex}$ = **200**$_{dec}$		CRC	

Read nominal power is 200 kW.

Reading all binary inputs as Modbus register

Table: Values									
Allowed Modbus functions: 03, 04									
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01089	8235	**Binary Inputs**		Binary#2	2	**0**	-	-	Controller I/O

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

Response: (Numbers in Hex)						
01	03	02	00	12	38	49
Controller address	Modbus function	Length of data 02_{hex} = 2 bytes read	Data 0012_{hex} = **00010010**$_{bin}$		CRC	

Binary inputs is 00010010. This means Binary input 2 and binary input 5 are active.

Note: *You can use Modbus function 4 instead of 3, the rest of the data remains the same (CRC differs).*

› Reading binary inputs as coil status.

Table: Binaries						
Allowed Modbus functions: 01, 02						
Addresses Modbus Addr. Prot. Addr.	Source = Value = State	C.O.# State #	Name of Value Name of State	Bit #	Bit Name Activated by protection (s):	Group
00000	Value	8235	Binary Inputs	1	GCB Feedback	Controller I/O
00001	Value	8235	Binary Inputs	2	MCB Feedback	Controller I/O

We will read state of MCB Feedback binary input.

Request: (Numbers in Hex)							
01	01	00	01	00	01	AC	0A
Controller address	Modbus function	Register address 0001_{hex} = **0001**$_{dec}$		Number of registers		CRC	

Response: (Numbers in Hex)					
01	01	01	01	90	48
Controller address	Modbus function	Length of data 01_{hex} = 1 byte read	Data 01_{hex} = active	CRC	

The read data is 01. This means this binary input is active.

Note: *You can use Modbus function 2 instead of 1, the rest of the data remains the same (CRC differs).*

Starting the engine

Before starting engine you may need to write password depending on the settings in controller.

Table **Reserved registers (page 226)**

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

Table **List of commands and arguments (page 227)**

Action	Command code	Argument	Return value
Engine start	0x01	0x01FE0000	0x000001FF
Engine stop	0x01	0x02FD0000	0x000002FE

Request 1/2: (Numbers in Hex)						
01	10	10	6F	00	03	06
Controller address	Modbus function $10_{hex} = 16_{dec}$	Register address $106F_{hex} = \mathbf{4207}_{dec}$		Number of registers		Data length in bytes

Request 2/2: (Numbers in Hex)							
01	FE	00	00	00	01	68	0B
Argument				Command code		CRC	

***Note:** Command and argument may be written as one "packet" (function 16) or you can split it and write argument (function 16) and then the command code (function 6).*

Password

This password is the same as in InteliConfig or directly in controller.

Table **Reserved registers (page 226)**

Register addresses	Number of registers	Access	Data type	Meaning
4211	1	write	Unsigned16	Password

Note: *Default password is "0".*

In this example the password is "1234".

Request: (Numbers in Hex)							
01	06	10	73	04	D2	7C	D1
Controller address	Modbus function	Register address 1073_{hex} = $\mathbf{4211}_{dec}$		Password $04D2_{hex}$ = $\mathbf{1234}_{dec}$		CRC	

Response for success: (Numbers in Hex)							
01	06	10	73	00	00	7C	D1
Controller address	Modbus function	Register address 1073_{hex} = $\mathbf{4211}_{dec}$		Allways zero.		CRC	

Response for bad password: (Numbers in Hex)				
01	86	04	43	A3
Controller address	Modbus exception for function 6.	04 – device error **see Error codes (exception codes) on page 225**	CRC	

Nominal Power – writing

Table: Setpoints									
Allowed Modbus functions: 03, 04, 06, 16									
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
03027	8276	**Nominal Power**	**kW**	Unsigned	2	**0**	1	5000	Basic Settings

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

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

Written setpoint nominal power is 100 kW.

CRC calculation

The check field allows the receiver to check the validity of the message. The check field value is the Cyclical Redundancy Check (CRC) based on the polynomial $x^{16}+x^{15}+x^{2}+1$. CRC is counted from all message bytes preceding the check field.

Online CRC calculator: http://www.lammertbies.nl/comm/info/crc-calculation.html Use CRC-16 (Modbus)

Write LSB first.

For writing nominal power 100 kW the CRC is calculated from this data: $01060BC00064_{hex}$

Modbus TCP examples

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

Table: Values									
Allowed Modbus functions: 03, 04									
Register (s)	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01083	8213	**Battery Volts**	**V**	Integer	2	**1**	0	360	Controller I/O

Request: (Numbers in Hex)													
00	00	00	00	00	06	01	03	04	1D	00	01
transaction identifier (usually 0)		protocol identifier (usually 0)		Length of data bytes following		Controller address	Modbus function	Register address $041D_{hex}$ = **1053**$_{dec}$		Number of registers	

Response: (Numbers in Hex)										
00	00	00	00	00	05	01	03	02	00	F0
transaction identifier (usually 0)		protocol identifier (usually 0)		Length of data bytes following		Controller address	Modbus function	Length of data 02_{hex} = 2 bytes read	Data $00F0_{hex}$ = **240**$_{dec}$	

We read a value of 240 from register 01083. From the table of Modbus registers we get the dimension of read value and "Dec". Dec=1 means shift one decimal place to the right. So the battery voltage is **24.0 V**.

back to Communication

7 Technical data

Power supply

Power supply range	8-36 VDC
Power consumption (without modules)	6 W
RTC battery	Replaceable (3 V)
Fusing power	5 A / 6 × 0.5 A BOUT
E-Stop fusing	1.2 A
Max. Power Dissipation	8 W

Operating conditions

Protection degree (front panel)	IP 65
Operating temperature	-30 ˚C to +70 ˚C (-40 °C to +70 ˚C)*
Storage temperature	-30 ˚C to +80 ˚C
Operating humidity	95 % non-condensing (EN 60068-2-30)
Vibration	5-25 Hz, ± 1.6 mm 25-100 Hz, a = 4 g
Shocks	a = 500 m/s^2
Surrounding air temperature rating 70 °C Suitable for pollution degree 2	

D+

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

Voltage measurement

Measurement inputs	3ph-n Gen voltage , 3ph-n Mains
Measurement range	277 V AC / 480 V AC (EU) 346 V AC / 600 V AC (US/Canada)
Accuracy	1 %
Frequency range	40-70 Hz (accuracy 0.1 Hz)
Input impedance	0.72 MΩ ph-ph , 0.36 MΩ ph-n

Voltage regulator output

Protection	Isolated
Type	max ±10 VDC

Speed governor output

Output Type	±10 VDC or 5 V @ 500 Hz, PWM selectable by jumper
Protection	Non-isolated

Display

Type	Build-in colour TFT 5"
Resolution	800 × 480 px

Communications

USB Device	Non-isolated type B connector
USB Host	Non-isolated type A connector
RS485	Isolated
Ethernet	10/100 Mbit
CAN 1 + CAN 2	250 / 50 kbps, isolated, nominal impedance 120 Ω

Current measurement

Measurement inputs	3ph Gen current, 1ph Mains current
Measurement range	5 A
Max. allowed current	10 A
Accuracy	±20 mA for 0-2 A; 1 % of value for 2-5 A
Input impedance	<0.1 Ω

E-Stop

Dedicated terminal for safe E-Stop input. Physically disconnects binary outputs 1 & 2 from power supply.

Binary inputs

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

Binary outputs

Number	8, non-isolated
Max. current	BO 1-8 = 0.5 A
Switching to	positive supply terminal

Analog inputs

Number	4, switchable (R/U/I)
Range	R = 0-2500 Ω; U = 0-10 V; I = 0-20 mA
Accuracy	R: ±2 % from value ±5 Ω in range 0-250 Ω R: ±4 % from value in range 250 Ω-2500 Ω U: 1 % from value ±100 mV I: 1 % from value ±0.2 mA

Magnetic pickup

Voltage input range	4 Vpk-pk to 50 Vpk-pk in range 4 Hz to 1 kHz 6 Vpk-pk to 50 Vpk-pk in range 1 to 5 kHz 10 Vpk-pk to 50 Vpk-pk in range 5 to 10 kHz
Frequency input range	4 Hz to 10 kHz
Frequency measurement tolerance	0.2 % from range 10 kHz

Note: **) If the device is powered on above -30 °C*

back to Table of contents

8 Appendix

back to Table of contents

8.1 Controller objects

8.1.1 List of controller objects types

8.1.2 Setpoints

What setpoints are:

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

All setpoints can be protected by a password against unauthorized changes. Password protection can be assigned to the setpoints during the configuration procedure. See the chapter **Password screen (page 80)** in Operator guide for instructions on how to enter and modify a password.

IMPORTANT: Do not write setpoints repeatedly (e.g. power control from a PLC by repeated writing of baseload setpoint via Modbus). The setpoints are stored in EEPROM memory, which can be overwritten up to 10^5 times without risk of damage or data loss, but it may become damaged, when the allowed number of writing cycles is exceeded.

For full list of setpoints go to the chapter **List of setpoints (page 238)**.

List of setpoints

back to Controller objects

Group: Process Control

Subgroup: Application Selector

Application Mode Select

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	SPtM / MINT / External [-]		
Default value	MINT	**Alternative config**	NO
Step	[-]		
Comm object	12157	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint defines the controller application.

The change of this setpoint is accepted in OFF mode only = It is not possible to change the setpoint while the controller is not set to OFF mode.

SPtM	Single parallel to mains application. The controller controls two breakers – a mains breaker and a generator breaker. Feedback from both breakers is required.
MINT	Multiple island-parallel application without mains and multiple parallel application with mains. The controller controls one breaker only, the generator breaker. Feedback from the generator breaker is required. For parallel to mains operation also mains breaker feedback is required.
External	Application mode selection is done with LBI **SPtM/MINT Mode Select (page 734)**, change of the LBI state is accepted in the OFF mode only.

back to List of setpoints

Subgroup: Load Control

Load Control PTM

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	Baseload / Import/Export [-]		
Default value	Baseload	**Alternative config**	NO
Step	[-]		
Comm object	8638	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjust the type of load control.

Baseload	Gen-set produces amount of the power given by setpoint **Baseload (page 252)**. The rest of power is supplied from the mains or exported to the mains (depends on proportions of load and **Baseload (page 252)** setpoint). Even in baseload control mode can be the Import/Export limited. This function can be activated by setpoint **Import/Export Limitation (page 254)** = Enabled. Then the request for the power of the genset operating in baseload can be limited to prevent the Import/Export go below the limit given by setpoint **Import Load (page 253)**. **Example:** Baseload = 1000 kW, load = 700 kW, Import load = 100. Then the Baseload request will be limited to 600 kW to prevent the Import power go below 100 kW **Example:** Baseload = 1000 kW, load = 700 kW, Import load = -100. Then the Baseload request will be limited to 800 kW to prevent the Import power go below -100 kW (actually it is limitation of the export). The load of the Gen-set group is controlled to keep constant level of base load of the whole system. The level is adjusted by the setpoint **#System BaseLoad (page 254)**.
Imp/Exp	Gen-set produces the certain amount of power to keep constant import/export from the mains regardless the demand of the load. The requested import/export is given by setpoint **Import Load (page 253)**. If the value of the setpoint is >0 the power is imported from the mains, if setpoint value is <0, then the power is exported to the mains.

Note: *In both modes, the lower level of the power is always limited by the setpoint **Minimal Power PTM (page 344)**. If the requested load (given by the active load control mode, e.g. Baseload, Import/Export) is below this limit the requested load is limited to the level adjusted by this setpoint.*

back to List of setpoints

PF Control PTM

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	Base PF/ PF Import/Export [-]		
Default value	Base PF	**Alternative config**	NO
Step	[-]		
Comm object	10120	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjust the type of power factor control.

Base PF	The power factor on the Gen-set is kept on the level given by the setpoint **BasePower Factor (page 252)** regardless the load demand. The rest of demanded reactive power is supplied from the mains. Values >1 means that capacitive reactive power is supposed to be imported from mains, values <1 means that inductive reactive power is imported from the mains. Gen-sets are controlled to keep the constant level of the power factor. The level is adjusted by setpoint **#System Power Factor (page 255)**.
PF Imp/Exp	Gen-set produces the certain amount of reactive power to keep constant PF imported from the mains regardless the demand of the load. The requested power factor import is given by setpoint **Import PF (page 253)**. Values >1 means that the gen-set is pushing the capacitive power to the system (sytem Gen-set – Load- Mains) , values <1 means that the Gen-set is pushing the inductive power to the system.

back to List of setpoints

#System Load Control PTM

Setpoint group	Process Control	Related FW	1.6.0
Range [units]	Baseload / Loadsharing [-]		
Default value	Baseload	Alternative config	NO
Step	[-]		
Comm object	8774	Related applications	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

Load control mode in parallel to mains operation of the whole group of Gen-sets.

Baseload	The total power of the group is controlled to constant level given by the setpoint **#System BaseLoad (page 254)**. Each loaded Gen-set takes equal part (relative to their nominal power) from this requested value. The load is regulated locally in each controller by Load control regulation loop, load-sharing is not active. The setpoint **#System BaseLoad (page 254)** is also used for determining which Gen-sets have to run or not.
Loadsharing	Gen-sets load is controlled by InteliMains 210 controller to share the total load (given by the setpoint **#System BaseLoad (page 254)**) with other loaded Gen-sets in such a way, that all loaded gen-sets will be loaded at the same level (relative to gen-set nominal power). Load-sharing regulation loop is active.

***Note:** The Loadsharing mode shall be used in case a InteliMains 210 controller is present in the system. In systems without InteliMains 210 the setpoint must be in the Baseload position.*

***Note:** The power factor (PF) is regulated to constant level given by the setpoint **#System PF Control PTM (page 252)** in parallel to mains operation and does not depend on active load control mode.*

back to List of setpoints

#System PF Control PTM

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	Base PF / Var Sharing [-]		
Default value	Base PF	**Alternative config**	NO
Step	[-]		
Comm object	8779	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
Power factor control mode in parallel to mains operation of the whole group of Gen-sets.			

Base PF	Gen-sets PF is controlled by their PF control loops to provide constant power factor adjusted by setpoint **#System Power Factor (page 255)**. InteliMains 210 doesn't play active role in PF control in parallel to mains operation.
Var Sharing	Gen-sets PF is controlled by InteliMains 210 through the VAr sharing line.

back to List of setpoints

Baseload

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	0 .. **Nominal Power (page 261)** [kW]		
Default value	100 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8639	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Required Gen-set load in parallel to mains operation.			

back to List of setpoints

BasePower Factor

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	0.60 .. 1.20 [-]		
Default value	1.00 [-]	**Alternative config**	NO
Step	0.01 [-]		
Comm object	8640	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Required gen-set power factor when the Gen-set is running in parallel to the mains.			

back to List of setpoints

Import Load

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	-32 000 .. 32 000 [kW]		
Default value	0 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8641	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Defines maximal limit of load for import/export. Behavior of setpoint depends on setpoint **Load Control PTM (page 249)**.

Baseload	Setpoint adjust the maximal value of import/export. Also **Import/Export Limitation (page 254)** setpoint has to be set to Enabled.
Import/Export	Setpoint adjust requested value of constant import/export.

If the value of the setpoint is >0 the power is imported from the mains, if the setpoint value is <0, then the power is exported to the mains.

back to List of setpoints

Import PF

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	0.60 .. 1.20 [-]		
Default value	1.00 [-]	**Alternative config**	NO
Step	0.01 [-]		
Comm object	8642	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Defines maximal limit of power factor for import/export. Behavior of setpoint depends on setpoint **PF Control PTM (page 250)**.

Baseload	Setpoint adjust the maximal value of import. Also **Import/Export Limitation (page 254)** setpoint has to be set to Enabled.
Import/Export	Setpoint adjust requested value of constant import.

back to List of setpoints

Import/Export Limitation

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	ENABLED / DISABLED [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	9592	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Enable or disable limitation for import/export. If function is enabled, then the request for the power of the gen set is limited to prevent the Import/Export go below the limits. Limits are adjusted via setpoints **Import Load (page 253)** and **Import PF (page 253)**.

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

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

back to List of setpoints

#System BaseLoad

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	0 .. 32 000 [kW]		
Default value	1000 kW	**Alternative config**	NO
Step	1 [kW]		
Comm object	8775	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

Required total load of the Gen-set group in parallel to mains operation in baseload mode (setpoint **#System Load Control PTM (page 251)** = Baseload).

back to List of setpoints

#System Power Factor

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	0.60 .. 1.20 [-]		
Default value	1.00 [-]	**Alternative config**	NO
Step	0.01 [-]		
Comm object	8776	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
Required Gen-set power factor when the group of Gen-sets is running parallel to the mains. The PF is regulated locally in each controller by PF control regulation loop, VARsharing is not active.			

back to List of setpoints

Subgroup: Neutral Contactor

#Neutral Contactor Control

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	Each / Common [-]		
Default value	Each	**Alternative config**	NO
Step	[-]		
Comm object	9890	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Setpoint changes behavior of binary output **NCB CLOSE/OPEN (PAGE 795)**which is used for neutral contactor control.

Each	The EACH option should be used if each Gen-set has it's own neutral contactor. Four-pole GCB must be used in this case. › 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. It is always the gen-set with lowest CAN address
Common	The COMMON option should be used if there is one common neutral contactor for the whole site. The **NCB CLOSE/OPEN (PAGE 795)** outputs from all controllers are combined together and the combined signal is used to control the breaker. Three-pole GCB must be used in this case. › 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 contactor is closed

***Note:** Logical binary input **NCB FEEDBACK (PAGE 728)** has to be configured for proper functionality.*

back to List of setpoints

Subgroup: Process Limitation

CB Control In MAN Mode

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	Full Ctrl / Aut Trans / Islnd Disl [-]		
Default value	Full Ctrl	**Alternative config**	NO
Step	[-]		
Comm object	14962	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

The behavior of transition of load in MAN mode is adjusted via this setpoint.

Full Ctrl	No limitation of CB control in MAN mode (operator can close any breaker manually or evoke the synchronization and consequential operation in parallel to mains)
Aut Trans	Operator can control both MCB or GCB breaker. However once transition is evoked the controller performs the automatic transfer of the load (depends on adjustment of setpoints **Transfer Gen To Mains (page 397)** and **Transfer Mains To Gen (page 397)**). Controller performs synchronization across MCB, ifGCB is closed and MCB button is pushed. Load transfer is done after synchronization andGCB is opened automatically. Controller performs synchronization acrossGCB, if MCB is closed andGCB button is pushed. Load transfer is done after synchronization and MCB is opened automatically. It is also possible to open currently closed breaker and keep the load non-energized. Then it is possible to close MCB orGCB to energize the load from a healthy source. ***Note:*** *Parallel operation with mains continues, if system already operates in parallel with mains and setting is changed to Aut Trans. It is necessary to push MCB or GCB button to open a breaker.* ***Note:*** *Open transfer is performed, if the Open option is selected with **Transfer Gen To Mains (page 397)** or **Transfer Mains To Gen (page 397)**.*
Islnd Disl	Behaves like the full manual control but the Island operation is disabled. **Example:** When MCB opened and GCB is pressed, controller doesn't go to island. **Example:** In parallel operation when MCB button pressed, MCB is not opened.

back to List of setpoints

Subgroup: Mains Import Measurement

Mains Import Measurement

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	None/Mains CT/Analog Input [-]		
Default value	Mains CT	**Alternative config**	NO
Step	[-]		
Comm object	10599	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Visible only in SPtM mode		
Description			

Defines source value of the **Mains Import kW (page 636)** measurement.

None	The Mains Import is not measured and the duration of the load transfer in direction Mains to Generator is given exactly by the setpoint Speed/Load Control / **Close Transfer Max Duration (page 393)**.
Mains CT	The **Mains Import kW (page 636)** value is measured via Mains CTs. The load transfer in direction Mains to Generator is considered to be finished when the mains is unloaded under certain level.
Analog Input	The **Mains Import kW (page 636)** value is measured via analog input, accordingly LAI: **MAINS IMPORT MEASUREMENT (PAGE 841)**. The load transfer in direction Mains to Generator is considered to be finished when the mains is unloaded under certain level.

back to List of setpoints

Subgroup: Peak Shaving

Peak Shaving

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	Enabled / Disabled [-]		
Default value	Disable	**Alternative config**	NO
Step	[-]		
Comm object	11601	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

The behavior of peak shaving functions

Enabled	The Peak Shaving function is active and the start command is activated when the conditions for Peaks Shaving activation were fulfilled.
Disabled	The Peak Shaving function is BLOCKED and the start command can not be activated even the conditions for Peaks Shaving activation were fulfilled.

back to List of setpoints

Peak Shaving Start Level

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	**Peak Shaving Start Level (page 259)** .. 32000 [kW]		
Default value	1000 kW	**Alternative config**	NO
Step	1 [kW]		
Comm object	8643	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Peak Shaving (page 258)** = enabled		
Description			
This setpoint starts Gen-set, when the value of the load consumption Load kW exceeds the value given by this setpoint for the time of **Peak Shaving Start/Stop Delay (page 260)**. The gen-set is synchronized to the Mains (kept in the parallel to the Mains) and the Gen-set power is controlled according to the settings in the Group Process Control/Load Control. The Gen-set stays running until the conditions for Peak Shaving run are active. Conditions of deactivation are given by the setpoint **Peak Shaving Stop Level (page 259)** and **Peak Shaving Start/Stop Delay (page 260)**.			

back to List of setpoints

Peak Shaving Stop Level

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	0 .. **Peak Shaving Start Level (page 259)** [kW]		
Default value	900 kW	**Alternative config**	NO
Step	1 [kW]		
Comm object	8644	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Peak Shaving (page 258)** = enabled		
Description			
This setpoint stops Gen-set, of the load consumption Load kW decreases under the value given by this setpoint for the time of **Peak Shaving Start/Stop Delay (page 260)**.			

back to List of setpoints

Peak Shaving Start/Stop Delay

Setpoint group	Process Control	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	600 s	**Alternative config**	NO
Step	1 s		
Comm object	9989	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Peak Shaving (page 258)** = enabled		
Description			
Defines of the delay of activation or deactivation of the Peak Shaving. Starts when: › The value of the load consumption Load kW exceeds the value given by the setpoint **Peak Shaving Start Level (page 259)**. › The value of the load consumption Load kW decreases under the value given by the setpoint **Peak Shaving Stop Level (page 259)**			

back to List of setpoints

Group: Basic settings

Subgroup: Name

Gen-Set Name

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	0 .. 15 characters [-]		
Default value	InteliGen 500	**Alternative config**	NO
Step	[-]		
Comm object	8637	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
User defined name, used for the controller identification at remote phone or mobile connection. Gen-set Name is maximally 15 characters long and can be entered using InteliConfig or from controller's configuration menu. ***Note:** If the Gen-set Name is "TurboRunHours", the running hours will be counted faster – 1 minute in real will represent 1 hour.*			

back to List of setpoints

Subgroup: Power settings

Nominal Power

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	8276	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal power of the Gen-set. Generator **Overload BOC (page 343)** protection is based on this setpoint.

> ***Note:*** *This setpoint is used when setpoint* ***Connection type (page 264)*** *is adjusted to Monophase or Splitphase or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.*

> ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Power 1 (page 506)****,* ***Nominal Power 2 (page 512)*** *and* ***Nominal Power 3 (page 518)****.*

> ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*

back to List of setpoints

Nominal Power Split Phase

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	9977	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**		
Description			

Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 343)** protection is based on this setpoint.

> ***Note:*** *This setpoint is used when setpoint* ***Connection type (page 264)*** *is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.*

> ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Power Split Phase 1 (page 506)****,* ***Nominal Power Split Phase 2 (page 512)*** *and* ***Nominal Power Split Phase 3 (page 518)****.*

back to List of setpoints

Subgroup: Current settings

Nominal Current

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	1 .. 10 000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	8275	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**.		
Description			
It is current limit for mains current protections and means maximal continuous mains current. Nominal Current can be different from mains rated current value.			
Note: *To lock this setpoint against editing you also have to lock setpoint **Nominal Current 1 (page 507)**, **Nominal Current 2 (page 513)** and **Nominal Current 3 (page 519)**.*			

back to List of setpoints

CT Ratio

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	1 .. 10000 [A/5A]		
Default value	2000 A/5A	**Alternative config**	NO
Step	1 A/5A		
Comm object	8274	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Current transformers ratio of Gen-set Mains import.			
Note: *Generator Mains currents and power measurement is suppressed if current level is below 1% of CT range.*			

back to List of setpoints

CT Location

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	Load / Gen-set / None [-]		
Default value	Gen-set	**Alternative config**	NO
Step	[-]		
Comm object	11625	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts position of current measurement.

Load	Current CT's are physically placed on Load (typically between GCB and MCB).
Gen-set	Current CT's are physically placed on Gen-set (typically before GCB).
None	There are no current CT's.

When option None is selected, following objects are hidden/changed:

- Current screen is hidden
- Generator Power screen is hidden
- Statistics screens – values Gen-set kWh, Gen-set kVArh, Mains kWh and Mains kWArh are hidden
- Main screen – kW meter is replaced by generator voltage meter
  - Generator L1-N voltage is displayed for Monopahse, Splitphase L1L2, Splitphase L1L3 and High Leg delta connection types
  - Generator L1-L2 voltage is displayed for 3ph3w and 3ph4w connection types
- Group Load is hidden
- Group Statistics – values Gen-set kWh, Gen-set kVArh, Mains kWh and Mains kWArh are hidden

back to List of setpoints

Mains/Aux CT Ratio

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	1 .. 10 000 [A/5A]		
Default value	500 A/5A	**Alternative config**	NO
Step	1 A/5A		
Comm object	8566	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Mains/auxiliary current transformers ratio.

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

back to List of setpoints

Subgroup: Voltage settings

Connection type

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	11628	**Related applications**	MINT, SPtM

Setpoint visibility	Always

Description

Connection type:

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)
SplPhL1L2	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
SplPhL1L3	Double Delta connection Split Phase Two phase voltage measurement L1,L3 with 180° phase shift 2x CT (Current Transformer)
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)

3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)	
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)	
Autodetect	High Leg Delta	L1 >=100 V; L1 <=140 V L2 >=140 V L3 >=100 V; L3 <=140 V
	3Ph Low Y	L1 <=160 V L2 <=160 V L3 <=160 V
	3Ph High Y	L1 >160 V L2 >160 V L3 >160 V
	SplPhL1L3	L1 >=100 V L2 <= 20 V L3 >=100 V
	SplPhL1L2	L1 >=100 V L2 >= 100 V L3 <= 20 V
	Mono Phase	L1 >=100 V L2 <= 20 V L3 <= 20 V
	Voltage Autodetect shutdown ***Note:*** *Function Autodetect can't be used with the setpoint* ***Gen to Mains/Bus Phase Shift (page 406)*** *simultaneously.*	

Note: *To lock this setpoint against editing you also have to lock setpoint* ***Connection Type 1 (page 503)***, ***Connection type 2 (page 509)*** *and* ***Connection type 3 (page 515)***.

Note: *There is a change in the voltage regulation in the Cooling state if the* ***Connection type (page 264)*** *is set to Autodetect. The controller continues to regulate to the selected nominal voltage even during Cooling instead of switching to the* ***Voltage Regulator Bias (page 401)*** *level to keep the requested nominal voltage.*

back to List of setpoints

Gen Nominal Voltage Ph-N

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	10 .. 34 641 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	8277	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**.		
Description			

Nominal generator voltage (phase to neutral).

> ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Gen Nominal Voltage Ph-N 1 (page 508)****,* ***Gen Nominal Voltage Ph-N 2 (page 514)*** *and* ***Gen Nominal Voltage Ph-N 3 (page 520)****.*

back to List of setpoints

Gen Nominal Voltage Ph-Ph

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	10 .. 60 000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	11657	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**.		
Description			

Nominal generator voltage (phase to phase).

> ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Gen Nominal Voltage Ph-Ph 1 (page 508)****,* ***Gen Nominal Voltage Ph-Ph 2 (page 514)*** *and* ***Gen Nominal Voltage Ph-Ph 3 (page 520)****.*

back to List of setpoints

Mains/Bus Nominal Voltage Ph-N

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	10 .. 34641 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	9888	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if**Connection type (page 264)** != High Leg D or **Connection type (page 264)** != MonoPhase		
Description			
Nominal Mains/Bus voltage (phase to neutral).			

back to List of setpoints

Mains/Bus Nominal Voltage Ph-Ph

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	10 .. 60000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	9907	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal Mains/Bus voltage (phase to phase).			

back to List of setpoints

Nominal Voltage 3Ph Low Y

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	80 .. 20 000 [V]		
Default value	120 V	**Alternative config**	YES
Step	1 V		
Comm object	20811	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 264)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Gen Nominal Voltage Ph-N (page 267)** by the voltage autodetect function, if detected **Connection type (page 264)** is 3Ph Low Y (controller can not distinguish between the 4 wire and 3 wire connection), detected phase-phase voltage is lower than 300 V in all three phases and phase-neutral voltage is lower than or equal to 160 V in all three phases.			

back to List of setpoints

Nominal Voltage 3Ph High Y

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	80 .. 20 000 [V]		
Default value	277 V	**Alternative config**	YES
Step	1 V		
Comm object	20812	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 264)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Gen Nominal Voltage Ph-N (page 267)** by the voltage autodetect function, if detected **Connection type (page 264)** is 3Ph High Y, detected phase-phase voltage is higher than or equal to 300 V in all three phases and phase-neutral voltage is higher than 160 V in all three phases.			

back to List of setpoints

Nominal Voltage High Leg D

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	80 .. 20 000 [V]		
Default value	277 V	**Alternative config**	YES
Step	1 V		
Comm object	20813	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 264)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Gen Nominal Voltage Ph-N (page 267)** by the voltage autodetect function, if detected **Connection type (page 264)** is High Leg D. Set this setpoint to 120 V with high leg delta system, which works with the high leg voltage 208 V (L2-N).			

back to List of setpoints

Nominal Voltage SplitPhase

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	80 .. 20 000 [V]		
Default value	120 V	**Alternative config**	YES
Step	1 V		
Comm object	20814	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 264)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Gen Nominal Voltage Ph-N (page 267)** by the voltage autodetect function, if detected **Connection type (page 264)** is SplPhL1L2 or SplPhL1L3.			

back to List of setpoints

Nominal Voltage MonoPhase

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	80 .. 20 000 [V]		
Default value	120 V	**Alternative config**	YES
Step	1 V		
Comm object	20815	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 264)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Gen Nominal Voltage Ph-N (page 267)** by the voltage autodetect function, if detected **Connection type (page 264)** is MonoPhase.			

back to List of setpoints

Gen VT Ratio

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	0.1 .. 500.0 [V/V]		
Default value	1.0 V/V	**Alternative config**	NO
Step	0.1 V/V		
Comm object	9579	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Generator voltage potential transformers ratio. If no VTs are used, adjust this setpoint to 1.			

back to List of setpoints

Mains/Bus VT Ratio

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	0.1 .. 500.0 [V/V]		
Default value	1.0 V/V	**Alternative config**	NO
Step	0.1 V/V		
Comm object	9580	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Mains voltage potential transformers ratio. If no PTs are used, adjust the setpoint to 1.			

back to List of setpoints

Subgroup: Frequency settings

Nominal Frequency

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	45 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	8278	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system frequency (usually 50 or 60 Hz). ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Frequency 1 (page 507)****,* ***Nominal Frequency 2 (page 513)*** *and* ***Nominal Frequency 3 (page 519)****.*			

back to List of setpoints

Gear Teeth

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	FGen->RPM / 1 .. 500 [-]		
Default value	FGen->RPM	**Alternative config**	NO
Step	1		
Comm object	8252	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Number of teeth on the engine flywheel where the pick-up is installed. Set to zero if no pick-up is used and the Engine speed will be counted from the generator frequency. ***Note:*** *If no pickup is used, the D+ or W terminal should be used to prevent possible overcranking, which can occur if at least 25% of nominal generator voltage is not present immediately after exceeding firing speed.*			

back to List of setpoints

Nominal RPM

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	100 .. 4 000 [RPM]		
Default value	1 500 RPM	**Alternative config**	YES
Step	1 RPM		
Comm object	8253	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Nominal engine speed (RPM - revolutions per minute). ***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal RPM 1 (page 507)****,* ***Nominal RPM 2 (page 513)*** *and* ***Nominal RPM 3 (page 519)****.*			

back to List of setpoints

Subgroup: Controller settings

Controller Mode

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	OFF / MAN / AUTO / TEST [-]		
Default value	OFF	**Alternative config**	NO
Step	[-]		
Comm object	8315	**Related applications**	MINT, SPtM
Config level	Advanced		
Description			
This setpoint can be used for changing the Controller mode remotely, e.g. via Modbus. Use the mode selector on the main screen for changing the mode from the front panel. Use mode selector in the control window for changing the mode from InteliConfig.			

back to List of setpoints

Power On Mode

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	Previous / OFF [-]		
Default value	Previous	**Alternative config**	NO
Step	[-]		
Comm object	13000	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts controller mode after power on of controller.

Previous	When controller is power on, controller is switched to last mode before power off.
OFF	When controller is power on, controller is switched to OFF Mode.

Note: *Remote modes – In case that some LBI remote mode is activated during power on of controller than this LBI has higher priority than this setpoint – controller mode is forced into mode selected via LBI. After deactivation of LBI, controller is switched into value selected via setpoint Power On Mode*

back to List of setpoints

Reset To Manual

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	9983	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
If this function is enabled, the controller will switch automatically to MAN mode when there is a red alarm in the alarm list and fault reset button is pressed. This is a safety function that prevents the Gen-set starting again automatically in specific cases when fault reset button is pressed.			

back to List of setpoints

Backlight Timeout

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	Disabled / 1 .. 255 [min]		
Default value	Disabled	**Alternative config**	NO
Step	1 min		
Comm object	10121	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
The display backlight is switched off when this timer exceed. When setpoint is adjusted to disabled then the display will be backlighted all the time.			

back to List of setpoints

Horn Timeout

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	Disabled / 1 .. 599 s / Horn Reset [-]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	8264	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

Setting of horn behavior.

Disabled	Disabling the Horn sounding function
1 .. 599 [s]	Timeout for **HORN (PAGE 784)** binary output. The **HORN (PAGE 784)** output is active when this timeout elapsed.
Horn reset	LBO **HORN (PAGE 784)** is deactivated by Fault reset button or by Horn reset button.

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

back to List of setpoints

Run Hours Source

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	AUTO / ECU / INTERNAL [-]		
Default value	AUTO	**Alternative config**	NO
Step	[-]		
Comm object	13345	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint selects source of running hours.

AUTO	If there is some ECU which send valid running hours, then this value is used. Otherwise value from internal counter is used.
ECU	Running hours are taken from ECU if ECU send valid data. It is not possible to set and reset this value in statistics.
INTERNAL	Running hours are taken from internal counter. It is possible to set and reset this value in statistics.

Note: *It is not necessary to restart controller when this setpoint is changed. Change of this setpoint is applied immediately.*

back to List of setpoints

Main Screen

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	PwrFactor/ATT/Run Hours [-]		
Default value	PwrFactor	**Alternative config**	NO
Step	[-]		
Comm object	13346	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Setpoint adjust value which is shown on main screen.			

PwrFactor:	Value of power factor is shown on main screen.
ATT:	This option is for Tier IV Final support. In this case value of DEF Level is shown on main screen.
Run Hours:	Value of running hours will be shown on main screen.

back to List of setpoints

Subgroup: Phase Rotation

Phase Rotation

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	Clockwise / CounterCCW [-]		
Default value	Clockwise	**Alternative config**	NO
Step	[-]		
Comm object	15122	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	All the time		
Description			
This setpoint adjust the phase sequence of voltage terminals.			

back to List of setpoints

Subgroup: Application Selector

Application Mode Select

Setpoint group	Basic settings	**Related FW**	1.6.0
Range [units]	SPtM, MINT, External [-]		
Default value	MINT	**Alternative config**	NO
Step	-		
Comm object		**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint defines the controller application.

The change of this setpoint is accepted in the OFF mode only = It is not possible to change the setpoint while the controller is not set to OFF mode.

SPtM	Single parallel to mains application. The controller controls two breakers – a mains breaker and a generator breaker. Feedback from both breakers is required.
MINT	Multiple island-parallel application without mains and multiple parallel application with mains. The controller controls one breaker only, the generator breaker. Feedback from the generator breaker is required. For parallel to mains operation also mains breaker feedback is required.
External	Application mode selection is done with **SPtM/MINT Mode Select (page 734)**, change in the LBI state is accepted in the OFF mode only.

back to List of setpoints

Group: Communication Settings

Subgroup: Controller CAN Address

Controller Address

Setpoint group	Communication Settings	**Related FW**	1.6.0
Range [units]	1 .. 32 [-]		
Default value	1	**Alternative config**	NO
Step	1		
Comm object	24537	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Controller identification number. It is possible to set controller address different from the default value (1) so that more controllers can be interconnected (via RS485) and accessed e.g. from Modbus terminal.

> ***Note:*** *When opening connection to the controller it's address has to correspond with the setting in PC tool.*

back to List of setpoints

Subgroup: RS485 Settings

RS485 Mode

Setpoint group	Communication Settings	**Related FW**	1.6.0
Range [units]	Direct / MODBUS [-]		
Default value	Direct	**Alternative config**	NO
Step	[-]		
Comm object	24134	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Communication protocol switch for on-board RS485.

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

back to List of setpoints

RS485 Communication Speed

Setpoint group	Communication Settings	**Related FW**	1.6.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	57600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24135	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
If the direct mode is selected on on-board RS485, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value. ***Note:*** *WinScope supports only 19200, 38400, 57600 speeds.* ***Note:*** *This speed is also used for communication during Dual Operation.*			

back to List of setpoints

RS485 Modbus Speed

Setpoint group	Communication Settings	**Related FW**	1.6.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24141	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 521)**		
Description			
If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here.			

back to List of setpoints

LB/Uart log

Setpoint group	Communication Settings	**Related FW**	1.6.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	11327	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
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 record may be overwritten quite fast.*			

back to List of setpoints

Group: CM-Ethernet

Subgroup: NTP Settings

NTP Clock Synchronization

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	1.6.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	24075	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS module)		
Description			
This setpoint is used to enable/disable controller time synchronization with exact time from an NTP server. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

NTP Server

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	[-]		
Default value	pool.ntp.org	**Alternative config**	NO
Step	[-]		
Comm object	24074	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
NTP server address.			

back to List of setpoints

Subgroup: TCP/IP Settings

IP Address Mode

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	FIXED / AUTOMATIC [-]		
Default value	AUTOMATIC	**Alternative config**	NO
Step	[-]		
Comm object	24259	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

The setpoint is used to select the method how the ethernet connection is adjusted.

FIXED	The Ethernet connection is fixed by means of the setpoints IP Addr, NetMask, GateIP, DNS IP Address. This method should be used for a classic Ethernet or internet connection. When this type of connection opens, the controller is specified by its IP address. This means that it would be inconvenient if the IP address were not fixed (static).
AUTOMATIC	The Ethernet connection setting is obtained **automatically from the DHCP server**. The obtained settings are then copied to the related setpoints. If the process of obtaining the settings from the DHCP server is not successful, the value *000.000.000.000* is copied to the setpoint IP address and the module continues to try to obtain the settings.

back to List of setpoints

IP Address

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	Valid IP address [-]		
Default value	192.168.1.254	**Alternative config**	NO
Step	[-]		
Comm object	24376	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 281)**		
Description			
The setpoint is used to set the address when you are in static mode. If **IP Address Mode (page 281)** is FIXED this setpoint is used to adjust the IP address of the ethernet interface of the controller. Ask your IT specialist for help with this setting. If **IP Address Mode (page 281)** is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server.			

back to List of setpoints

Subnet Mask

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	Valid IP address [-]		
Default value	255.255.255.0	**Alternative config**	NO
Step	[-]		
Comm object	24375	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 281)**		
Description			
The setpoint is used to select the method how the Subnet Mask is adjusted. If **IP Address Mode (page 281)** is FIXED this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting. If **IP Address Mode (page 281)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.			

back to List of setpoints

Gateway IP

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	Valid IP address [-]		
Default value	192.168.1.1	**Alternative config**	NO
Step	[-]		
Comm object	24373	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 281)**		
Description			
The setpoint is used to select the method how the Gateway IP is adjusted. If **IP Address Mode (page 281)** is DISABLE this setpoint is used to adjust the IP address of the gateway of the network segment where the controller is connected. If **IP Address Mode (page 281)** is ENABLED this setpoint is used to display the gateway IP address which has been assigned by the DHCP server. A gateway is a device which connects the respective segment with the other segments and/or Internet.			

back to List of setpoints

DNS Mode

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	Automatic / Manual [-]		
Default value	Automatic	**Alternative config**	NO
Step	[-]		
Comm object	24101	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint enables to enter DNS server addresses manually, even with the **IP Address Mode (page 281)** set to Automatic.

Automatic	DNS server addresses automatically obtained from a DHCP server are used
Manual	**DNS Mode (page 284)** and **DNS Mode (page 284)** can be adjusted manually. Use this option to resolve e.g. internet access policy related issue, if local DNS server addresses automatically obtained from a DHCP server do not work

back to List of setpoints

DNS Mode

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Alternative config**	NO
Step	[-]		
Comm object	24362	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
The setpoint is used to select the method how the DNS Address 1 is adjusted. If **IP Address Mode (page 281)** is FIXED this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses. If **IP Address Mode (page 281)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.			

back to List of setpoints

DNS Mode

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Alternative config**	NO
Step	[-]		
Comm object	24331	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
The setpoint is used to select the method how the DNS Address 2 is adjusted. If **IP Address Mode (page 281)** is FIXED this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses. If **IP Address Mode (page 281)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.			

back to List of setpoints

IP Firewall

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	ENABLED / DISABLED [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	24092	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoints enables to switch on the built-in Firewall functionality.

DISABLED	The firewall function is switched off
ENABLED	The firewall function is switched on, use InteliConfig to setup the firewall rules (configuration card Others – Firewall)

back to List of setpoints

Subgroup: AirGate Settings

AirGate Connection

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	24365	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint selects the Ethernet connection mode.

DISABLED:	This is a standard mode in which the controller listens to the incoming traffic and answers the TCP/IP queries addressed to it. This mode requires the controller to be accessible from the remote device (PC), i.e. it must be accessible at a public and static IP address if you want to connect to it from the internet.
ENABLED	This mode enables the AirGate service. The AirGate server address is adjusted by the setpoint **AirGate Address (page 286)**. Also the standard TCP/IP is enabled.

back to List of setpoints

AirGate Address

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	1.6.0
Range [units]	[-]		
Default value	airgate.comap.cz	**Alternative config**	NO
Step	[-]		
Comm object	24364	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
This setpoint is used for entering the domain name or IP address of the AirGate server. Use the free AirGate server provided by ComAp at airgate.comap.cz. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

AirGate Data Port

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	1 .. 65535 [-]		
Default value	23	**Alternative config**	NO
Step	1		
Comm object	24096	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used for TCP data communication with the AirGate server. ***Note:*** *Use port 21, 23 or 6127 for standard ComAp AirGate service.*			

back to List of setpoints

AirGate Signaling Port

Setpoint group	; ; CM-Ethernet	**Related FW**	1.6.0
Range [units]	0 .. 65535 [-]		
Default value	6127	**Alternative config**	NO
Step	[-]		
Comm object	24358	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used for UDP signalling communication with the AirGate server. ***Note:*** *Use port 6127 for standard ComAp AirGate service.*			

back to List of setpoints

Subgroup: Messages Settings

Event Message

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10926	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Event Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

Wrn Message

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8482	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Wrn Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

BOC Message

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10566	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

Sd Messages

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8484	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Sd Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

Time Zone

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Alternative config**	NO
Step	[-]		
Comm object	24366	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint is used to select the time zone where the controller is located. See your computer time zone setting (click on the time indicator located in the rightmost position of the Windows task bar) if you are not sure about your time zone. ***Note:*** *If the time zone is not selected properly the active e-mails may contain incorrect information about sending time, which may result in confusion when the respective problem actually occurred.* ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

E-mail/SMS Language

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	Depends on CU languages [-]		
Default value	English	**Alternative config**	NO
Step	[-]		
Comm object	24299	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to set the language of SMS and e-mail. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

Subgroup: E-mail Settings

Email Address 1

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24298	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

Email Address 2

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24297	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

Email Address 3

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24145	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

Email Address 4

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24144	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

SMTP UserName

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24370	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

back to List of setpoints

SMTP User Password

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24369	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

back to List of setpoints

SMTP Server Address

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	airgate.comap.cz:9925	**Alternative config**	NO
Step	[-]		
Comm object	24093	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information. ***Note:*** *You may use also any public SMTP server which does not require connection over SSL/TLS channels. If the device is connected to AirGate the AirGate SMTP server at "airgate.comap.cz" may be used. Ports 25 and 9925 are supported. After controller connects to AirGate for the first time (or with new public IP address), it may not be able to send emails for first 5-10 minutes.*			

back to List of setpoints

SMTP Sender Address

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24367	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter an existing email address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller. ***Note:*** *It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.* **IMPORTANT: This item is obligatory when emails are configured.**			

back to List of setpoints

Subgroup: SNMP Settings

SNMP Agent

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	24336	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enable or disable SNMP v1 Agent.			

back to List of setpoints

SNMP RD Community String

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..31 characters [-]		
Default value	public	**Alternative config**	NO
Step	[-]		
Comm object	24335	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **SNMP Agent (page 294)**		
Description			
SNMP Community String only for reading.			

back to List of setpoints

SNMP WR Community String

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..31 characters [-]		
Default value	private	**Alternative config**	NO
Step	[-]		
Comm object	24334	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **SNMP Agent (page 294)**		
Description			
SNMP Community String for writing and reading.			

back to List of setpoints

SNMP Traps IP Address 1

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	Valid IP address [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	24294	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
IP address 1 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

back to List of setpoints

SNMP Traps IP Address 2

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	Valid IP address [-]		
Default value	DISABLED	**Alternative config**	NO
Step	[-]		
Comm object	24293	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
IP address 2 for receiving SNMP Traps. Leave this setpoint blank if SNMP traps should not be send.			

back to List of setpoints

SNMP Trap Format

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	v1Trap / v2Notif / v2Inform [-]		
Default value	v1Trap	**Alternative config**	NO
Step	[-]		
Comm object	24136	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts type of SNMP traps.			

back to List of setpoints

Subgroup: MODBUS Settings

MODBUS Server

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	DISABLED / ENABLED [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	24337	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enable or disable Modbus communication via ethernet interface.			

back to List of setpoints

MODBUS Client Inactivity Timeout

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	24097	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Modbus connection (TCP socket) is closed by controller, if a Modbus client does not communicate for this time.			

back to List of setpoints

Subgroup: ComAp Client Settings

Direct Connection

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	24099	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this to enable/disable direct connection of a ComAp client (e.g. InteliConfig) to the IP address of the controller. ***Note:** For Direct connection the controller IP address must be reachable from the client IP address.*			

back to List of setpoints

Direct Connection Port

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	1 .. 65535 [-]		
Default value	23	**Alternative config**	NO
Step	[-]		
Comm object	24374	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used to listen for an incoming TCP connection if Direct Connection is ENABLED.			

back to List of setpoints

ComAp Client Inactivity Timeout

Setpoint group	CM-Ethernet	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	24098	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Connection (TCP socket) is closed by controller, if a client (e.g. InteliConfig) does not communicate for this time. This timeout applies to both direct and AirGate connection.			

back to List of setpoints

Group: Engine settings

Subgroup: Starting

Fuel Solenoid

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	Diesel / Gas [-]		
Default value	Diesel	**Alternative config**	NO
Step	[-]		
Comm object	9100	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Determines behavior of the Binary output **FUEL SOLENOID (PAGE 775)**			

Diesel:	Output is activated before binary output **STARTER (PAGE 803)**. Lead of output is adjusted via setpoint **Fuel Solenoid Lead (page 302)**. The output is deactivated if Emergency Stop comes or Gen-set is stopped and in pause between repeated starts.
Gas: (Gaseous)	Output is activated together with binary output **IGNITION (PAGE 786)** if RPM is over the 30 RPM (fixed value). Output is deactivated after stop command or in pause between repeated start.

back to List of setpoints

Cranking Attempts

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	1 .. 10 [-]		
Default value	3	**Alternative config**	NO
Step	1		
Comm object	8255	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maximal number of cranking attempts.			

back to List of setpoints

Maximum Cranking Time

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	1 .. 255 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	8256	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Maximum time limit of cranking time. **IMPORTANT: There is a protection against broken pinion on starter. In case that there are no RPM after 5 seconds of starting, cranking is interrupted and cranking fail pause follows.**			

back to List of setpoints

Cranking Fail Pause

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	5 .. 60 [s]		
Default value	8 s	**Alternative config**	NO
Step	1 s		
Comm object	8257	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Pause between **Cranking Attempts (page 298)**. **PRESTART (PAGE 797)** output is active in this pause until Cranking Fail Pause elapses.			

back to List of setpoints

Prestart Time

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 3600 [s]		
Default value	2 s	**Alternative config**	NO
Step	1 s		
Comm object	8394	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Time of closing of the **PRESTART (PAGE 797)** output prior to the engine start. Set to zero if you want to leave the output **PRESTART (PAGE 797)** open.

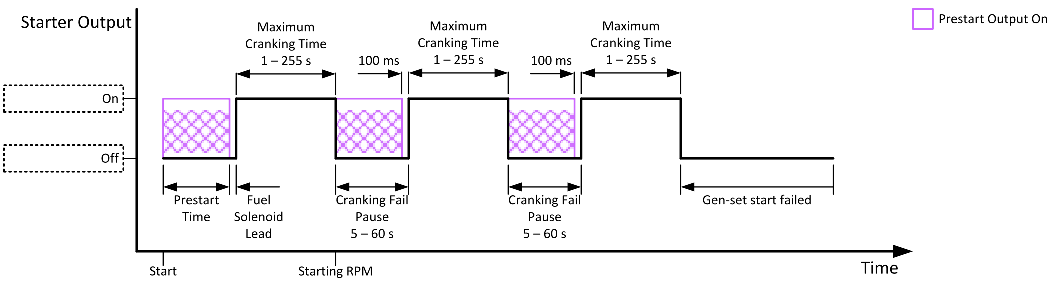


Image 8.1 Prestart Time

back to List of setpoints

Starting RPM

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	5 .. 50 [%]		
Default value	25%	**Alternative config**	NO
Step	1 % of **Nominal RPM (page 272)**		
Comm object	8254	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint defines the "firing" speed level as percent value of the **Nominal RPM (page 272)**. If this level is exceeded the engine is considered as started.

back to List of setpoints

Idle RPM

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	100 .. 4000 [RPM]		
Default value	900 RPM	**Alternative config**	NO
Step	1 RPM		
Comm object	9946	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint adjusts idle speed of engine.			

back to List of setpoints

Starting Oil Pressure

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	Disabled / 0,1 .. 10,0 [bar]		
Default value	4,5 bar	**Alternative config**	NO
Step	0,1 bar		
Comm object	9681	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Oil pressure limit for starting. The controller will stop cranking (**STARTER (PAGE 803)** goes OFF) if the oil pressure rises above this limit. Option Disabled – when this option is selected, Oil Pressure value (value from CU analog Oil Pressure, value from ECU analog Oil pressure and state of binary input Oil Pressure) is not used for disengagement of starter and for engine running evaluation. **IMPORTANT: Value from analog input has higher priority than value from ECU.**			

back to List of setpoints

Glow Plugs Time

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0.0 .. **Prestart Time (page 300)** [s]		
Default value	0.1 s	**Alternative config**	NO
Step	1.0 s		
Comm object	14412	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint defines the time before starting when logical binary output **GLOW PLUGS (PAGE 782)** will be active.			

back to List of setpoints

Subgroup: Starting Timers

Fuel Solenoid Lead

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0,0 .. 25,0 [s]		
Default value	0,5 s	**Alternative config**	NO
Step	0,1 s		
Comm object	10525	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

Delay between **Fuel Solenoid** **(page 775)** and **Starter** **(page 803)** logical binary outputs. **Fuel Solenoid** **(page 775)** is active before **Starter** **(page 803)**. Lead time is adjusted via this setpoint.

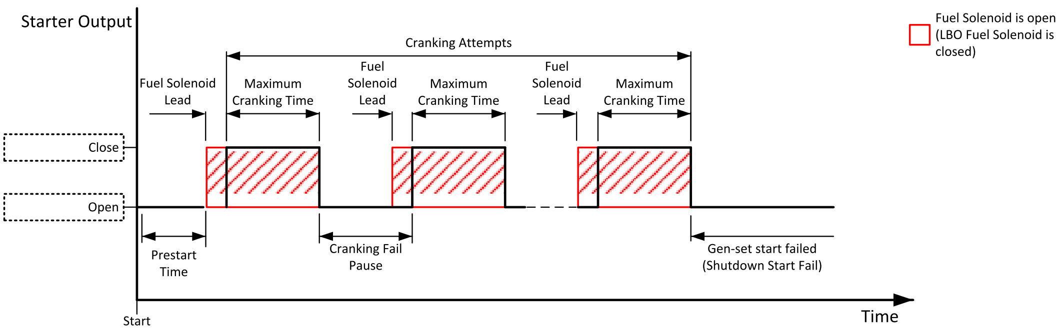


Image 8.2 Fuel Solenoid Lead

Note: *LBO* ***Prestart*** ***(page 797)*** *goes to logical zero when Fuel Solenoid Lead goes to logical one.*

Note: *This setpoint is used only for diesel* ***Fuel Solenoid*** ***(page 298)***

back to List of setpoints

Idle Time

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	12 s	**Alternative config**	NO
Step	1 s		
Comm object	9097	**Related applications**	MINT, SPtM
Config level	Standard		

Setpoint visibility	Always
Description	

Idle Time delay starts when RPM exceeds **Starting RPM (page 300)**. Start fail is detected when during Idle state RPM decreases below 2 RPM.

The output **IDLE/NOMINAL (PAGE 785)** remains inactive during the idle period. Binary output Idle/Nominal opens during Cooling period again. This output can be used for switching the governor between idle and nominal speed.

> ***Note:*** *When controller is in the MAN mode, it is possible to finish the Idle Time count down by pushing the Start button.*

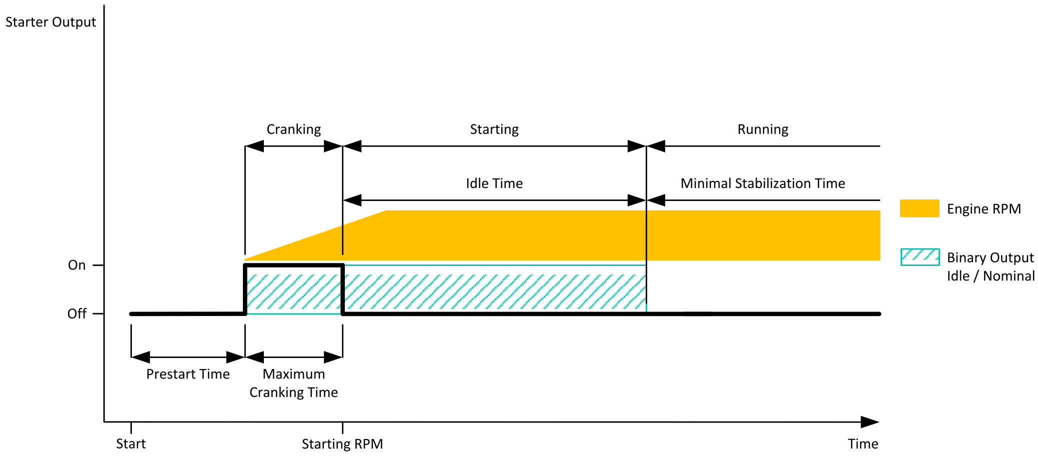


Image 8.3 Idle Time 1

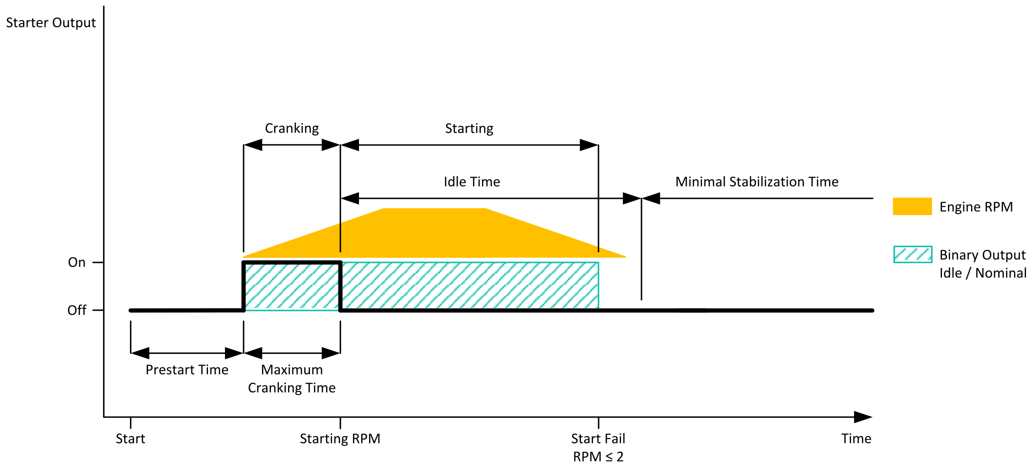


Image 8.4 Idle Time 2

back to List of setpoints

Minimal Stabilization Time

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	1 .. **Maximal Stabilization Time (page 305)** [s]		
Default value	2 s	**Alternative config**	NO
Step	1 s		
Comm object	8259	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

When the gen-set has been started and the idle timer has elapsed, the controller will wait for a period adjusted by this setpoint before closing GCB, even if the generator voltage and frequency are already in limits.

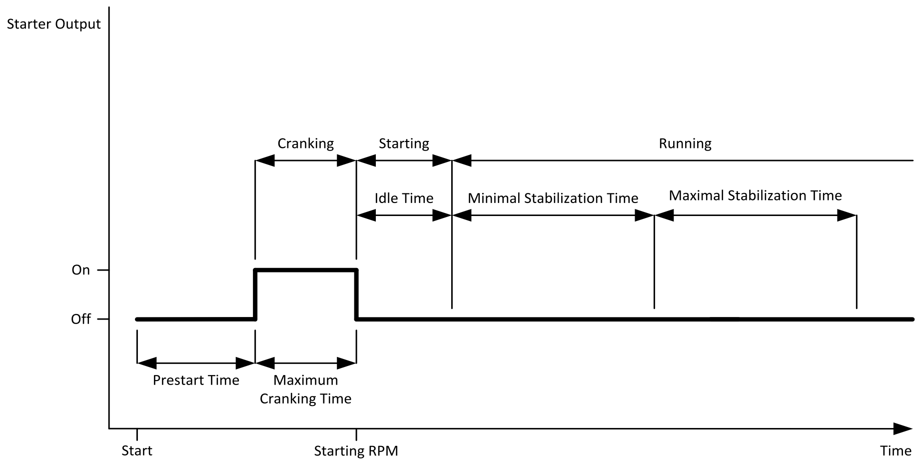


Image 8.5 Minimal Stabilization Time

back to List of setpoints

Maximal Stabilization Time

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	**Minimal Stabilization Time** (page 304) .. 300 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	8313	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

When the gen-set has been started and the idle timer has elapsed, the generator voltage and frequency must get within limits within this period of time, otherwise an appropriate shutdown alarm (generator voltage and/or frequency) is issued.

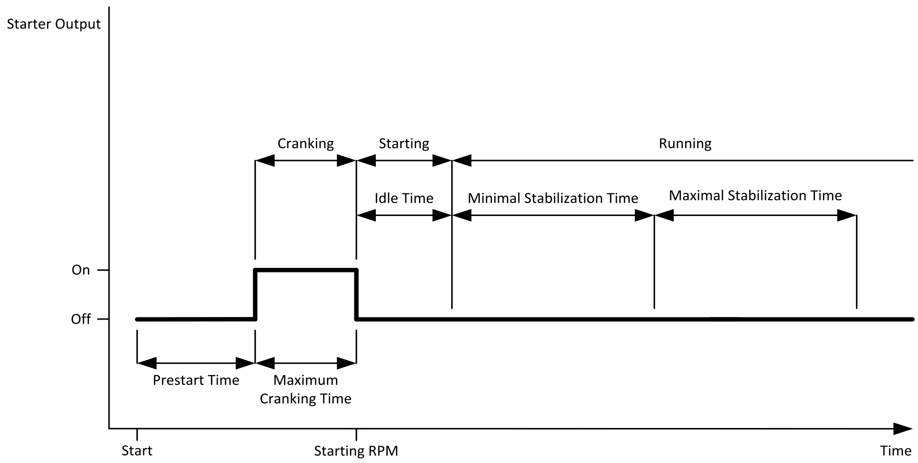


Image 8.6 Maximal Stabilization Time

back to List of setpoints

GCB Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	1 .. 600 [s]		
Default value	2 s	**Alternative config**	NO
Step	1 s		
Comm object	20816	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

GCB Delay count down is used with the voltage autodetection function. Controller regulates generator voltage to selected nominal voltage during the GCB Delay count down and GCB closing is possible only when it is over.

back to List of setpoints

Protection Hold Off

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0.0 .. 300.0 [s]		
Default value	5.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	10023	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
During the start of the Gen-set, some engine protections have to be blocked (e.g. Oil pressure). The protections are unblocked after the Protect Hold Off. The time starts after reaching Starting RPM.			

back to List of setpoints

Sd Ventilation Time

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 60 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	9695	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
In case **Fuel Solenoid (page 298)** is set to GAS, the Sd Ventilation Time adjusts the time of the starter to be switched on for engine pre-ventilation in the case of a first start attempt after shutdown or controller switch-on.			

back to List of setpoints

Subgroup: Stopping

Cooling Speed

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	Idle / Nominal [-]		
Default value	Nominal	**Alternative config**	NO
Step	[-]		
Comm object	10046	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

Selects the function of the binary output IDLE/NOMINAL (PAGE 785) during engine cooling state.

Idle	Cooling is executed at Idle speed and generator protections are switched off.
Nominal	Cooling is executed at Nominal speed and generator protections are active.

Note: *When ECU is connected the predefined value 900 RPM for Idle speed is requested.*

Note: *Binary output* ***IDLE/NOMINAL (PAGE 785)*** *must be configured and connected to speed governor. Engine Idle speed must be adjusted on speed governor.*

back to List of setpoints

Subgroup: Stopping Timers

Cooling Time

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 3 600 [s]		
Default value	30 s	**Alternative config**	NO
Step	1 s		
Comm object	8258	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Runtime of the unloaded gen-set to cool the engine before stop.

back to List of setpoints

Stop Time

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	9815	**Related applications**	MINT, SPtM
Config level	Advanced		

Setpoint visibility	Always

Description

Under normal conditions the engine must certainly stop within this period after the **FUEL SOLENOID (PAGE 775)** has been de-energized and the **STOP SOLENOID (PAGE 804)** energized. The Stop Solenoid output is deactivated 12 s after last running engine indication went off.

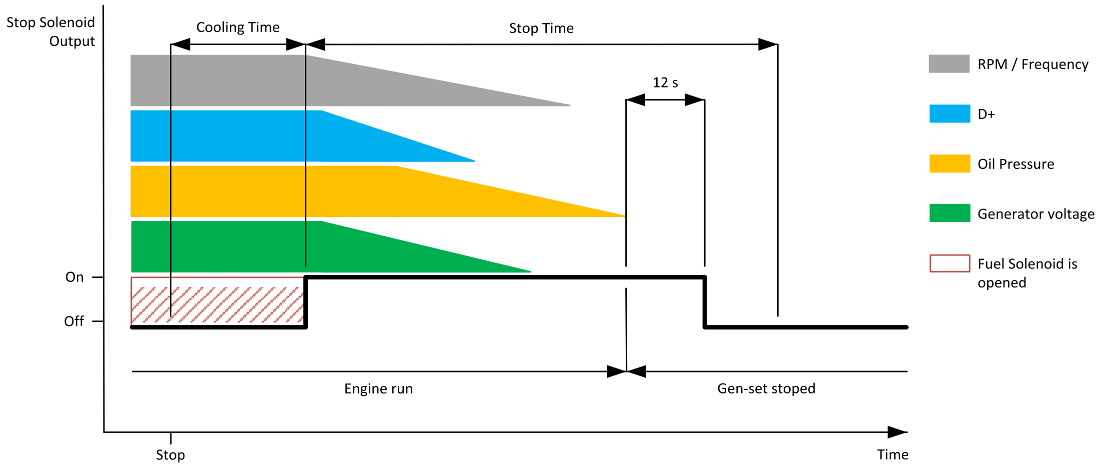


Image 8.7 Stop Time 1

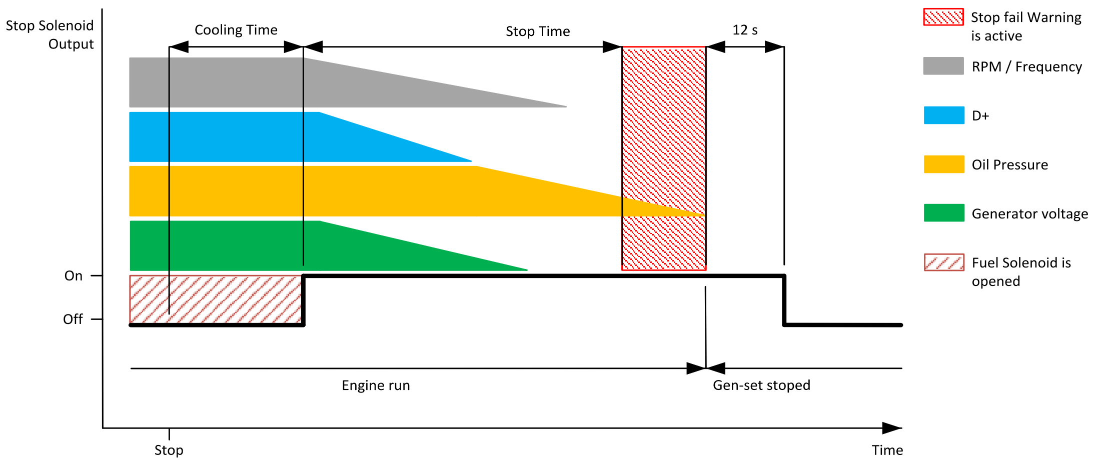


Image 8.8 Stop Time 2

back to List of setpoints

After Cooling Time

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 3 600 [s]		
Default value	180 s	**Alternative config**	NO
Step	1 s		
Comm object	8662	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Runtime of engine after cooling pump. Binary output **COOLING PUMP (PAGE 770)** is active when the engine starts deactivates after timer set in this setpoint elapses (timer starts counting down as soon as engine switches to stop phase).			

back to List of setpoints

Subgroup: Power switch

Power Switch On

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 32 000 [kW]		
Default value	100 kW	**Alternative config**	NO
Step	1 kW		
Comm object	11658	**Related applications**	MINT, SPtM
Config level	Advanced		

Setpoint visibility	Visible only if the logical binary output **POWER SWITCH (PAGE 797)** is configured.

Description

Threshold level for switching the binary output **POWER SWITCH (PAGE 797)** on.

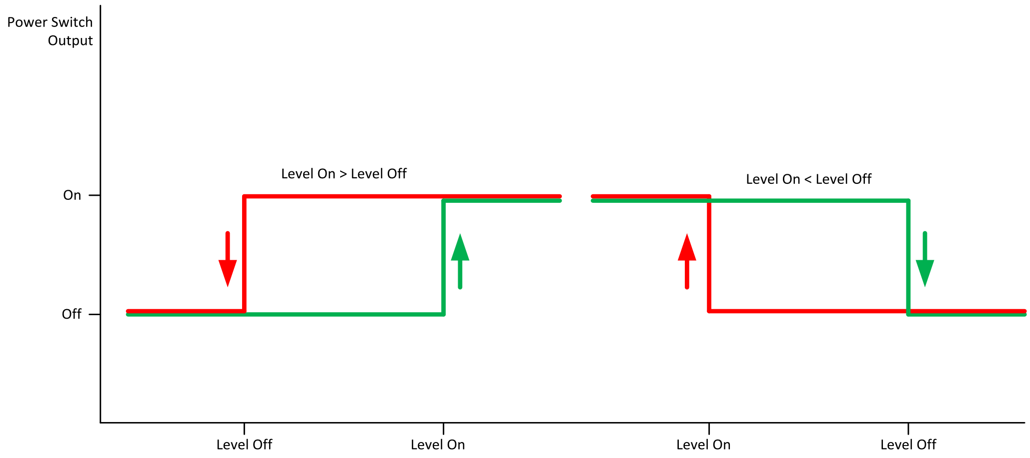


Image 8.9 Power Switch Level On < Level Off

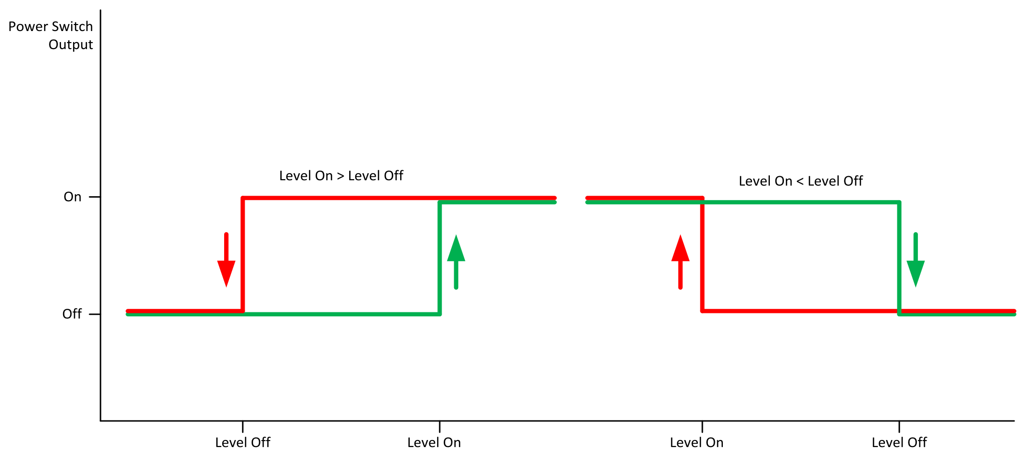


Image 8.10 Power Switch Level On > Level Off

back to List of setpoints

Power Switch Off

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 32 000 [kW]		
Default value	50 kW	**Alternative config**	NO

Step	1 kW		
Comm object	11659	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if the logical binary output **POWER SWITCH (PAGE 797)** is configured.		
Description			
Threshold level for switching the binary output **POWER SWITCH (PAGE 797)** on.			

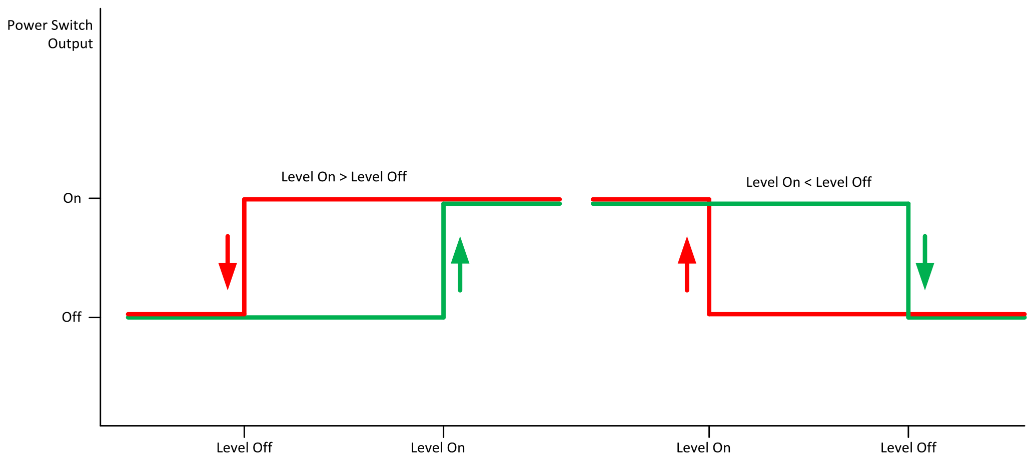


Image 8.11 Power Switch Level On < Level Off

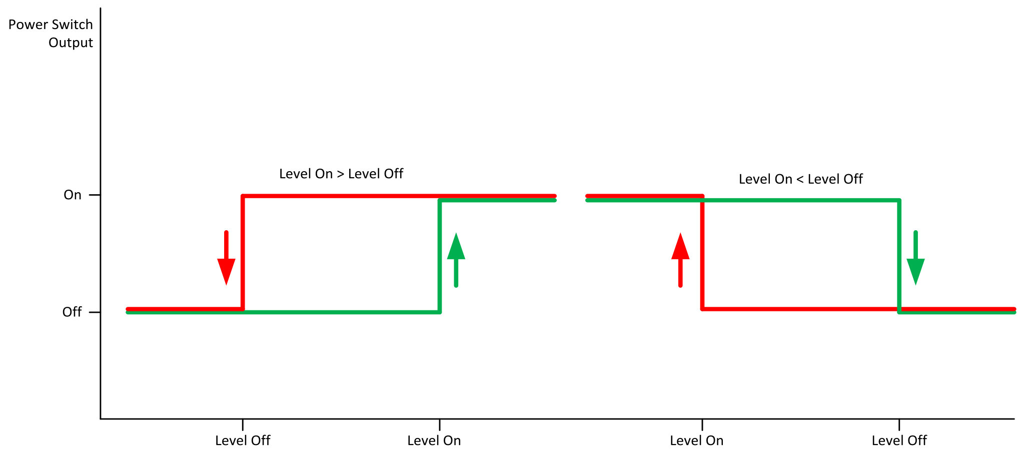


Image 8.12 Power Switch Level On > Level Off

back to List of setpoints

Subgroup: Engine Protections

Overspeed Sd

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	50 .. 200 [%]		
Default value	115%	**Alternative config**	NO
Step	1 % of **Nominal RPM (page 272)**		
Comm object	8263	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for over speed protection. Relative to the nominal speed.			

back to List of setpoints

Starting Overspeed Sd

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	100 ..200 [%]		
Default value	115%	**Alternative config**	NO
Step	1 %		
Comm object	11033	**Related applications**	MINT, SPtM
Config level	Standard		

Setpoint visibility	Always

Description

The rise up threshold for overspeed protection. The time for which this level is accepted is defined as **Starting Overspeed Time (page 313)**. This period starts to be counted once the RPM exceeds the value **Starting RPM (page 300)**. The threshold **Overspeed Sd (page 312)** starts to be valid once this period elapsed.
The type of reaction of the overspeed protection within the **Starting Overspeed Time (page 313)** is defined by the setpoint **Starting Overspeed Protection (page 314)**, so it is either considered as Sd Overspeed or unsuccessful start attempt. Then the next start attempt is enabled once the engine was stopped. History record Starting Overspeed should be written in this case.

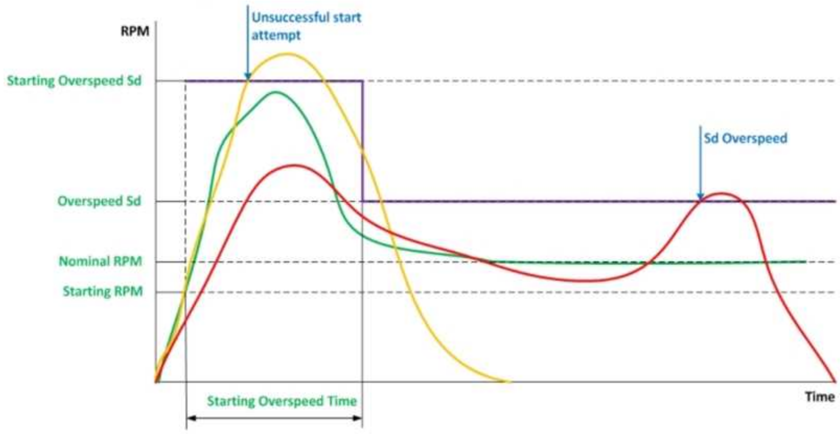


Image 8.13 Staring speed overshoot › Ovespeed Sd

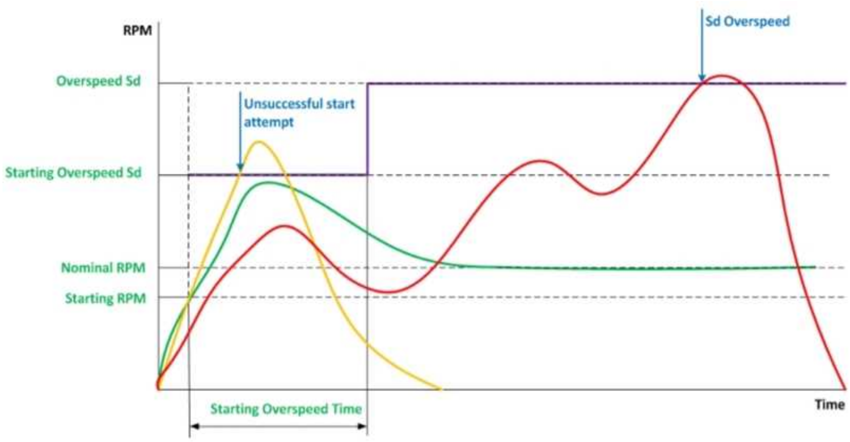


Image 8.14 Staring speed overshoot ‹ Ovespeed Sd

back to List of setpoints

Starting Overspeed Time

Setpoint group	Engine protection	**Related FW**	1.6.0
Range [units]	0 .. 255 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		

Comm object	14108	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Time when **Starting Overspeed Sd (page 312)** level is used for overspeed protection. This time starts countdown when starting RPM are reached.			

back to List of setpoints

Starting Overspeed Protection

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	OverSpd Sd / NextStartAt [-]		
Default value	OverSpd Sd	**Alternative config**	NO
Step	[-]		
Comm object	15808	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
The setpoint allows user to chose which kind of protection will be triggered if speed limit is reached during **Starting Overspeed Time (page 313)**. Sd overspeed option will result in controller shutting down the engine and displaying Sd Starting Overspeed alarm and NextStartAt option will result in controller stopping the engine and trying to start again. The number of attempts is defined by **Cranking Attempts (page 298)**.			

back to List of setpoints

Oil Pressure Wrn

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	12895	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **OIL PRESSURE (PAGE 842)** is configured		
Description			
Warning or history threshold level for **OIL PRESSURE (PAGE 842)**.			

back to List of setpoints

Oil Pressure Sd

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	12779	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **OIL PRESSURE (PAGE 842)** is configured		
Description			
Shutdown threshold level for **OIL PRESSURE (PAGE 842)**.			

back to List of setpoints

Oil Pressure Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	3 s	**Alternative config**	NO
Step	1 s		
Comm object	14341	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **OIL PRESSURE (PAGE 842)** is configured or logical binary input **OIL PRESSURE (PAGE 729)** is configured		
Description			
Delay for **OIL PRESSURE (PAGE 842)**.			

back to List of setpoints

ECU Oil Pressure Wrn

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an ECU sensor curve		
Default value	the value is defined by an an ECU sensor curve	**Alternative config**	YES
Step	the step is defined by an ECU sensor curve		
Comm object	14426	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Warning threshold level for Oil pressure which is send from ECU.			

back to List of setpoints

ECU Oil Pressure Sd

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an ECU sensor curve		
Default value	the value is defined by an an ECU sensor curve	**Alternative config**	NO
Step	the step is defined by an ECU sensor curve		
Comm object	14425	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Shutdown threshold level for Oil pressure which is send from ECU.			

back to List of setpoints

ECU Oil Pressure Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	3 s	**Alternative config**	NO
Step	1 s		
Comm object	14427	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Delay for Oil pressure which is send from ECU.			

back to List of setpoints

Coolant Temperature Wrn

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	12896	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **COOLANT TEMP (PAGE 839)** is configured		
Description			
Warning or history threshold level for **COOLANT TEMP (PAGE 839)**.			

back to List of setpoints

Coolant Temperature Sd

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	12780	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **COOLANT TEMP (PAGE 839)** is configured		
Description			
Shutdown or BOC threshold level for **COOLANT TEMP (PAGE 839)**.			

back to List of setpoints

Coolant Temperature Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	14342	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **COOLANT TEMP (PAGE 839)** is configured or logical binary input **COOLANT TEMP (PAGE 715)** is configured		
Description			
Delay for **COOLANT TEMP (PAGE 839)**.			

back to List of setpoints

ECU Coolant Temperature Wrn

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an ECU sensor curve		
Default value	the value is defined by an an ECU sensor curve	**Alternative config**	NO
Step	the step is defined by an ECU sensor curve		
Comm object	14429	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Warning threshold level for Coolant temperature which is send from ECU.			

back to List of setpoints

ECU Coolant Temperature Sd

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an ECU sensor curve		
Default value	the value is defined by an an ECU sensor curve	**Alternative config**	NO
Step	the step is defined by an ECU sensor curve		
Comm object	14428	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Shutdown or BOC threshold level for Coolant temperature which is send from ECU.			

back to List of setpoints

ECU Coolant Temperature Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	14430	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Delay for Coolant temperature which is send from ECU.			

back to List of setpoints

Oil Temp Wrn

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	15747	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **OIL TEMP (PAGE 843)** is configured		
Description			
Warning or history threshold level for **OIL TEMP (PAGE 843)**.			

back to List of setpoints

Oil Temp Sd

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	15748	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **OIL TEMP (PAGE 843)** is configured		
Description			
Shutdown or history threshold level for **OIL TEMP (PAGE 843)**.			

back to List of setpoints

Oil Temp Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	3 s	**Alternative config**	NO
Step	1 s		
Comm object	15749	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **OIL TEMP (PAGE 843)** is configured		
Description			
Delay for **OIL TEMP (PAGE 843)**.			

back to List of setpoints

ECU Oil Temp Wrn

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an ECU sensor curve		
Default value	the value is defined by an an ECU sensor curve	**Alternative config**	NO
Step	the step is defined by an ECU sensor curve		
Comm object	15637	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Warning threshold level for Oil temperature which is send from ECU.			

back to List of setpoints

ECU Oil Temp Sd

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an ECU sensor curve		
Default value	the value is defined by an an ECU sensor curve	**Alternative config**	NO
Step	the step is defined by an ECU sensor curve		
Comm object	15636	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Shutdown threshold level for Oil temperature which is send from ECU.			

back to List of setpoints

ECU Oil Temp Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	3 s	**Alternative config**	NO
Step	1 s		
Comm object	15638	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Delay for Oil temperature which is send from ECU.			

back to List of setpoints

Temperature Switch On

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is define by sensor curve (analog or ECU)		
Default value	the value is defined by an an sensor curve (analog or ECU)	**Alternative config**	NO
Step	the step is defined by an sensor curve (analog or ECU)		
Comm object	8688	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **TEMPERATURE SWITCH (PAGE 807)** is configured.		
Description			

Threshold level for switching the binary output **TEMPERATURE SWITCH (PAGE 807)** on.

Note: *Value from analog input has higher priority than ECU.*

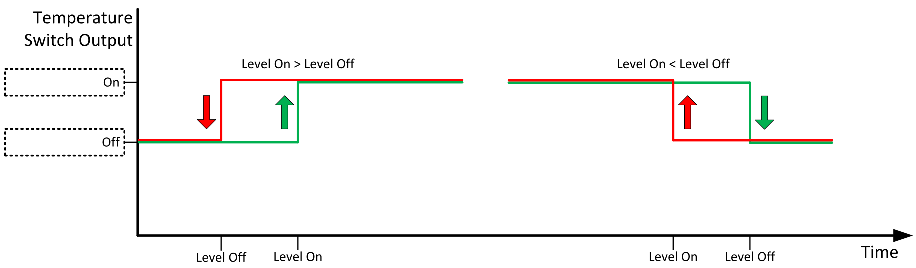


Image 8.15 Temperature Switch

back to List of setpoints

Temperature Switch Off

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is define by sensor curve (analog or ECU)		
Default value	the value is defined by an an sensor curve (analog or ECU)	**Alternative config**	NO
Step	the step is defined by an sensor curve (analog or ECU)		
Comm object	8689	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **TEMPERATURE SWITCH (PAGE 807)** is configured.		
Description			

Threshold level for switching the binary output **TEMPERATURE SWITCH (PAGE 807)** off.

> ***Note:*** *Value from analog input has higher priority than ECU.*

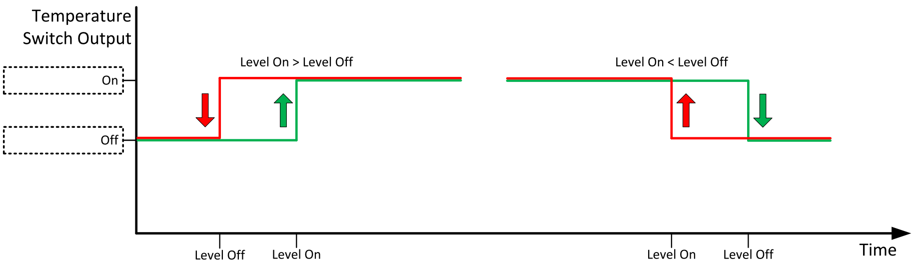


Image 8.16 Temperature Switch

back to List of setpoints

Coolant Temperature Low Wrn

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	YES
Step	the step is defined by an analog sensor curve		
Comm object	9684	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if the logical analog input **COOLANT TEMP (PAGE 839)** is configured		
Description			
Threshold level for lower limit of **COOLANT TEMP (PAGE 839)**.			

back to List of setpoints

Coolant Temperature Low Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	5 s	**Alternative config**	YES
Step	1 s		
Comm object	10270	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if the logical analog input **COOLANT TEMP (PAGE 839)** is configured		
Description			
Delay for **Coolant Temperature Low Wrn (page 322)**.			

back to List of setpoints

Fuel Level Wrn

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	12897	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **FUEL LEVEL (PAGE 840)** is configured		
Description			
Warning or history threshold level for **FUEL LEVEL (PAGE 840)**.			

back to List of setpoints

Fuel Level Sd

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	12898	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **FUEL LEVEL (PAGE 840)** is configured		
Description			
Shutdown or BOC threshold level for **FUEL LEVEL (PAGE 840)**.			

back to List of setpoints

Fuel Level Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	14343	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **FUEL LEVEL (PAGE 840)** is configured or logical binary input **FUEL LEVEL (PAGE 721)** is configured		
Description			
Delay for **FUEL LEVEL (PAGE 840)**.			

back to List of setpoints

ECU Fuel Level Wrn

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an ECU sensor curve		
Default value	the value is defined by an an ECU sensor curve	**Alternative config**	NO
Step	the step is defined by an ECU sensor curve		
Comm object	14432	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Warning threshold level for Fuel level which is send from ECU.			

back to List of setpoints

ECU Fuel Level Sd

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	the range is defined by an ECU sensor curve		
Default value	the value is defined by an an ECU sensor curve	**Alternative config**	NO
Step	the step is defined by an ECU sensor curve		
Comm object	14431	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configured		
Description			
Shutdown or BOC threshold level for Fuel level which is send from ECU.			

back to List of setpoints

ECU Fuel Level Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	14433	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if ECU is configuredd		
Description			
Delay for Fuel level which is send from ECU.			

back to List of setpoints

Fuel Tank Volume

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 10 000 [l]		
Default value	200 l	**Alternative config**	YES
Step	1 l		
Comm object	11103	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if the logical analog input **FUEL LEVEL (PAGE 840)** is or ECU is configured		
Description			
Define a capacity of Gen-set fuel tank.			

back to List of setpoints

Maximal Fuel Drop

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	Disabled / 1 .. 50 [%/h]		
Default value	25 %/h	**Alternative config**	NO
Step	1%/h		
Comm object	12373	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Setpoint indicates the maximum allowable drop of fuel in fuel tank per running hour. When the engine is not running the maximal allowed fuel drop-off is preset to 5% of total tank volume per hour.			

back to List of setpoints

Maximal Fuel Drop Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	5 s	**Alternative config**	NO
Step	s		
Comm object	14683	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
When the value of fuel drop per hour is higher than **Maximal Fuel Drop (page 325)** this delay starts count down. After count down of this delay alarm **Wrn Fuel Theft (page 890)** is activated.			

back to List of setpoints

Fuel Pump On

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. **Fuel Pump Off (page 328)** [%]		
Default value	20 %	**Alternative config**	YES
Step	1 %		
Comm object	10100	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if the logical binary output **FUEL PUMP (PAGE 775)** is configured and logical binary input **FUEL PUMP ON/OFF (PAGE 722)** isn't configured		

Description

Threshold level for switching the binary output **FUEL PUMP (PAGE 775)** on.

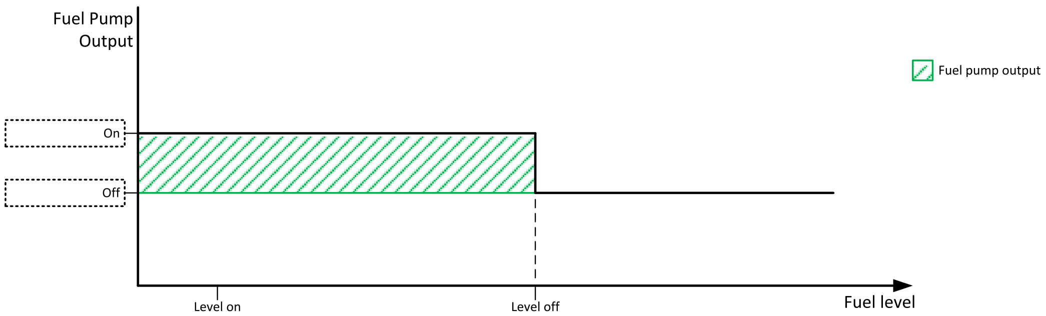


Image 8.17 Fuel Pump On

> **IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 722) is configured then binary output FUEL PUMP (PAGE 775) is control by this binary input. Setpoints Fuel Pump On and Fuel Pump Off (page 328) are not evaluated!**

Note: *Value from analog input has higher priority than ECU.*

Note: *This setpoint is visible only if the logical binary output **FUEL PUMP (PAGE 775)** is configured.*

back to List of setpoints

Fuel Pump Off

Setpoint group	Engine settings	Related FW	1.6.0
Range [units]	**Fuel Pump On (page 327)** .. 100 [%]		
Default value	90 %	**Alternative config**	YES
Step	1 %		
Comm object	10101	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if the logical binary output **FUEL PUMP (PAGE 775)** is configured and logical binary input **FUEL PUMP ON/OFF (PAGE 722)** isn't configured		

Description

Threshold level for switching the binary output **FUEL PUMP (PAGE 775)** off.

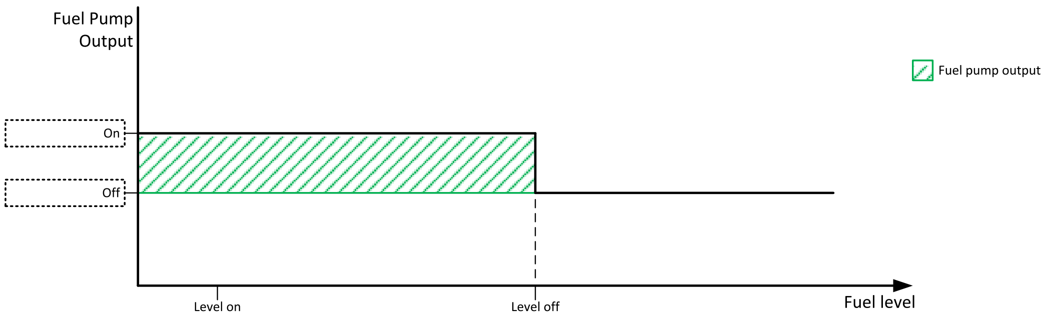


Image 8.18 Fuel Pump Off

> **IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 722) is configured then binary output FUEL PUMP (PAGE 775) is control by this binary input. Setpoints Fuel Pump On (page 327) and Fuel Pump Off are not evaluated!**

Note: *Value from analog input has higher priority than ECU.*

Note: *This setpoint is visible only if the logical binary output **FUEL PUMP (PAGE 775)** is configured.*

back to List of setpoints

Transfer Wrn Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	Disabled / 1 .. 600 [s]		
Default value	30 s	**Alternative config**	YES
Step	1 s		
Comm object	10685	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if the logical binary output **FUEL PUMP (PAGE 775)** is configured		
Description			
If the controller does not see the fuel increase during fuel transfer within this time alarm **Wrn Fuel Transfer Failed (page 878)** will be displayed and the **FUEL PUMP (PAGE 775)** will be turned off. Alarm **Wrn Fuel Transfer Failed (page 878)** will be displayed but this alarm becomes immediately inactive and it will be possible to delete this message by the Fault reset button. If the fault is deleted the controller will initiate the transfer again.			

back to List of setpoints

Subgroup: Battery Protections

Battery Undervoltage

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	8.0 V .. **Battery Overvoltage (page 329)** [V]		
Default value	18.0 V	**Alternative config**	NO
Step	0.1 V		
Comm object	8387	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Warning threshold for low battery voltage.			

back to List of setpoints

Battery Overvoltage

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	**Battery Undervoltage (page 329)** .. 40.0 [V]		
Default value	36.0 V	**Alternative config**	NO
Step	0.1 V		
Comm object	9587	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Warning threshold for high battery voltage.			

back to List of setpoints

Battery <> Voltage Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	8383	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Battery Undervoltage (page 329)** and **Battery Overvoltage (page 329)** protection.			

back to List of setpoints

Battery Charger Fail Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0 .. 15 [min]		
Default value	5 min	**Alternative config**	NO
Step	1 min		
Comm object	11374	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned with LBI **BATTERY CHARGER (PAGE 690)**		
Description			
Delay for LBI **BATTERY CHARGER (PAGE 690)**.			

back to List of setpoints

Subgroup: ECU Settings

Open Param Governor Speed Adjust

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0.000 .. 10.000 [%]		
Default value	5.000	**Alternative config**	NO
Step	0.001 %		
Comm object	16617	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if ECU is configured		
Description			
This parameter will adjust engine control characteristics to suit special requirements for stability or transient response. Lower values will result in smaller control gains that offer improved steady state stability but decreased transient response. Higher values will provide better transient response but will result in decreased steady state stability. Nominal value of 5 provides a good balance for most applications.			

back to List of setpoints

Subgroup: D+ Function

D+ Function

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	Enabled / ChargeFail / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	9683	**Related applications**	MINT, SPtM
Config level	Standard		

Setpoint visibility	Always

Description

Behavior of D+ terminal.

Enabled	The D+ terminal is used for both functions – "running engine" detection and charge fail detection.
ChargeFail	The D+ terminal is used for charge fail detection only
Disabled	The D+ terminal is not used.

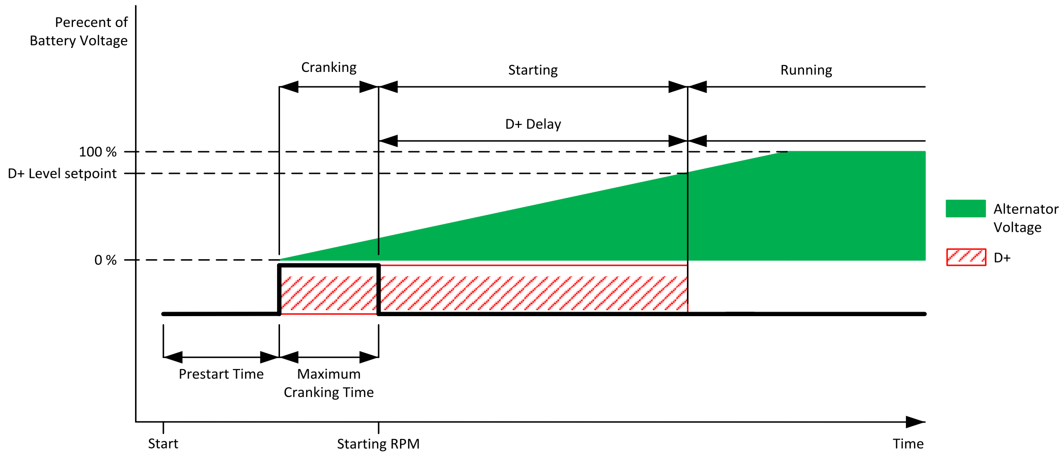


Image 8.19 D+ Function 1

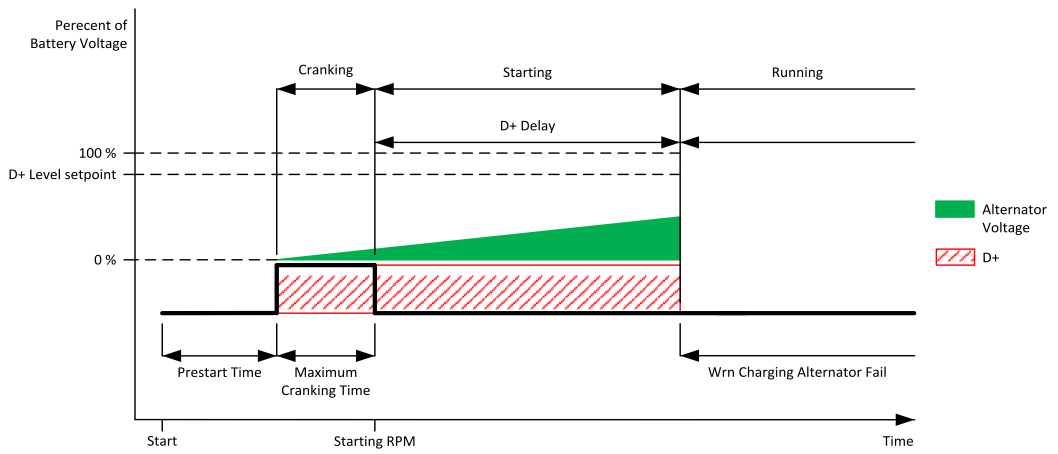


Image 8.20 D+ Function 2

Note: *Delay of this function is adjusted via **D+ Delay (page 333)** setpoint, threshold of this function is adjusted via D+ Level setpoint.*

back to List of setpoints

D+ Threshold

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	0..100 [%]		
Default value	80 %	**Alternative config**	NO
Step	1 %		
Comm object	14959	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 331)** is not set to *Disabled* value.		
Description			
This setpoint adjusts threshold level for **D+ Function (page 331)**.			

back to List of setpoints

D+ Delay

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	1..255 [s]		
Default value	1 s	**Alternative config**	NO
Step	1 s		
Comm object	14960	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 331)** is not set to *Disabled* value.		
Description			
This setpoint adjusts delay for **D+ Function (page 331)**. This delay is used for: › Alarm **Wrn Charging Alternator Fail (page 889)**. › For engine running condition – disengagement of starter			

back to List of setpoints

D+ Alarm Type

Setpoint group	Engine settings	**Related FW**	1.6.0
Range [units]	No Protec/Wrn/Sd [-]		
Default value	Wrn	**Alternative config**	NO
Step	[-]		
Comm object	15751	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 331)** is not set to *Disabled* value.		
Description			
This setpoint adjusts type of alarm **Wrn Charging Alternator Fail (page 889)**.			

back to List of setpoints

Group: SUS Control

SUS Sequence

Setpoint group	SUS Control	**Related FW**	1.6.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	**Alternative config**	YES
Step	[-]		
Comm object	10110	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint enables/disables **Start Up Synchronization (SUS) (page 109)** function.

Disabled	Function is disabled.
Enabled	Function is enabled. Behavior of the function is adjusted via setpoints **Dead Bus Limit (page 334)**, **#SUS Min Power 1 (page 335)**,**#SUS Min Power 2 (page 336)**, **#SUS Min Power 3 (page 337)**, **Excitation Control (page 337)**, **SUS RPM Window (page 338)**, **SUS RPM Window Time Out (page 338)** and **#SUS Excitation Delay (page 338)**.

back to List of setpoints

Dead Bus Limit

Setpoint group	SUS Control	**Related FW**	1.6.0
Range [units]	0 .. 70 [%] of **Mains/Bus Nominal Voltage Ph-N (page 268)**		
Default value	30 % of **Mains/Bus Nominal Voltage Ph-N (page 268)**	**Alternative config**	YES
Step	1 % of **Mains/Bus Nominal Voltage Ph-N (page 268)**		
Comm object	16390	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if **SUS Sequence (page 334)** = Enabled		
Description			

This setpoint adjusts the maximal value of **Mains Voltage L1-N (page 635)**, **Mains Voltage L2-N (page 635)** and **Mains Voltage L3-N (page 636)** related to **Mains/Bus Nominal Voltage Ph-N (page 268)**.

GCB is immediately opened if one of mentioned values is over this limit during SUS Starting Sequence and Standard Starting is initiated.

back to List of setpoints

#SUS Min Power 1

Setpoint group	SUS Control	**Related FW**	1.6.0
Range [units]	1 .. 65000 [kW]		
Default value	100 kW	**Alternative config**	NO
Step	1 kW		
Comm object	14013	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 334)** = Enabled		
Description			

This setpoint indicates required minimal **Nominal Power (page 261)** of Gen-sets needed to activate the LBO **READY TO EXCITE (PAGE 799)**.

Every Gen-set in SUS sequency which activates LBO **READY TO EXCITE (PAGE 799)** is counted. When sum of **Nominal Power (page 261)** of these Gen-sets achieves this condition, rest of Gen-sets (without of activated LBO **READY TO EXCITE (PAGE 799)** are switched to STANDARD sequence (GCBs are opened) and Gen-sets with active LBO **READY TO EXCITE (PAGE 799)** are excited.

If this condition is not met, and on the bus all Gen-sets have LBO **READY TO EXCITE (PAGE 799)** activated, timer **#SUS Excitation Delay (page 338)** is started. After it expires, all Gen-sets with active LBO **READY TO EXCITE (PAGE 799)** are excited.

> ***Note:*** *This setpoint is considered only if LBI* ***SUS MIN POWER 2 (PAGE 735)*** *and LBI* ***SUS MIN POWER 3 (PAGE 735)*** *are either not configured or opened.*

back to List of setpoints

#SUS Min Power 2

Setpoint group	SUS Control	**Related FW**	1.6.0
Range [units]	1 .. 65000 [kW]		
Default value	100 kW	**Alternative config**	NO
Step	1 kW		
Comm object	16414	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 334)** = Enabled		
Description			

This setpoint indicates required minimal **Nominal Power (page 261)** of Gen-sets needed to activate the LBO **READY TO EXCITE (PAGE 799)**.

Every Gen-set in SUS sequency which activates LBO **READY TO EXCITE (PAGE 799)** is counted. When sum of **Nominal Power (page 261)** of these Gen-sets achieves this condition, rest of Gen-sets (without of activated LBO **READY TO EXCITE (PAGE 799)** are switched to STANDARD sequence (GCBs are opened) and Gen-sets with active LBO **READY TO EXCITE (PAGE 799)** are excited.

If this condition is not met, and on the bus all Gen-sets have LBO **READY TO EXCITE (PAGE 799)** activated, timer **#SUS Excitation Delay (page 338)** is started. After it expires, all Gen-sets with active LBO **READY TO EXCITE (PAGE 799)** are excited.

Note: *This setpoint is considered only if LBI **SUS MIN POWER 2 (PAGE 735)** is closed and LBI **SUS MIN POWER 3 (PAGE 735)** is either not configured or opened.*

back to List of setpoints

#SUS Min Power 3

Setpoint group	SUS Control	**Related FW**	1.6.0
Range [units]	1 .. 65000 [kW]		
Default value	100 kW	**Alternative config**	NO
Step	1 kW		
Comm object	16415	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 334)** = Enabled		
Description			
This setpoint indicates required minimal **Nominal Power (page 261)** of Gen-sets needed to activate the LBO **READY TO EXCITE (PAGE 799)**. Every Gen-set in SUS sequency which activates LBO **READY TO EXCITE (PAGE 799)** is counted. When sum of **Nominal Power (page 261)** of these Gen-sets achieves this condition, rest of Gen-sets (without of activated LBO **READY TO EXCITE (PAGE 799)** are switched to STANDARD sequence (GCBs are opened) and Gen-sets with active LBO **READY TO EXCITE (PAGE 799)** are excited. If this condition is not met, and on the bus all Gen-sets have LBO **READY TO EXCITE (PAGE 799)** activated, timer **#SUS Excitation Delay (page 338)** is started. After it expires, all Gen-sets with active LBO **READY TO EXCITE (PAGE 799)** are excited. ***Note:*** *This setpoint is considered only if LBI* ***SUS MIN POWER 3 (PAGE 735)*** *is closed and LBI* ***SUS MIN POWER 2 (PAGE 735)*** *is either not configured or opened.*			

back to List of setpoints

Excitation Control

Setpoint group	SUS Control	**Related FW**	1.6.0
Range [units]	Internal / External [-]		
Default value	Internal	**Alternative config**	YES
Step	[-]		
Comm object	10056	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 334)** = Enabled		
Description			
This setpoint influences the behavior of the SUS starting sequence. See **Start Up Synchronization (SUS) (page 109)** for more information.			

back to List of setpoints

SUS RPM Window

Setpoint group	SUS Control	**Related FW**	1.6.0
Range [units]	0,0 .. 100,0 [%] of **Nominal RPM (page 272)**		
Default value	30,0 % of **Nominal RPM (page 272)**	**Alternative config**	YES
Step	0,1 % of **Nominal RPM (page 272)**		
Comm object	10193	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 334)** = Enabled		
Description			
This setpoint adjusts the RPM Window in which Gen-set is **Ready To Excite (page 799)** during SUS Start Sequence.			

back to List of setpoints

SUS RPM Window Time Out

Setpoint group	SUS Control	**Related FW**	1.6.0
Range [units]	2.0 .. 6000.0 [s]		
Default value	30 s	**Alternative config**	YES
Step	0.1 s		
Comm object	10194	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 334)** = Enabled		
Description			
This setpoint adjusts the delay in which gen-set has to reach **SUS RPM Window (page 338)** during SUS Start Sequence.			

back to List of setpoints

#SUS Excitation Delay

Setpoint group	SUS Control	**Related FW**	1.6.0
Range [units]	0 .. 600 [s] / No Timeout		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	14104	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 334)** = Enabled		
Description			
This setpoint adjusts the delay before excitation which starts to be counted down after › All active Gen-sets **RPM (page 622)** reach the **SUS RPM Window (page 338)** › **SUS RPM Window Time Out (page 338)** elapses			

back to List of setpoints

Group: Maintenance Timers

Subgroup: Maintenance Timer 1

Maintenance Timer 1 RunHours

Setpoint group	Maintenance Timers	**Related FW**	1.6.0
Range [units]	-10 000 ... 9 999 [h] / Disabled		
Default value	1 000 h	**Alternative config**	NO
Step	1 h		
Comm object	13853	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down when engine is running. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 10 000 (Disabled) is set, the Maintenance function is disabled and the counter value disappears from controllers statistics. Reset of the timer can be done using command **MAINTENANCE TIMER 1 RESET (PAGE 725)**.			

back to List of setpoints

Maintenance Timer 1 Interval

Setpoint group	Maintenance Timers	**Related FW**	1.6.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	1 month	**Alternative config**	NO
Step	12 h		
Comm object	20583	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down all the time, setting is done in months, but actual **Maintenance 4 (page 649)** value is displayed and counted in days. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 37 (Disabled) is set, then the maintenance function is disabled and counter does not count and the counter value disappears from controllers statistics. Reset of the timer can be using command **MAINTENANCE TIMER 1 RESET (PAGE 725)**. Setting of the setpoint does not change when the reset is done, only the **Maintenance 4 (page 649)** value changes to reflect reset of the maintenance timer.			

back to List of setpoints

Maintenance Timer 1 Protection

Setpoint group	Maintenance Timers	**Related FW**	1.6.0
Range [units]	Warning / BOC [-]		
Default value	Warning	**Alternative config**	NO
Step	[-]		
Comm object	20586	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 1 RunHours (page 339)** and **Maintenance Timer 1 Interval (page 339)**.			

back to List of setpoints

Subgroup: Maintenance Timer 2

Maintenance Timer 2 RunHours

Setpoint group	Maintenance Timers	**Related FW**	1.6.0
Range [units]	-10 000 ... 9 999 [h] / Disabled		
Default value	1 000 h	**Alternative config**	NO
Step	1 h		
Comm object	13854	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down when engine is running. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 10 000 (Disabled) is set, the Maintenance function is disabled and the counter value disappears from controllers statistics. Reset of the timer can be done using command **MAINTENANCE TIMER 2 RESET (PAGE 726)**.			

back to List of setpoints

Maintenance Timer 2 Interval

Setpoint group	Maintenance Timers	**Related FW**	1.6.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	1 month	**Alternative config**	NO
Step	12 h		
Comm object	20584	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down all the time, setting is done in months, but actual **Maintenance 5 (page 649)** value is displayed and counted in days. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 37 (Disabled) is set, then the maintenance function is disabled and counter does not count and the counter value disappears from controllers statistics. Reset of the timer can be using command **MAINTENANCE TIMER 2 RESET (PAGE 726)**. Setting of the setpoint does not change when the reset is done, only the **Maintenance 5 (page 649)** value changes to reflect reset of the maintenance timer.			

back to List of setpoints

Maintenance Timer 2 Protection

Setpoint group	Maintenance Timers	**Related FW**	1.6.0
Range [units]	Warning / BOC [-]		
Default value	Warning	**Alternative config**	NO
Step	[-]		
Comm object	20587	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 2 RunHours (page 340)** and **Maintenance Timer 2 Interval (page 341)**.			

back to List of setpoints

Subgroup: Maintenance Timer 3

Maintenance Timer 3 RunHours

Setpoint group	Maintenance Timers	**Related FW**	1.6.0
Range [units]	-10 000 ... 9 999 [h] / Disabled		
Default value	1 000 h	**Alternative config**	NO
Step	1 h		
Comm object	13855	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down when engine is running. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 10 000 (Disabled) is set, the Maintenance function is disabled and the counter value disappears from controllers statistics. Reset of the timer can be done using command **MAINTENANCE TIMER 3 RESET (PAGE 726)**.			

back to List of setpoints

Maintenance Timer 3 Interval

Setpoint group	Maintenance Timers	**Related FW**	1.6.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	1 month	**Alternative config**	NO
Step	12 h		
Comm object	20585	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down all the time, setting is done in months, but actual **Maintenance 6 (page 649)** value is displayed and counted in days. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 37 (Disabled) is set, then the maintenance function is disabled and counter does not count and the counter value disappears from controllers statistics. Reset of the timer can be done using command **MAINTENANCE TIMER 3 RESET (PAGE 726)**. Setting of the setpoint does not change when the reset is done, only the **Maintenance 6 (page 649)** value changes to reflect reset of the maintenance timer.			

back to List of setpoints

Maintenance Timer 3 Protection

Setpoint group	Maintenance Timers	**Related FW**	1.6.0
Range [units]	Warning / BOC [-]		
Default value	Warning	**Alternative config**	NO
Step	[-]		
Comm object	20588	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 3 RunHours (page 342)** and **Maintenance Timer 3 Interval (page 342)**.			

back to List of setpoints

Group: Generator settings

Subgroup: Overload Protection

Overload BOC

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	**Overload Wrn (page 344)** .. 200 [%]		
Default value	120 %	**Alternative config**	NO
Step	1 % of **Nominal Power (page 261)**		
Comm object	8280	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for overload of generator (in % of Nominal power) protection. Protection is BOC (Breaker Open and Gen-set Cooldown). ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

back to List of setpoints

Overload Wrn

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0 .. **Overload BOC (page 343)** [%]		
Default value	120 %	**Alternative config**	NO
Step	1 % of **Nominal Power (page 261)**		
Comm object	9685	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for overload of generator (in % of **Nominal Power (page 261)**) protection. This is only warning.			

back to List of setpoints

Overload Delay

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8281	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for protections **Overload BOC (page 343)** and **Overload Wrn (page 344)**.			

back to List of setpoints

Subgroup: Underload Protection

Minimal Power PTM

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	5 %	**Alternative config**	NO
Step	1 % of **Nominal Power (page 261)**		
Comm object	9241	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Minimal power of the Gen-set. Value of this setpoint is used in **Load Control PTM (page 249)**.			

back to List of setpoints

Subgroup: Current Protection

Short Circuit BOC

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	100 .. 500 [%]		
Default value	250 %	**Alternative config**	NO
Step	1 % of **Nominal Current (page 262)**		
Comm object	8282	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Protection occurs when generator current reaches this preset threshold. Type of the protection is BOC. ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

back to List of setpoints

Short Circuit BOC Delay

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0.00 .. 10.00 [s]		
Default value	0.04 s	**Alternative config**	YES
Step	0.01 s		
Comm object	9991	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Delay for **Short Circuit BOC (page 345)** protection.			

back to List of setpoints

IDMT Overcurrent Delay

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	1.0 .. 600.0 [s]		
Default value	4.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8283	**Related applications**	MINT, SPtM
Config level	Standard		

Setpoint visibility	Always

Description

IDMT curve shape selection. IDMT is "very inverse" over current protection. Reaction time is not constant but depends on over current level according to the following formula:

$$\text{Reaction time} = \frac{\textit{Overcurrent IDMT Delay* Nominal Current}}{I_{gen} - \textit{Nominal Current}}$$

Note: *Reaction time is limited to 3600 s = 60 minutes. IDMT protection is not active for Reaction time values longer than 60 minutes.*

I_{gen} is maximal value of all measured phases of generator current.

Table 8.1 EXAMPLE of Reaction time for different over current levels

	Overcurrent IDMT Delay	Overcurrent		
		≤ 100 %	101 %	110 %
Reaction time	0.2 s	No action	20 s	2 s
	2 s	No action	200 s	20 s
	20 s	No action	2000 s	200 s

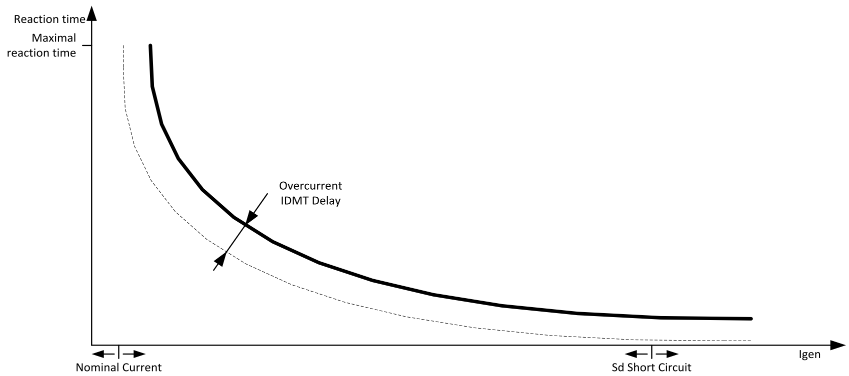


Image 8.21 IDMT Overcurrent Delay

back to List of setpoints

Current Unbalance BOC

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	1 .. 200 [%] of **Nominal Current (page 262)**		
Default value	50 %	**Alternative config**	NO
Step	1 % of **Nominal Current (page 262)**		
Comm object	8284	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**		
Description			
Threshold for generator current asymmetry (unbalance). Protection is BOC (Breaker Open and Gen-set Cooldown). ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

back to List of setpoints

Current Unbalance BOC Delay

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8285	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**		
Description			
Delay for **Current Unbalance BOC (page 347)** protection.			

back to List of setpoints

Subgroup: Voltage Protection

Generator Overvoltage Sd

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	**Generator Overvoltage Wrn (page 348)** .. 200 [%]		
Default value	110 %	**Alternative config**	NO
Step	1 % of **Gen Nominal Voltage Ph-N (page 267)** or **Gen Nominal Voltage Ph-Ph (page 267)**		
Comm object	8291	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Threshold for generator overvoltage protection. All three phases are checked. Maximum out of three is used.

Note: *Phase to phase and phase to neutral voltages are used for this protection.*

back to List of setpoints

Generator Overvoltage Wrn

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	**Generator Undervoltage Wrn (page 349)** .. **Generator Overvoltage Sd (page 348)** [%]		
Default value	110 %	**Alternative config**	NO
Step	1 % of **Gen Nominal Voltage Ph-N (page 267)** or **Gen Nominal Voltage Ph-Ph (page 267)**		
Comm object	9686	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Threshold for generator overvoltage protection. All three phases are checked. Maximum out of three is used.

Note: *Phase to phase and phase to neutral voltages are used for this protection.*

back to List of setpoints

Generator Undervoltage BOC

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0 .. **Generator Undervoltage Wrn (page 349)** [%]		
Default value	70 %	**Alternative config**	NO
Step	1 % of **Gen Nominal Voltage Ph-N (page 267)** or **Gen Nominal Voltage Ph-Ph (page 267)**		
Comm object	8293	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator undervoltage protection. All three phases are checked. Minimum out of three is used. ***Note:*** *Phase to phase and phase to neutral voltages are used for this protection.* ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

back to List of setpoints

Generator Undervoltage Wrn

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	**Generator Undervoltage BOC (page 349)** .. **Generator Overvoltage Wrn (page 348)** [%]		
Default value	70 %	**Alternative config**	NO
Step	1 % of **Gen Nominal Voltage Ph-N (page 267)** or **Gen Nominal Voltage Ph-Ph (page 267)**		
Comm object	9687	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator undervoltage protection. All three phases are checked. Minimum out of three is used. ***Note:*** *Phase to phase and phase to neutral voltages are used for this protection.*			

back to List of setpoints

Generator <> Voltage Delay

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0,0 .. 600,0 [s]		
Default value	3,0 s	**Alternative config**	NO
Step	0,1 s		
Comm object	9103	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Generator Overvoltage Sd (page 348)**, **Generator Overvoltage Wrn (page 348)**, **Generator Undervoltage BOC (page 349)** and **Generator Undervoltage Wrn (page 349)** protection.			

back to List of setpoints

Voltage Unbalance BOC

Setpoint group	Generator settingsBus Settings	**Related FW**	1.6.0
Range [units]	1 .. 200 [%] of **Gen Nominal Voltage Ph-Ph (page 267)** or **Gen Nominal Voltage Ph-N (page 267)**		
Default value	10 %	**Alternative config**	NO
Step	1 %		
Comm object	8288	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**		
Description			
Threshold for generator voltage unbalance alarm. ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

back to List of setpoints

Voltage Unbalance BOC Delay

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0.0 .. 600.0 [s]		
Default value	3.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8289	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**		
Description			
Delay for **Voltage Unbalance BOC (page 350)** protection.			

back to List of setpoints

Subgroup: Frequency Protection

Generator Overfrequency BOC

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	**Generator Overfrequency Wrn (page 351)** .. 200,0 [%]		
Default value	110,0 %	**Alternative config**	NO
Step	0,1 % of **Nominal Frequency (page 271)**		
Comm object	8296	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator phase L1 overfrequency. ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

back to List of setpoints

Generator Overfrequency Wrn

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	**Generator Underfrequency Wrn (page 352)** .. **Generator Overfrequency BOC (page 351)** [%]		
Default value	110,0 %	**Alternative config**	NO
Step	0,1 % of **Nominal Frequency (page 271)**		
Comm object	9688	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator phase L1 overfrequency.			

back to List of setpoints

Generator Underfrequency BOC

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0,0 .. **Generator Underfrequency Wrn (page 352)** [%]		
Default value	85,0 %	**Alternative config**	NO
Step	0,1 % of **Nominal Frequency (page 271)**		
Comm object	8298	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator phase L1 underfrequency. ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

back to List of setpoints

Generator Underfrequency Wrn

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	**Generator Underfrequency BOC (page 351)** .. **Generator Overfrequency Wrn (page 351)** [%]		
Default value	85,0 %	**Alternative config**	NO
Step	0,1 % of **Nominal Frequency (page 271)**		
Comm object	9689	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator phase L1 underfrequency.			

back to List of setpoints

Generator <> Frequency Delay

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0,0 .. 600,0 [s]		
Default value	3,0 s	**Alternative config**	NO
Step	0,1 s		
Comm object	8297	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Generator Overfrequency BOC (page 351)**, **Generator Overfrequency Wrn (page 351)**, **Generator Underfrequency Wrn (page 352)** and **Generator Underfrequency BOC (page 351)** protection.			

back to List of setpoints

Subgroup: Reverse Power Protection

Reverse Power Level

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0 .. 50 [%]		
Default value	10 %	**Alternative config**	NO
Step	1 % of **Nominal Power (page 261)**		
Comm object	8486	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Reverse Power Protection (page 357)**		
Description			
Level for generator **Reverse Power Protection (page 357)**.			

back to List of setpoints

Reverse Power Delay

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0.0 .. 600 [s]		
Default value	5.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8552	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Reverse Power Protection (page 357)**		
Description			
Delay for generator **Reverse Power Protection (page 357)**.			

back to List of setpoints

Subgroup: Excitation Loss Protection

Excitation Loss Level

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0 .. 150 [%]		
Default value	30 %	**Alternative config**	NO
Step	1 % of **Nominal Frequency (page 271)**		
Comm object	12486	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Excitation Loss Protection (page 358)**.		
Description			
Level for generator **Excitation Loss Protection (page 358)**			

back to List of setpoints

Excitation Loss Delay

Setpoint group	Generator settings	**Related FW**	1.6.0
Range [units]	0,0 .. 600,0 [s]		
Default value	5,0 s	**Alternative config**	NO
Step	0,1 s		
Comm object	12487	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Excitation Loss Protection (page 358)**.		
Description			
Delay for generator **Excitation Loss Protection (page 358)**.			

back to List of setpoints

Group: Protections

Subgroup: Overload Protection

Overload Protection

Setpoint group	Protections	**Related FW**	1.6.0
Range [units]	Enabled/Disabled/ExtDisable [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	15664	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the behavior of generator Overload protection.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoints **Overload BOC (page 343)**, **Overload Wrn (page 344)** and **Overload Delay (page 344)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 720)**

back to List of setpoints

Subgroup: Current Protection

IDMT Overcurrent Protection

Setpoint group	Protections	**Related FW**	1.6.0
Range [units]	Enabled / Disabled / ExtDisable[-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	15666	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the behavior of generator IDMT Overcurrent protection.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoint **IDMT Overcurrent Delay (page 345)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 720)**

back to List of setpoints

Current Unbalance Protection

Setpoint group	Protections	**Related FW**	1.6.0
Range [units]	Enabled / Disabled / ExtDisable[-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	15667	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the behavior of generator Current Unbalance protection.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoints **Current Unbalance BOC (page 347)** and **Current Unbalance BOC Delay (page 347)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 720)**

back to List of setpoints

Subgroup: Voltage Protection

Generator <> Voltage Protection

Setpoint group	Protections	**Related FW**	1.6.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	15668	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the behavior of generator Generator <> Voltage protection. GCB closing is blocked, if the protection is disabled!

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoints **Generator Overvoltage Sd (page 348)**, **Generator Overvoltage Wrn (page 348)**, **Generator Undervoltage BOC (page 349)**, **Generator Undervoltage Wrn (page 349)** and **Generator <> Voltage Delay (page 350)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 720)**

GCB closing, generator voltage regulation and synchronization are disabled (blocked), if the parameter is set to Disabled. It is blocked as well, if the parameter is set to ExtDisable and LBI **FORCE PROTECTION DISABLE (PAGE 720)** is active.

back to List of setpoints

Voltage Unbalance Protection

Setpoint group	Protections	**Related FW**	1.6.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	15669	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		

Description

This setpoint adjusts the behavior of generator Voltage Unbalance protection.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoints **Voltage Unbalance BOC (page 350)** and **Voltage Unbalance BOC Delay (page 350)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 720)**

back to List of setpoints

Subgroup: Frequency Protection

Generator Frequency Protection

Setpoint group	Protections	**Related FW**	1.6.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	15670	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		

Description

This setpoint adjusts the behavior of Generator Frequency protection. GCB closing is blocked, if the protection is disabled!.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoints **Generator Overfrequency BOC (page 351)**, **Generator Overfrequency Wrn (page 351)**, **Generator Underfrequency BOC (page 351)**, **Generator Underfrequency Wrn (page 352)**, and **Generator <> Frequency Delay (page 352)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 720)**

GCB closing, generator voltage regulation and synchronization are disabled (blocked), if the parameter is set to Disabled. It is blocked as well, if the parameter is set to ExtDisable and LBI **FORCE PROTECTION DISABLE (PAGE 720)** is active.

back to List of setpoints

Subgroup: Reverse Power Protection

Reverse Power Protection

Setpoint group	Protections	**Related FW**	1.6.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	13230	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

The protection of the generator against the reverse (negative) active power. Protection gets active when the level of active power [kW] gets under limit given by setpoint **Reverse Power Level (page 352)** for time longer than the value of setpoint **Reverse Power Delay (page 353)**.

This setpoint adjusts behavior of generator Reverse power protection.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoints **Reverse Power Level (page 352)**, **Reverse Power Delay (page 353)**
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 720)**.

back to List of setpoints

Subgroup: Excitation Loss Protection

Excitation Loss Protection

Setpoint group	Protections	**Related FW**	1.6.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	13269	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

The protection protect the generator against negative value of reactive power. Protection gets active when the level of reactive power [kVAr] gets under limit given by setpoint **Excitation Loss Level (page 353)** for time longer than the value of setpoint **Excitation Loss Delay (page 353)**.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoints **Excitation Loss Level (page 353)**, **Excitation Loss Delay (page 353)**
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 720)**.

back to List of setpoints

Subgroup: Speed Protection

Underspeed Protection

Setpoint group	Protections	**Related FW**	1.6.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	15671	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the behavior of generator Underspeed protection.

Enabled:	Protection is enabled.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 720)**

back to List of setpoints

Subgroup: AMF Timers

Emergency Start Delay

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	0 .. 6 000 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	8301	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Delay after the mains failure to the start command of the Gen-set.			

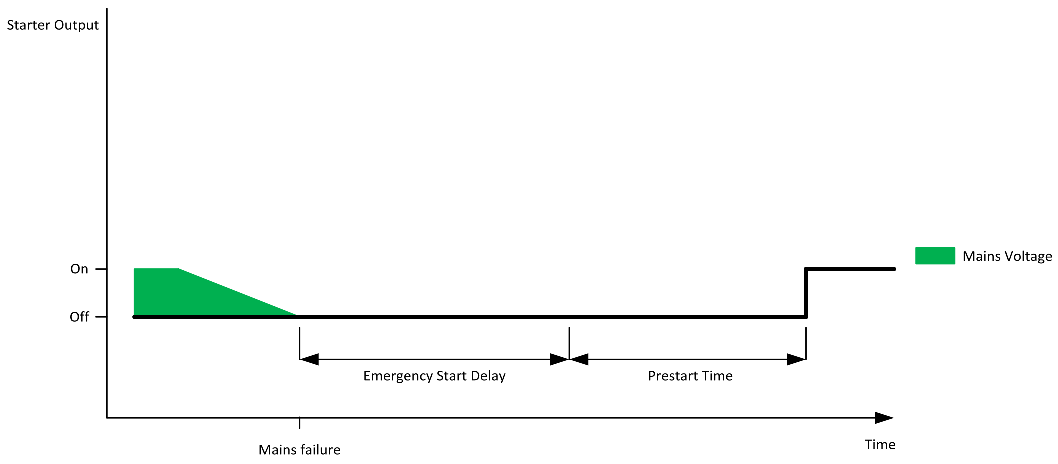


Image 8.22 Emergency Start Delay

back to List of setpoints

Mains Return Delay

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	1 .. 3 600 [s]		
Default value	20 s	**Alternative config**	NO
Step	1 s		
Comm object	8302	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
This setpoint adjust the delay, how long mains has to be returned after mains fail to start load transfer to mains.			

back to List of setpoints

MCB Close Delay

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	0.0 .. 600.0 [s]		
Default value	1.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8389	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Delay after mains returns to MCB closing, if the Gen-set is not running (e.g. is in start-up procedure).			

back to List of setpoints

AMF Start

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	9238	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Use this setpoint to enable or disable the **AMF operation (page 126)**.			

back to List of setpoints

Subgroup: Mains Voltage Limits

Mains Overvoltage

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	**Mains Undervoltage (page 361)** .. 150 [%]		
Default value	110 %	**Alternative config**	NO
Step	1 % of **Mains/Bus Nominal Voltage Ph-N (page 268)** and **Mains/Bus Nominal Voltage Ph-Ph (page 268)**		
Comm object	8305	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Threshold for Mains overvoltage. All three phases are checked. Maximum out of three is used.			

back to List of setpoints

Mains Undervoltage

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	50 .. **Mains Overvoltage (page 360)** [%]		
Default value	60 %	**Alternative config**	YES
Step	1 % of **Mains/Bus Nominal Voltage Ph-N (page 268)** and **Mains/Bus Nominal Voltage Ph-Ph (page 268)**		
Comm object	8307	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Threshold for Mains undervoltage. All three phases are checked. Minimum voltage out of three phases is used.			

back to List of setpoints

Mains <> Voltage Delay

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	0.0 .. 600.0 [s]		
Default value	2.0 s	**Alternative config**	YES
Step	0.1 s		
Comm object	8306	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Delay for **Mains Undervoltage (page 361)** and **Mains Overvoltage (page 360)** protection.			

back to List of setpoints

Mains Voltage Unbalance

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	1 .. 150 [%]		
Default value	10 %	**Alternative config**	NO
Step	1 % of **Mains/Bus Nominal Voltage Ph-N (page 268)** and **Mains/Bus Nominal Voltage Ph-Ph (page 268)**		
Comm object	8446	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Threshold for Mains voltage unbalance.			

back to List of setpoints

Mains Voltage Unbalance Delay

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	0.0 .. 600.0 [s]		
Default value	2.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8447	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Delay for **Mains Voltage Unbalance (page 361)** protection.			

back to List of setpoints

Subgroup: Mains Frequency Limits

Mains Overfrequency

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	**Mains Underfrequency (page 362)** .. 150 [%]		
Default value	102.0 %	**Alternative config**	NO
Step	1.0 % of **Nominal Frequency (page 271)**		
Comm object	8310	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Threshold for Mains overfrequency.			

back to List of setpoints

Mains Underfrequency

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	50 .. **Mains Overfrequency (page 362)** [%]		
Default value	98.0 %	**Alternative config**	NO
Step	1.0 % of **Nominal Frequency (page 271)**		
Comm object	8312	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Threshold for Mains underfrequency.			

back to List of setpoints

Mains < > Frequency Delay

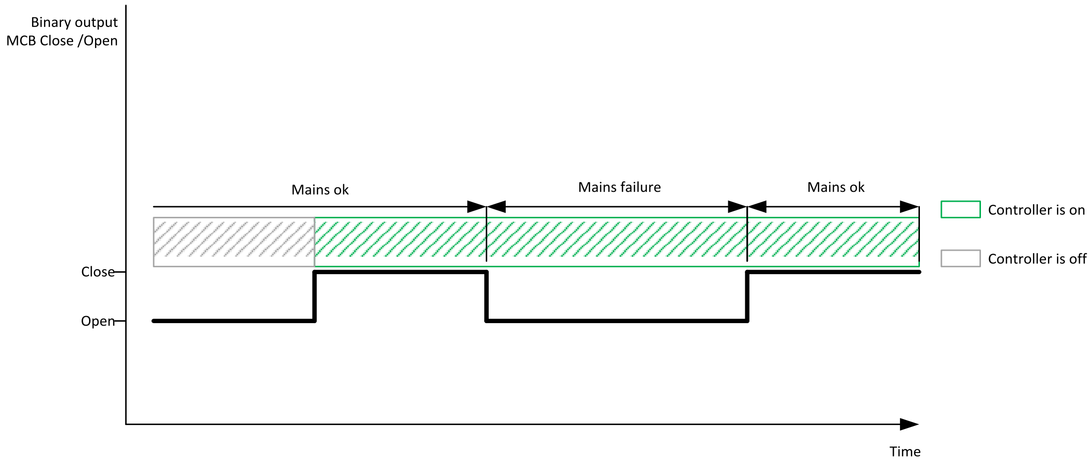
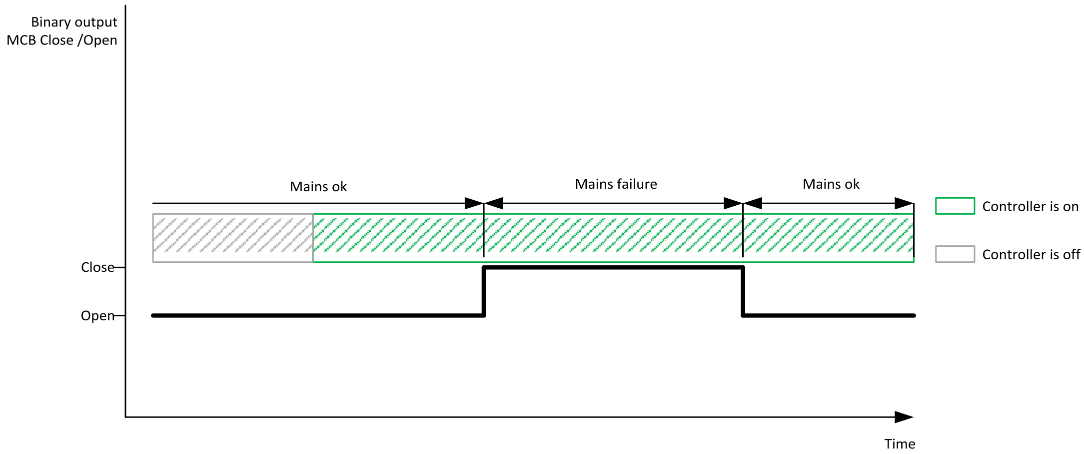
Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	0.0 .. 600.0 [s]		
Default value	0.5 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8311	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Delay for **Mains Underfrequency (page 362)** and **Mains Overfrequency (page 362)** protection.			

back to List of setpoints

Subgroup: MCB Control

MCB Logic

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	Close On / Close Off [-]		
Default value	Close Off	**Alternative config**	NO
Step	[-]		
Comm object	8444	**Related applications**	MINT, SPtM
Config level	Advanced		

Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**
Description	
The setpoint influences the behavior of the output **MCB Close/Open (page 789)**. Close On When the output **MCB Close/Open (page 789)** is active – MCB should be closed. Close Off When the output **MCB Close/Open (page 789)** is active – MCB should be opened.  Image 8.23 MCB Logic 1  Image 8.24 MCB Logic 2	

back to List of setpoints

Subgroup: AMF Settings

Return From Island

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	Manual / Auto [-]		
Default value	Auto	**Alternative config**	NO
Step	[-]		
Comm object	9590	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			

Setpoint adjust the behavior of closing MCB when the mains returns.

Manual	Controller remains in AUT mode and the manual return to Mains is done via MCB button. **Manual Restore (page 883)** message is displayed in alarmlist to notify operator – it will disappear automatically after MCB close button is pushed. ***Note:*** *Select MANUAL in case you need to manually control the moment when the load is transferred back to the mains.*
Auto	The MCB is closed automatically after the timer **Mains Return Delay (page 359)** elapses. The transfer of load from a generator to mains is given by the setpoint **Transfer Gen To Mains (page 397)**.

back to List of setpoints

MCB Opens On

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	Mains Fail / Gen Run [-]		
Default value	Gen Run	**Alternative config**	NO
Step	[-]		
Comm object	9850	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			

Setpoint adjust the behavior of opening MCB in AUTO mode when there is mains fail.

Mains Fail	The command to open the MCB is given immediately after mains fail condition is evaluated. If the mains will return into parameters after MCB was opened and before GCB is closed, timer **MCB Close Delay (page 360)** is applied before MCB closing.
Gen Run	MCB will be opened when engine will be running and it will be possible to transfer load from Mains to Gen-set (after stabilization phase). ***Note:*** *This option should be used for MCBs using 230V control and not equipped with the undervoltage coil.*

back to List of setpoints

Subgroup: Mains Decoupling Protection

Vector Shift Protection

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	Enabled / Parallel Only / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	10551	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint selects the function of the built-in vector shift protection.

Disabled	The vector shift protection is disabled.
Parallel Only	The vector shift protection is enabled only while the Gen-set is running parallel to the mains, i.e. the both MCB and GCB are closed.
Enabled	The vector shift 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* ***Vector Shift CB Selector (page 369)****. If the MCB is not controlled in the particular application then GCB is opened.*

Note: *If a vector shift is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is then reclosed again after* ***Mains Return Delay (page 359)****, as the mains is evaluated as healthy.*

back to List of setpoints

Vector Shift Limit

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	1 .. 45 [°]		
Default value	10 °	**Alternative config**	NO
Step	1 °		
Comm object	9843	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjusts the threshold level for the vector shift protection.

Note: *To adjust this setpoint properly, check the value* ***Vector Shift Limit (page 367)****. The value is available in InteliConfig, contains the maximal measured vector shift value since the gen-set has been synchronized to the mains and after opening of GCB or MCB it is "frozen". In normal conditions the value should not be higher than 3 ° and the most common setting of the threshold is about 7 °.*

back to List of setpoints

ROCOF Protection

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	Enabled / Parallel Only / Disabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	9840	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint selects the function of the built-in ROCOF protection.

Disabled	The ROCOF protection is disabled.
Parallel Only	The ROCOF protection is enabled only while the Gen-set is running parallel to the mains, i.e. the both MCB and GCB are closed.
Enabled	The ROCOF protection is active always while the MCB is closed, regardless of the GCB position.

Note: *The ROCOF protection is recorded into the history file, however it is not indicated in the Alarm list. When it occurs the controller opens either MCB or GCB depending on the setpoint* ***Vector Shift CB Selector (page 369)****. If the MCB is not controlled in the particular application then GCB is opened.*

Note: *If a ROCOF is detected and consequently the MCB is opened, however mains voltage and frequency remain in limits, the MCB is then reclosed again after* ***Mains Return Delay (page 359)****, as the mains is evaluated as healthy.*

back to List of setpoints

ROCOF Windows Length

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	3 .. 30 [-]		
Default value	5	**Alternative config**	NO
Step	1 [-]		
Comm object	9990	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjusts the averaging level for the **ROCOF Protection (page 368)**. It defines number of periods of the mains voltage in which the ROCOF protection is evaluated. The higher length of ROCOF window means less sensitive protection for short oscillations of the frequency to both directions from the nominal value. Also delay of evaluation is higher.

back to List of setpoints

ROCOF df_dt

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	0.1 .. 10.0 [Hz/s]		
Default value	1.0 Hz/s	**Alternative config**	NO
Step	0.1 Hz/s		
Comm object	9844	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the trip level for **ROCOF Protection (page 368)** (Rate Of Change Of Frequency).			

back to List of setpoints

Vector Shift CB Selector

Setpoint group	Mains Settings	**Related FW**	1.6.0
Range [units]	MCB / GCB [-]		
Default value	MCB	**Alternative config**	NO
Step	[-]		
Comm object	10552	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint selects which breaker will be opened when the **Vector Shift Protection (page 367)** or **ROCOF Protection (page 368)** 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.*			

back to List of setpoints

Group: Load Shedding

Subgroup: Load Shedding

Load Shedding Active

Setpoint group	Load Shedding	**Related FW**	1.6.0
Range [units]	Disabled / Island only / ISL+Trip paral / All the time [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	11001	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint is used for adjustment when the load shedding function is active.

Disabled	The Load shedding function is disabled. All the outputs are open.
Island only	The function is active when **Breaker State (page 653)** = IsOper or MultIsOp. › Load shedding outputs are activated / deactivated one by one in island operation › All Loadshedding outputs are tripped once the Gen-set comes into the island operation from "NO LOAD" operation (MCB and (M)GCB were opened -> Gen-set started and (M)GCB closed).
ISL+Trip paral	This setting adjusts the same behavior as ISLAND ONLY but in addition to it all load shedding outputs are closed when gen-set group goes from parallel operation ino the island operation. › Load shedding outputs are activated / Deactivated one by one in island operation. › All Loadshedding outputs are tripped at once when the Gen-set comes into the island operation from "NO LOAD" operation (MCB and (M)GCB were opened -> Gen-set started and (M)GCB closed). › All Loadshedding outputs are tripped at once when the Gen-set comes from Parallel operation (MCB, (M)GCB closed) to island operation (MCB opens, (M)GCB stays closed). This scenario is also valid when Test On Load is taken.
All the time	Load shedding Outputs are controlled by the load shedding function regardless of breaker positions. › Loadshedding is active in island operation, in parallel operation too. › All Loadshedding outputs are never tripped at once.

back to List of setpoints

Load Shedding Level

Setpoint group	Load Shedding	**Related FW**	1.6.0
Range [units]	Load Reconnection Level .. 200 [%] of **Nominal Power (page 261)**		
Default value	80 %	**Alternative config**	NO
Step	1 %		
Comm object	8884	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 370)** is enabled		
Description			
This setpoint is used to activates the next Load shedding stage.When Gen-set load exceeds this level for more than **Load Shedding Delay (page 371)** time			

back to List of setpoints

Load Shedding Delay

Setpoint group	Load Shedding	**Related FW**	1.6.0
Range [units]	0.0 .. 600.0 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	8887	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 370)** is enabled		
Description			
This setpoint is used to proceeds the next Load shedding stage. When Gen-set load exceeds **Load Shedding Level (page 371)** for more than this delay's time, the controller proceeds to the next Load shedding stage – the next binary output Load Shedding Stage 1-3 is active.			

back to List of setpoints

Load Reconnection Level

Setpoint group	Load Shedding	**Related FW**	1.6.0
Range [units]	0 .. **Load Shedding Level (page 371)** [%]		
Default value	20 %	**Alternative config**	NO
Step	1 %		
Comm object	8890	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 370)** is enabled		
Description			
This setpoint is used to proceed to the lower load shedding stage when the Gen-set load drops below this level for more than **Load Reconnection Delay (page 372)**.			

back to List of setpoints

Load Reconnection Delay

Setpoint group	Load Shedding	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	8893	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 370)** is enabled		
Description			
This setpoint is used to proceeds the lower Load shedding stage. When Gen-set load drops under **Load Reconnection Level (page 371)** for more than this delay time, the binary output for higher stage is opened. Automatic load reconnection works only when **Auto Load Reconnection (page 372)** = Enabled			

back to List of setpoints

Auto Load Reconnection

Setpoint group	Load Shedding	**Related FW**	1.6.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	9649	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 370)** is enabled		
Description			
Switch between manual and automatic reconnection of shedded load..			

Disabled	Rising edge on binary input **MANUAL LOAD RECONNECTION (PAGE 726)** resets controller to the lower stage, but only if the load is under the **Load Reconnection Level (page 371)**. **Load Reconnection Delay (page 372)** is not taken into account in this case.
Enabled	Load reconnection is automatic depend on setpoints **Load Reconnection Level (page 371)** and **Load Reconnection Delay (page 372)**. Binary input **MANUAL LOAD RECONNECTION (PAGE 726)** has no function.

back to List of setpoints

Group: Power Management

Subgroup: Power Management Control

Power Management

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	8551	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
This setpoint is used to enable or disable the **Power management (page 128)** function in the particular controller. It performs automatic load dependent starts and stops or load demand swap. If the function is disabled the Gen-set's nominal power is not part of the power management calculation and the start and stop of the Gen-set is performed only according to the position of the binary input **REMOTE START/STOP (PAGE 732)** i.e. if the input is active the Gen-set is running and vice versa.			

back to List of setpoints

Power Management Delay

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 3600 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	12488	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
Setpoint defines delay of the **Power Management (page 373)**. When **REMOTE START/STOP (PAGE 732)** signal is activated and the gen-sets should start, all the engines (where **Power Management (page 373)** is enabled) are started and stay running for time period specified by this parameter. After this period elapses, only the Gen-set(s) needed according to the Power Management calculation stay running and the rest is stopped. **Example:** This delay is useful, when you need to start gen-sets to an unknown load. Setting for example 360 s (6 minutes) and activating **REMOTE START/STOP (PAGE 732)** will force all gen-sets to start and run for 6 minutes despite of the power management setting. ***Note:*** *By setting "0" the Power Management function is enabled immediately.*			

back to List of setpoints

#Power Management Mode

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	ABS [kW] / REL [%]		
Default value	ABS	**Alternative config**	NO
Step	[-]		
Comm object	9874	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			

This setpoint is used to select the **Power Management (page 373)** mode.

ABS [kW]	The power management is based on actual active power and Gen-set nominal power. The reserves are calculated and adjusted in kW.
Not Available	This mode of Power Management is not supported in this controller. Alarm **Wrn Unsupported PMS Mode (page 893)** is active.
REL [%]	The power management is based on the relative load, i.e. ratio active power to nominal power. The reserves are calculated and adjusted in %.

back to List of setpoints

Dynamic Spinning Reserve

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	ENABLED, DISABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	-		
Comm object	14126	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint is used to enable / disable use of the Dynamic Spinning Reserve functionality with power management.

back to List of setpoints

Priority

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	1 .. 32 [-]		
Default value	1	**Alternative config**	NO
Step	1		
Comm object	8488	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			

This setpoint adjusts the priority of the Gen-set within the group. A lower number represents a "higher" priority, i.e. a gen-set with lower number will start before another one with higher number.

Note: *If the binary input* ***Top Priority (page 736)*** *is active, the gen-set gets the highest priority (0) independent of the setpoint setting.*

Note: *If more than one gen-set have the same priority they will act as "one big" Gen-set.*

IMPORTANT: Value of the setpoint Priority is taken into account only for absolute mode of power management (#Power Management Mode (page 374) = ABS).

back to List of setpoints

#Priority Auto Swap

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	Disabled / Run Hours Equal / Efficient [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	10593	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			

This setpoint adjusts priority auto swapping.

Disabled	Optimization is disabled. Priorities are given directly by the values adjusted in the setpoints **Priority (page 375)**.
Run Hours Equal	This method changes the priorities (not the setpoints itself) to equalize running hours of the Gen-sets or to keep constant difference of running hours by the controller (adjusted via setpoint **#Run Hours Max Difference (page 385)**).
Not Available	This mode of Priority Auto Swap is not supported in controller.
Efficient	This method changes the priorities (not the setpoints itself) to optimize which Gen-sets are running according to their capacities and actual load demand. **IMPORTANT: This priority swapping function is only for absolute mode of power management (#Power Management Mode (page 374) = ABS).** Optimal power band (number of running gen-sets) is calculated based on the nominal power of each Gen-set, their Run Hours and requested Load reserve. For Gen-sets with the same nominal power also run hour equalization is being performed.

IMPORTANT: Binary input TOP PRIORITY (PAGE 736) can be used only if #Priority Auto Swap (page 376) = Disabled.

back to List of setpoints

#System Start Delay

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	5	**Alternative config**	NO
Step	1		
Comm object	8549	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
This setpoint adjusts the delay of the system activation after the binary input **REMOTE START/STOP (PAGE 732)** has been activated.			

back to List of setpoints

#System Stop Delay

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	30	**Alternative config**	NO
Step	1		
Comm object	8550	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
This setpoint adjusts the delay of the system deactivation after the binary input **REMOTE START/STOP (PAGE 732)** has been deactivated.			

back to List of setpoints

Subgroup: Load Reserve Set 1

#Starting Load Reserve 1

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. **#Stopping Load Reserve 1 (page 378)** [-]		
Default value	60 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8489	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint is used to adjust the load reserve for start of next Gen-set in absolute mode. i.e. **#Power Management Mode (page 374)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 725) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

Note: *See* ***Power management (page 128)*** *chapter for more information.*

back to List of setpoints

#Stopping Load Reserve 1

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	**#Starting Load Reserve 1 (page 378)** .. 32000 [-]		
Default value	110 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8491	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint is used to adjust the load reserve for stop of next Gen-set in absolute mode. i.e. **#Power Management Mode (page 374)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 725) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

Note: *See* ***Power management (page 128)*** *chapter for more information.*

back to List of setpoints

#Starting Rel Load Reserve 1

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. **#Stopping Rel Load Reserve 1 (page 379)** [%]		
Default value	60 %	**Alternative config**	NO
Step	1 %		
Comm object	10648	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to adjust the load reserve for start of next Gen-set in relative mode. i.e. **#Power Management Mode (page 374)** = REL. **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 725) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.** ***Note:*** *See* ***Power management (page 128)*** *chapter for more information.*			

back to List of setpoints

#Stopping Rel Load Reserve 1

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	**#Starting Rel Load Reserve 1 (page 379)** .. 110 [%]		
Default value	80 %	**Alternative config**	NO
Step	1 %		
Comm object	10652	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to adjust the load reserve for stop of next Gen-set in relative mode. i.e. **#Power Management Mode (page 374)** = REL. **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 725) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.** ***Note:*** *See* ***Power management (page 128)*** *chapter for more information.*			

back to List of setpoints

Subgroup: Load Reserve Set 2

#Starting Load Reserve 2

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. **#Stopping Load Reserve 2 (page 380)** [-]		
Default value	410 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8490	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint is used to adjust the load reserve for start of next Gen-set in absolute mode. i.e. **#Power Management Mode (page 374)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 725) has to be deactivated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 128)** chapter for more information.*

back to List of setpoints

#Stopping Load Reserve 2

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	**#Starting Load Reserve 2 (page 380)** .. 32000 [kW]		
Default value	460 kW	**Alternative config**	NO
Step	1 kW		
Comm object	8633	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint is used to adjust the load reserve for stop of next Gen-set in absolute mode. i.e. **#Power Management Mode (page 374)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 725) has to be deactivated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 128)** chapter for more information.*

back to List of setpoints

#Starting Rel Load Reserve 2

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. **#Stopping Rel Load Reserve 2 (page 381)** [%]		
Default value	60 %	**Alternative config**	NO
Step	1 %		
Comm object	10649	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint is used to adjust the load reserve for start of next Gen-set in relative mode. i.e. **#Power Management Mode (page 374)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 725) has to be deactivated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 128)** chapter for more information.*

back to List of setpoints

#Stopping Rel Load Reserve 2

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	**#Starting Rel Load Reserve 2 (page 381)** .. 110 [%]		
Default value	80 %	**Alternative config**	NO
Step	1 %		
Comm object	10653	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint is used to adjust the load reserve for stop of next Gen-set in relative mode. i.e. **#Power Management Mode (page 374)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 725) has to be deactivated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 128)** chapter for more information.*

back to List of setpoints

Subgroup: Minimal Running Power

#Min Run Power

Setpoint group	Power Management	Related FW	1.6.0
Range [units]	0 .. 65 000 [kW]		
Default value	210 kW	Alternative config	NO
Step	1 kW		
Comm object	9584	Related applications	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint is used to adjust certain minimum value of the sum of nominal power of all running Gen-sets. If the function is active (by logical binary input **MIN RUN POWER ACTIVE** (PAGE 728)), then the Gen-sets would not be stopped, although the reserve for stop is fulfilled, if the total remaining nominal power drops below this minimal value.

> ***Note:*** *Logical binary input* ***MIN RUN POWER ACTIVE*** ***(PAGE 728)*** *needs to be activated on all Gen-sets in the same time.*

back to List of setpoints

Subgroup: Start/Stop Timing

#Next Engine Start Delay

Setpoint group	Power Management	Related FW	1.6.0
Range [units]	0 .. 3 600 [s]		
Default value	5 s	Alternative config	NO
Step	1 s		
Comm object	8492	Related applications	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjusts the delay for starting the next Gen-set after the reserve has dropped below the reserve for start.

back to List of setpoints

#Next Engine Stop Delay

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 3 600 [s]		
Default value	20 s	**Alternative config**	NO
Step	1 s		
Comm object	8494	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the delay for stopping the Gen-set after the reserve has risen above the reserve for stop.			

back to List of setpoints

#Slow Stop Delay

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	8495	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to adjust how long the particular Gen-set will suppress it's own Slow stop alarm to give chance to another gen-set to start and replace the defective one. ***Note:*** *If there isn't any available gen-set to start, the alarm is not suppressed.*			

back to List of setpoints

Subgroup: Over Load Next Start Protection

#Overload Next Start Protection

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	14942	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is intended for activation of the protection against the overloading of the system due to rapid change of the load. It makes the next Gen-set (in priority order) to start when the load excises the value given by the setpoint **#Overload Next Start Level (page 384)** right after the delay **#Overload Next Start Delay (page 384)**.			

back to List of setpoints

#Overload Next Start Level

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	80 %	**Alternative config**	NO
Step	1 %		
Comm object	14941	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for **#Overload Next Start Protection (page 384)**.			

back to List of setpoints

#Overload Next Start Delay

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 5 [s]		
Default value	1 s	**Alternative config**	NO
Step	1 s		
Comm object	8493	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **#Overload Next Start Protection (page 384)**.			

back to List of setpoints

Subgroup: Run Hours Equalization

Run Hours Base

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0.0 .. 200000.0 [h]		
Default value	0.0 h	**Alternative config**	NO
Step	0.1 h		
Comm object	10600	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
Running hours base corrects actual Running hours differences between particular Gen-sets. **Example:** Gen-set 1 actual Running hours = 1000 h. Gen-set 2 actual Running hours = 2000 h. Adjust this setpoint for Gen-set 1 = 1000 h and for Gen-set 2 = 2000 h to be on the same base for Running Hours Equalization.			

back to List of setpoints

#Run Hours Max Difference

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 65 000 [h]		
Default value	100 h	**Alternative config**	NO
Step	1 h		
Comm object	9919	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the "dead-band" for the running hours equalization function (**#Priority Auto Swap (page 376)** = Run Hours Equal). The priorities are swapped when engine hours difference is higher than this dead-band. ***Note:*** *The system calculates with whole hours.* **Example:** The difference in engine running hours has to be 11.0 hours, if #Run Hours Max Difference is set to 10. The priorities shuffling is not done with the difference just 10.1 hours.			

back to List of setpoints

Subgroup: Efficient Mode

#Power Band Change Up Delay

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 3 600 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	8896	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for adjusting the delay of changing the power band if the load demand rose above the upper limit of the current power band. Setpoint is taken into account only if **#Priority Auto Swap (page 376)** = Efficient.			

back to List of setpoints

#Power Band Change Down Delay

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 3 600 [s]		
Default value	10 s	**Alternative config**	NO
Step	1 s		
Comm object	10795	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for adjusting the delay of changing the power band if the load demand drops below the lower limit of the current power band. Setpoint is taken into account only if **#Priority Auto Swap (page 376)** = Efficient.			

back to List of setpoints

Subgroup: Group Settings

Control Group

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	1,2 .. 32 [-]		
Default value	1	**Alternative config**	NO
Step	1		
Comm object	10589	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint selects the control group(to get more information on this function please refer to the chapter **Control groups (page 149)** to which the particular Gen-set belongs. If there aren't logical groups at the site, adjust the setpoint to 1.			

back to List of setpoints

Group Link L

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	1,2 .. 32 [-]		
Default value	1	**Alternative config**	NO
Step	1		
Comm object	10590	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
If the input **GROUP LINK (PAGE 724)** of this particular controller is used to provide the "group link" information for two Control groups (to get more information refer to the chapter **Control groups (page 149)**), then this setpoint is used to select which group is located at the left side of the group link breaker (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1.			

back to List of setpoints

Group Link R

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	1,2 .. 32 [-]		
Default value	1	**Alternative config**	NO
Step	1		
Comm object	10591	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
If the input **GROUP LINK (PAGE 724)** of this particular controller is used to provide the "group link" information for two Control groups (to get more information refer to the chapter **Control groups (page 149)**), then this setpoint is used to select which group is located at the right side of the group link breaker (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1.			

back to List of setpoints

Group: Speed/Load Control

Subgroup: Speed Control

Speed Regulator Character

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	Positive / Negative [-]		
Default value	Positive	**Alternative config**	NO
Step	[-]		
Comm object	9054	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
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 the governor.			

Positive	Raising the voltage on the governor remote speed input causes engine speed to rise.
Negative	Raising the voltage on the governor remote speed input causes engine speed to go down.

back to List of setpoints

Speed Governor Bias

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	10.00 V	**Alternative config**	NO
Step	0.01 V		
Comm object	8656	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
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. ***Note:*** *To make a fine adjustment, start the Gen-set in MAN mode, leave it running unloaded and then make fine adjustment of this setpoint to achieve nominal engine speed.*			

back to List of setpoints

Speed Governor Low Limit

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	0.00 V	**Alternative config**	NO
Step	0.01 V		
Comm object	10115	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Lower limit of the speed governor output. Use this setpoint to adjust the governor output range according to your governor type.			

back to List of setpoints

Speed Governor High Limit

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	0.00 V	**Alternative config**	NO
Step	0.01 V		
Comm object	10559	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Upper limit of the speed governor output. Use this setpoint to adjust the governor output range according to your governor type.			

back to List of setpoints

Speed Governor PWM Rate

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	500 .. 2 900 [Hz]		
Default value	500 Hz	**Alternative config**	NO
Step	1 Hz		
Comm object	10911	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the frequency of the speed governor PWM output.			

back to List of setpoints

Tau Speed Governor Actuator

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	1.0 .. 300.0 [s]		
Default value	10.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	10784	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to adjust the transformation ratio of the speed governor output to the pulses at the binary outputs **SPEED UP (PAGE 802)** and **SPEED DOWN (PAGE 801)**. Adjust the setpoint to the pulse duration which is needed for the speed control device to travel from minimal position to the maximal position.			

back to List of setpoints

Subgroup: Regulation Loops

Frequency Gain

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Alternative config**	NO
Step	0.1 %		
Comm object	8715	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the frequency control PI loop. *Note: See the chapter **Regulation loops (page 153)** for more information.*			

back to List of setpoints

Frequency Int

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	8716	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the relative integration factor (I-factor) of the frequency control PI loop.			
Note: *See the chapter* ***Regulation loops (page 153)*** *for more information.*			

back to List of setpoints

Angle Gain

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Alternative config**	NO
Step	0.1 %		
Comm object	8718	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for adjusting of the gain factor (P-factor) of the phase angle P-control loop.			
Note: *During synchronization, first the frequency loop is started to match the generator frequency with the mains or bus and after that the phase angle loop is started to match the phase angle.*			
Note: *See the chapter* ***Regulation loops (page 153)*** *for more information.*			

back to List of setpoints

Load Gain

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Alternative config**	NO
Step	0.1 %		
Comm object	8659	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the load control PI loop. *__Note:__ During synchronization, first the frequency loop is started to match the generator frequency with the mains or bus and after that the phase angle loop is started to match the phase angle.* *__Note:__ See the chapter __Regulation loops (page 153)__ for more information.*			

back to List of setpoints

Load Int

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	8713	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the relative integration factor (I-factor) of the load control PI loop. *__Note:__ See the chapter __Regulation loops (page 153)__ for more information.*			

back to List of setpoints

Load Sharing Gain

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Alternative config**	NO
Step	0.1 %		
Comm object	8725	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
This setpoint adjusts the gain factor (P-factor) of the load sharing control PI loop. *Note: See the chapter **Regulation loops (page 153)** for more information.*			

back to List of setpoints

Load Sharing Int

Setpoint group	Power Management	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	9035	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
This setpoint adjusts the relative integration factor (I-factor) of the load sharing control PI loop. *Note: See the chapter **Regulation loops (page 153)** for more information.*			

back to List of setpoints

Subgroup: Load Transfer

Close Transfer Max Duration

Setpoint group	Speed/Load Control	**Related FW**	1.6.0
Range [units]	0.1 .. **Load Ramp (page 400)** [s]		
Default value	5.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8661	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
The time of parallel work of Gen-set and mains in close transition.			

back to List of setpoints

Open Transfer Min Break

Setpoint group	AMF settings Process Control	**Related FW**	1.6.0
Range [units]	0.0 .. 600.0 [s]		
Default value	1.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8303	**Related applications**	MINT, SPtM
Config level	Standard		

Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**

Description

Transition Delay between power sources.

Delay after GCB opening to MCB closing during the return procedure. Delay after MCB opening to GCB closing if the setpoint **MCB Opens On (page 366)** is set to GENRUN.

The time charts bellow show recommended setting of Transfer Delay setpoint.

If the Transfer Delay setpoint is set shorter than the time required for opening of the circuit breaker, the controller closes **GCB CLOSE/OPEN (PAGE 777)** output straight away (100 ms) after the **MCB FEEDBACK (PAGE 727)** input deactivates.

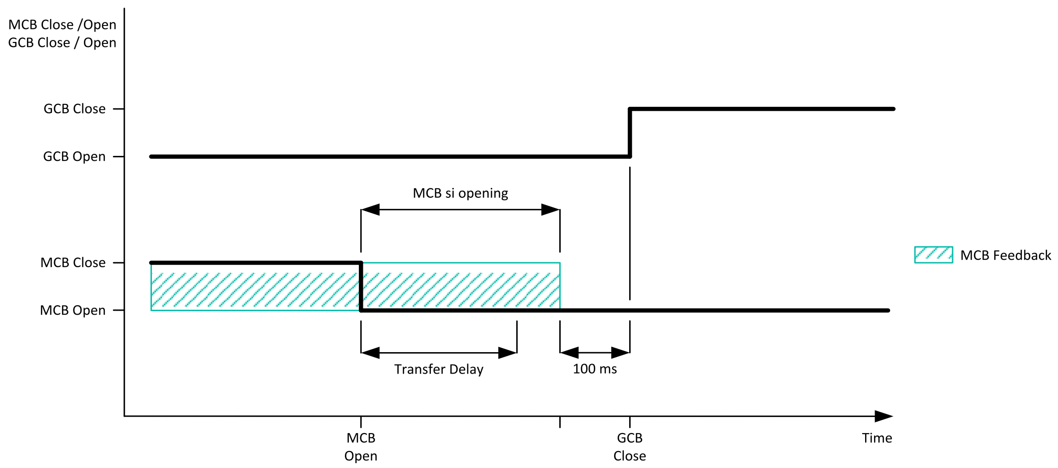


Image 8.25 Transfer Delay 1

If some delay between **MCB FEEDBACK (PAGE 727)** deactivation and closing of **GCB CLOSE/OPEN (PAGE 777)** output is required, then the Transfer Delay must be set to sum of "MCB opening" + "Delay" time.

Delay used in dual operation function. This delay is used when load from first Gen-set is transferred to second Gen-set. Delay starts to countdown when GCB of first Gen-set is open. When this delay countdown, GCB of second Gen-set is closed. This delay is important for correct function of external interlock.

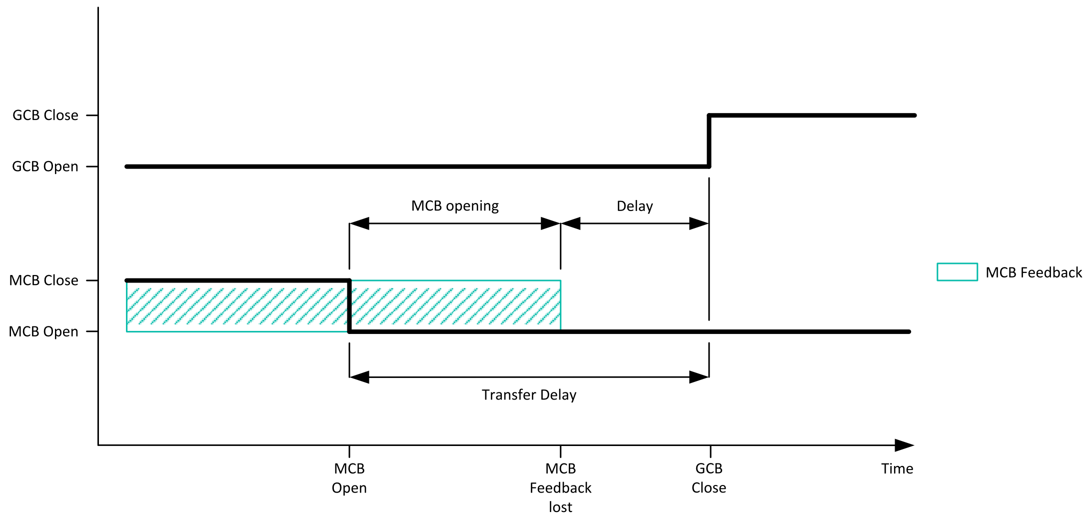


Image 8.26 Transfer Delay 2

This delay is also used in dual operation function. This delay is used when load from first Gen-set is transferred to second Gen-set. Delay starts to countdown when GCB of first Gen-set is open. When this delay countdown, GCB of second Gen-set is closed. This delay is important for correct function of external interlock.

back to List of setpoints

Transfer Mains To Gen

Setpoint group	Speed/Load Control	**Related FW**	1.6.0
Range [units]	Open / Close Only / Close Primarily / Soft Transfer [-]		
Default value	Soft Transfer	**Alternative config**	NO
Step	[-]		
Comm object	12969	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint defines the type of transfer of load from mains to generator.

Open	Transfer of the load from mains to generator without parallel work and synchronization (one breaker opens and second is closed – checking feedbacks). The setpoint **Open Transfer Min Break (page 394)** sets the minimal duration of break.
Close Only	Transfer of the load from mains to generator with synchronization and parallel work. The time of parallel work is given by setpoint **Close Transfer Max Duration (page 393)**. In case of synchronization fail, MCB stays close and Gen-set is stopped.
Close Primarily	Transfer of the load from mains to generator with synchronization and parallel work. The time of parallel work is given by setpoint **Close Transfer Max Duration (page 393)**. In case of synchronization fail, open transfer is done.
Soft Transfer	Transfer of the load from mains to generator with parallel work and soft loading of the Gen-set. This function is proceeded like the closed transfer, but there is time limitation of loading of the Gen-set adjusted via setpoint **Load Ramp (page 400)**. The transfer is succeed only when the Gen-set is fully loaded – mains is fully unloaded (level of load when mains is considered as unloaded is adjusted via setpoint **Generator Unload GCB Open Level (page 399)**).

***Note:** Close transfer of load is also affected by setpoint **Mains Import Measurement (page 258)**.*

back to List of setpoints

Transfer Gen To Mains

Setpoint group	Speed/Load Control	**Related FW**	1.6.0
Range [units]	Open / Close Only / Close Primarily / Soft Transfer [-]		
Default value	Soft Transfer	**Alternative config**	NO
Step	[-]		
Comm object	14688	**Related applications**	SPtM
Config level	Standard		

Setpoint visibility	Always
Description	

This setpoint defines the type of transfer of load from generator to mains.

Open	Transfer of the load from generator to mains without parallel work and synchronization (one breaker opens and second is closed – checking feedbacks). The setpoint **Open Transfer Min Break (page 394)** sets the minimal duration of break.
Close Only	Transfer of the load from generator to mains with synchronization and parallel work. The time of parallel work is given by setpoint **Close Transfer Max Duration (page 393)**. In case of synchronization fail, GCB stays closed and Gen-set keeps running. ***Note:*** *If the generator load level is below the value of setpoint* ***Generator Unload GCB Open Level (page 399)****, the setpoint* ***Generator Unload GCB Open Level (page 399)*** *effects cutting the* ***Close Transfer Max Duration (page 393)****.*
Close Primarily	Transfer of the load from generator to mains with synchronization and parallel work. The time of parallel work is given by setpoint **Close Transfer Max Duration (page 393)**. In case of synchronization fail, open transfer is done. ***Note:*** *If the generator load level is below the value of setpoint* ***Generator Unload GCB Open Level (page 399)****, the setpoint* ***Generator Unload GCB Open Level (page 399)*** *effects cutting the* ***Close Transfer Max Duration (page 393)****.*
Soft Transfer	Transfer of the load from generator to mains with parallel work and soft unloading of the Gen-set. This function is proceeded like the closed transfer, but there is time limitation of unloading of the Gen-set adjusted via setpoint **Load Ramp (page 400)**. The transfer is succeed only when the Gen-set is fully unloaded (level of load when Gen-set is considered as unloaded is adjusted via setpoint **Generator Unload GCB Open Level (page 399)**).

back to List of setpoints

Generator Unload GCB Open Level

Setpoint group	Speed/Load Control	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	10 %	**Alternative config**	NO
Step	1 % of **Nominal Power (page 261)**		
Comm object	8547	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the value of the power when the GCB is opened during unloading of the Gen-set. ***Note:*** *It is set usually higher than 0 to prevent the engine to go to reverse power.*			

back to List of setpoints

Mains Unload MCB Open Window

Setpoint group	Speed/Load Control	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	10 %	**Alternative config**	NO
Step	1 % of **Nominal Power (page 261)**		
Comm object	14694	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			
This setpoint adjusts the value which defines the level where the mains is considered as unloaded. ***Note:*** *This setpoint is window. It means that when you adjust this setpoint to 10 %, there is window from -10 % to +10 %. The reason is import/export function.*			

back to List of setpoints

Load Ramp

Setpoint group	Speed/Load Control	**Related FW**	1.6.0
Range [units]	0 .. 600 [s]		
Default value	5 s	**Alternative config**	NO
Step	1 s		
Comm object	8658	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

All changes of requested Gen-set load are made gradually instead of being made in one step – i.e. the requested load is changing slowly with the rate adjusted by this setpoint.

Rate is adjusted in seconds for change from 0 to 100% load

The ramp takes place in following situations:

- The gen-set has been just synchronized and is ramping up to the target load level.
- The gen-set is running parallel to the mains and baseload is changed.

back to List of setpoints

Group: Voltage/PF Control

Subgroup: Voltage Control

Voltage Regulator Character

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	Positive / Negative [-]		
Default value	Positive	**Alternative config**	NO
Step	[-]		
Comm object	9055	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint selects the characteristic of the voltage governor output of the controller. Adjust it according to the behavior of the remote voltage input of the governor.

Positive	Raising the voltage on the remote voltage adjustment input causes the generator voltage to raise.
Negative	Raising the voltage on the governor remote speed input causes engine speed to go down.

back to List of setpoints

Voltage Regulator Bias

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	0.00 V	**Alternative config**	NO
Step	0.01 V		
Comm object	8500	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the initial level for the voltage governor output. This level is present on the output if no regulation loop is active.			

back to List of setpoints

Voltage Regulator Low Limit

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	-10.00 V	**Alternative config**	NO
Step	0.01 V		
Comm object	14792	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Lower limit of the voltage governor output. Use this setpoint to adjust the governor output range according to your governor type.			

back to List of setpoints

Voltage Regulator High Limit

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	10.00 V	**Alternative config**	NO
Step	0.01 V		
Comm object	14793	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Upper limit of the voltage governor output. Use this setpoint to adjust the governor output range according to your governor type.			

back to List of setpoints

Tau Voltage Governor Actuator

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	1.0 .. 300.0 [s]		
Default value	10.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	10785	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to adjust the transformation ratio of the voltage governor output to the pulses at the binary outputs **AVR UP (PAGE 765)** and **AVR DOWN (PAGE 765)**. Adjust the setpoint to the pulse duration which is needed for the voltage control device to travel from minimal position to the maximal position.			

back to List of setpoints

Subgroup: Regulation Loops

Voltage Gain

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Alternative config**	NO
Step	0.01 %		
Comm object	8501	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the voltage control PI loop. *Note: See the chapter* ***Regulation loops (page 153)*** *for more information.*			

back to List of setpoints

Voltage Int

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	8720	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the relative integration factor (I-factor) of the voltage control PI loop. *Note: See the chapter* ***Regulation loops (page 153)*** *for more information.*			

back to List of setpoints

PF Gain

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Alternative config**	NO
Step	0.1 %		
Comm object	8503	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the PF control PI loop. ***Note:*** *See the chapter **Regulation loops (page 153)** for more information.*			

back to List of setpoints

PF Int

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	8721	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the relative integration factor (I-factor) of the PF control PI loop. ***Note:*** *See the chapter **Regulation loops (page 153)** for more information.*			

back to List of setpoints

VAr Sharing Gain

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.00 %	**Alternative config**	NO
Step	0.1 %		
Comm object	8777	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the VAr sharing control PI loop. ***Note:*** *See the chapter **Regulation loops (page 153)** for more information.*			

back to List of setpoints

VAr Sharing Int

Setpoint group	Voltage/PF Control	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	50 %	**Alternative config**	NO
Step	1 %		
Comm object	9036	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the relative integration factor (I-factor) of the VAr sharing control PI loop. *Note: See the chapter **Regulation loops (page 153)** for more information.*			

back to List of setpoints

Group: Synchronization

Subgroup: Synchronisation

Synchronization Type

Setpoint group	Synchronization	**Related FW**	1.6.0
Range [units]	Phase Match / Slip Synchro [-]		
Default value	Phase Match	**Alternative config**	NO
Step	[-]		
Comm object	14802	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjusts the type of synchronization.

Phase Match	This type of synchronization is based on voltage and phase shift match. Limits are adjusted via setpoints **Voltage Window (page 406)** and **Phase Window (page 407)**. When voltage and phase shift are match, **Dwell Time (page 407)** starts countdown. After that the command for breaker closing is activated.
Slip Synchro	This type of synchronization regulates the value of frequency to the value Mains/Bus frequency + **Slip Frequency (page 407)** (Mains frequency in SPtM, Bus frequency in MINT application). When this frequency is reached, **Dwell Time (page 407)** starts countdown. After that the command for breaker closing is activated. The closing breaker command is issued in advance due to latency of breakers (adjusted via setpoints **GCB Latency (page 408)** and **MCB Latency (page 408)** ***Note:*** *Condition of **Voltage Window (page 406)** has to be also fulfilled.* ***Note:*** *Slip synchronization can not be used for synchronization of Mains to Mains.* ***Note:*** *Synchronization is not allowed if there is already synchronized any Mains CU in the control group.*

back to List of setpoints

Synchronization Timeout

Setpoint group	Synchronization	**Related FW**	1.6.0
Range [units]	OFF / 1 .. 1800 [s]		
Default value	60 s	**Alternative config**	NO
Step	1 s		
Comm object	8657	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the maximum duration of synchronizing. ***Note:*** *If this setpoint is adjusted to OFF then automatic restart of synchronization occurs every 180 s. This method helps to synchronize successfully even in difficult conditions.*			

back to List of setpoints

Voltage Window

Setpoint group	Synchronization	**Related FW**	1.6.0
Range [units]	0.0 .. 100.0 [%]		
Default value	10.0 %	**Alternative config**	NO
Step	0.1 %		
Comm object	8650	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts maximum difference between generator and mains/bus voltage in respective phases for synchronization.			

back to List of setpoints

Gen to Mains/Bus Phase Shift

Setpoint group	Synchronization	**Related FW**	1.6.0
Range [units]	-120 .. 120 [°]		
Default value	0 °	**Alternative config**	YES
Step	1 °		
Comm object	9578	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to compensate phase shift which is caused by transformer. ***Note:*** *Function Autodetect can't be used with the setpoint* ***Gen to Mains/Bus Phase Shift (page 406)*** *simultaneously.*			

back to List of setpoints

Phase Window

Setpoint group	Synchronization	**Related FW**	1.6.0
Range [units]	0 .. 90 [°]		
Default value	10 °	**Alternative config**	NO
Step	1 °		
Comm object	8652	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the maximum absolute value of difference between actual phase angle and between the generator and mains/bus voltages for synchronization. In order to disable breaker close command, adjust this setpoint to zero degree. Synchronisation procedure will go on for set timeout or till breaker is closed from an external device.			

back to List of setpoints

Dwell Time

Setpoint group	Synchronization	**Related FW**	1.6.0
Range [units]	0.0 .. 25.0 [s]		
Default value	0.3 s	**Alternative config**	NO
Step	0.1 s		
Comm object	8653	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
The period of time, during which the phase angle difference must be within **Phase Window (page 407)** and voltage difference within **Voltage Window (page 406)**, before the breaker is closed.			

back to List of setpoints

Slip Frequency

Setpoint group	Synchronization	**Related FW**	1.6.0
Range [units]	-0.50 .. 0.50 [Hz]		
Default value	-0.25 Hz	**Alternative config**	NO
Step	0.1 Hz		
Comm object	14798	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Slip frequency for slip synchronization (**Synchronization Type (page 405)** = Slip Synchro).			

back to List of setpoints

Slip Frequency Window

Setpoint group	Synchronization	**Related FW**	1.6.0
Range [units]	0.01 .. 0.50 [Hz]		
Default value	0.15 Hz	**Alternative config**	NO
Step	0.01 Hz		
Comm object	14799	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Window of slip frequency for slip synchronization (**Synchronization Type (page 405)** = Slip Synchro).			

back to List of setpoints

GCB Latency

Setpoint group	Synchronization	**Related FW**	1.6.0
Range [units]	20 .. 1 000 [ms]		
Default value	80 ms	**Alternative config**	NO
Step	1 ms		
Comm object	14800	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Latency of GCB. **IMPORTANT: This setpoint is enable, when Synchronization Type (page 405) has Split Synchro value.**			

back to List of setpoints

MCB Latency

Setpoint group	Synchronization	**Related FW**	1.6.0
Range [units]	20 .. 1 000 [ms]		
Default value	80 ms	**Alternative config**	NO
Step	1 ms		
Comm object	14801	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Latency of MCB. **IMPORTANT: This setpoint is enable, when Synchronization Type (page 405) has Split Synchro value.**			

back to List of setpoints

Group: Droop Settings

Subgroup: Droop Settings

Load/Var Sharing Regulation Type

Setpoint group	Droop Settings	**Related FW**	1.6.0
Range [units]	Isochronous / Droop / Emergency Droop [-]		
Default value	Isonchronous	**Alternative config**	NO
Step	[-]		
Comm object	13212	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Application Mode Select (page 248)**		
Description			

This setpoint adjusts how the active and reactive power is regulated. The droop is primarily intended for multiple parallel operation in island to ensure the load sharing and VAr sharing when intercontroller communication fails.

Isochronous	The active and reactive power is regulated based on data communicated between the controller units (intercontroller communication).
Droop	The active and reactive power is not regulated based on data communicated between the units but the speed request and voltage request is calculated from actual voltage and actual frequency of the system. The speed request is correlative to active power and the voltage request is correlative to reactive power.
Emrg Droop	Regulation of active and reactive power is based on standard isochronous regulation based on intercontroller communication but it can be conditionally turned to droop

back to List of setpoints

Dead Bus GCB Close Master

Setpoint group	Droop Settings	**Related FW**	1.6.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	13952	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Only if **Load/Var Sharing Regulation Type (page 409)** is not set to Isochronous		
Description			

This setpoint adjusts the behavior of GCB for droop regulation in AUTO mode. If the bus values are without the limits then the controller is prohibited to close it's GCB because of safety reasons.

Disabled	If the bus values are without the limits then the controller is prohibited to close it’s GCB because of safety reasons. Closing of GCB can be done manually in MAN mode.
Enabled	If the bus values are without the limits, controller is allowed to close it´s GCB to the dead bus.

back to List of setpoints

Subgroup: Frequency Droop

Frequency Droop Slope

Setpoint group	Droop Settings	**Related FW**	1.6.0
Range [units]	0.0 .. 20.0 [%]		
Default value	4.0 %	**Alternative config**	NO
Step	0.1 %		
Comm object	10032	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint defines the slope of the load droop correlation. The slope is set as a droop of frequency in percentages of the requested system frequency (Basic settings: **Nominal Frequency (page 271)**) on the range of the requested power from 0 to 100% of Basic settings: **Nominal Power (page 261)**.

back to List of setpoints

Frequency Droop Offset

Setpoint group	Droop Settings	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	100 %	**Alternative config**	NO
Step	1 %		
Comm object	13213	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint defines the value of requested power on the requested system frequency (Basic settings: **Nominal Frequency (page 271)**). Allows to shift the droop correlation line up or down.			

back to List of setpoints

Subgroup: Voltage Droop

Voltage Droop Slope

Setpoint group	Droop Settings	**Related FW**	1.6.0
Range [units]	0.0 .. 20.0 [%]		
Default value	4.0 %	**Alternative config**	NO
Step	0.1 %		
Comm object	10033	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint defines the slope of the VAr droop correlation. The slope is set as a droop of voltage in percentages of the generator nominal voltage (Basic settings: **Gen Nominal Voltage Ph-N (page 267)**) on the range of the requested reactive power from 0 to 100% of nominal reactive power (value of nominal reactive power is not given by setpoint but it is calculated from setpoint **Gen Nominal Voltage Ph-Ph (page 267)** whilst the PF=0,8).			

back to List of setpoints

Voltage Droop Offset

Setpoint group	Droop Settings	**Related FW**	1.6.0
Range [units]	0 .. 100 [%]		
Default value	100 %	**Alternative config**	NO
Step	1 %		
Comm object	13214	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint defines the value of requested reactive power on the nominal voltage (Basic settings: **Gen Nominal Voltage Ph-N (page 267)**). Allows to shift the droop correlation line up or down.			

back to List of setpoints

Subgroup: Emergency Droop Settings

#Number Of Controller On CAN

Setpoint group	Droop Settings	**Related FW**	1.6.0
Range [units]	1 .. 32 [-]		
Default value	1	**Alternative config**	NO
Step	1		
Comm object	13953	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint defines the minimum number of units supposed to be connected to CAN2. See values CAN16 and CAN32 for information about number of controllers on CAN2 bus. Controller counts itself as well, the number is always 1 or higher, it is never 0. If the number of controllers detected by the controller on CAN2 is lower than the number in this setpoint, the system falls in emergency droop, it means that regulations are switched to droop after delay defined by **Emergency Droop On Delay (page 413)**. If the intercontroller communication recovers (the number of controllers detected on CAN2 gets equal or higher than value in this setpoint), then the system turns the regulations back to isochronous mode after delay defined by setpoint **Emergency Droop Off Delay (page 413)**. ***Note:*** *This function is available only when **Load/Var Sharing Regulation Type (page 409)** = Emergency Droop.*			

back to List of setpoints

Emergency Droop On Delay

Setpoint group	Droop Settings	**Related FW**	1.6.0
Range [units]	0.0 .. 10.0 [s]		
Default value	10.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	13954	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the delay for switching from isochronous regulation to droop regulation when number of controller detected by the controller on CAN2 is lower than the number in the setpoint **#Number Of Controller On CAN (page 412)**.

> ***Note:*** *This function is available only when **Load/Var Sharing Regulation Type (page 409)** = Emergency Droop.*

back to List of setpoints

Emergency Droop Off Delay

Setpoint group	Droop Settings	**Related FW**	1.6.0
Range [units]	0.0 .. 10.0 [s]		
Default value	10.0 s	**Alternative config**	NO
Step	0.1 s		
Comm object	13955	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the delay for switching from droop regulation to isochronous regulation when number of controller detected by the controller on CAN2 is equal or higher than the number in the setpoint **#Number Of Controller On CAN (page 412)**.

> ***Note:*** *This function is available only when **Load/Var Sharing Regulation Type (page 409)** = Emergency Droop.*

back to List of setpoints

Group: General Analog Inputs

Subgroup: General Analog Inputs 1

Analog Protection 1 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9259	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT01 (PAGE 812)** is configured		
Description			
Warning or history threshold level for **AIN PROT01 (PAGE 812)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT01 (PAGE 812)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 1 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9260	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT01 (PAGE 812)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT01 (PAGE 812)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT01 (PAGE 812)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 1 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9261	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT01 (PAGE 812)** is configured		
Description			
Delay for **AIN PROT01 (PAGE 812)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT01 (PAGE 812)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 1 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11407	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH01 (PAGE 753)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH01 (PAGE 753)** on. The value is measured from **AIN SWITCH 01 (PAGE 832)** analog input.			

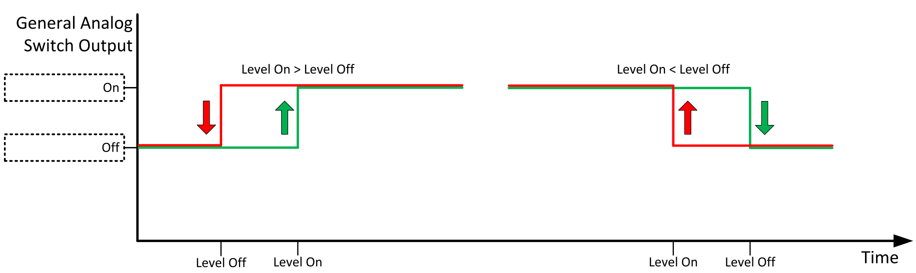


Image 8.27 General analog input 1 switch

back to List of setpoints

Analog Switch 1 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11410	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH01 (PAGE 753)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH01 (PAGE 753)** off. The value is measured from **AIN SWITCH 01 (PAGE 832)** analog input.

Image 8.28 General analog input 1 switch

back to List of setpoints

Subgroup: General Analog Inputs 2

Analog Protection 2 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9262	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT02 (PAGE 813)** is configured		
Description			

Warning or history threshold level for **AIN PROT02 (PAGE 813)**.

Note: *These setpoints are used only if LAI* ***AIN PROT02 (PAGE 813)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 2 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9263	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT02** (**PAGE 813**) is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT02** (**PAGE 813**). ***Note:*** *These setpoints are used only if LAI **AIN PROT02 (PAGE 813)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 2 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9264	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT02** (**PAGE 813**) is configured		
Description			
Delay for **AIN PROT02** (**PAGE 813**). ***Note:*** *These setpoints are used only if LAI **AIN PROT02 (PAGE 813)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 2 On

Setpoint group	General Analog Inputs	Related FW	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11408	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH02 (PAGE 754)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH02 (PAGE 754)** on. The value is measured from **AIN SWITCH 02 (PAGE 832)** analog input.			

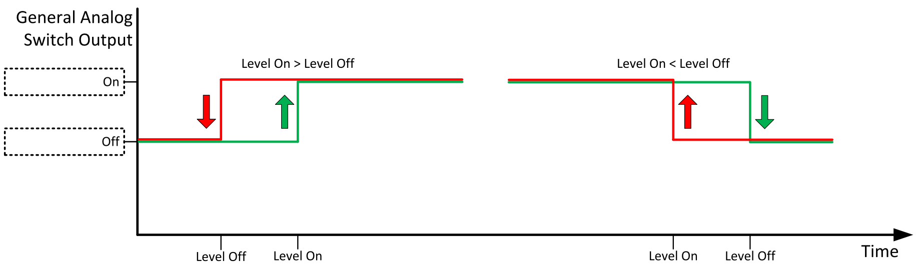


Image 8.29 General analog input 2 switch

back to List of setpoints

Analog Switch 2 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11411	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH02 (PAGE 754)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH02 (PAGE 754)** off. The value is measured from **AIN SWITCH 02 (PAGE 832)** analog input.

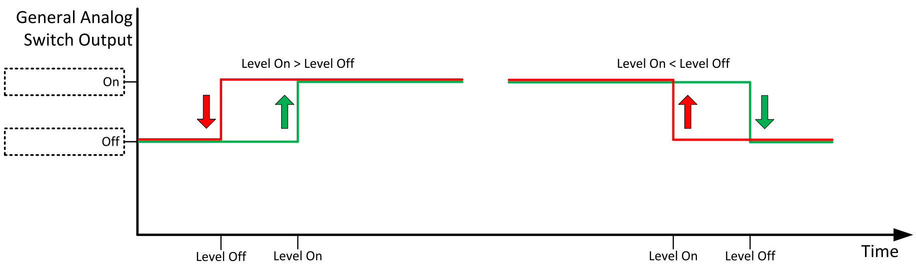


Image 8.30 General analog input 2 switch

back to List of setpoints

Subgroup: General Analog Inputs 3

Analog Protection 3 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9265	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT03 (PAGE 814)** is configured		
Description			

Warning or history threshold level for **AIN PROT03 (PAGE 814)**.

***Note:** These setpoints are used only if LAI **AIN PROT03 (PAGE 814)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 3 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9266	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT03 (PAGE 814)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT03 (PAGE 814)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT03 (PAGE 814)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 3 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9267	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT03 (PAGE 814)** is configured		
Description			
Delay for **AIN PROT03 (PAGE 814)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT03 (PAGE 814)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 3 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11409	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH03 (PAGE 754)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH03 (PAGE 754)** on. The value is measured from **AIN SWITCH 03 (PAGE 832)** analog input.			

Image 8.31 General analog input 3 switch

back to List of setpoints

Analog Switch 3 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11412	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH03 (PAGE 754)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH03 (PAGE 754)** off. The value is measured from **AIN SWITCH 03 (PAGE 832)** analog input.			

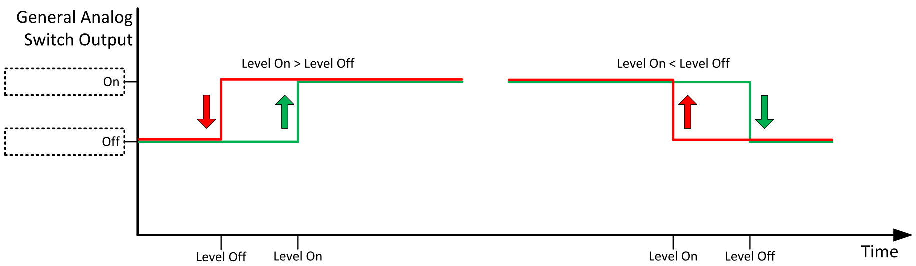


Image 8.32 General analog input 3 switch

back to List of setpoints

Subgroup: General Analog Inputs 4

Analog Protection 4 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9268	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT04 (PAGE 815)** is configured		
Description			
Warning or history threshold level for **AIN PROT04 (PAGE 815)**.			
Note: *These setpoints are used only if LAI **AIN PROT04 (PAGE 815)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 4 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9269	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT04 (PAGE 815)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT04 (PAGE 815)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT04 (PAGE 815)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 4 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9270	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT04 (PAGE 815)** is configured		
Description			
Delay for **AIN PROT04 (PAGE 815)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT04 (PAGE 815)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 4 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14385	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH04 (PAGE 755)** on. The value is measured from **AIN SWITCH 04 (PAGE 833)** analog input.

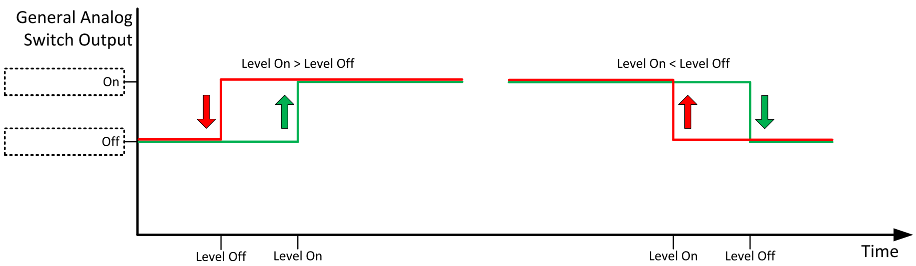


Image 8.33 General analog input 4 switch

back to List of setpoints

Analog Switch 4 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14386	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH04 (PAGE 755)** off. The value is measured from **AIN SWITCH 04 (PAGE 833)** analog input.

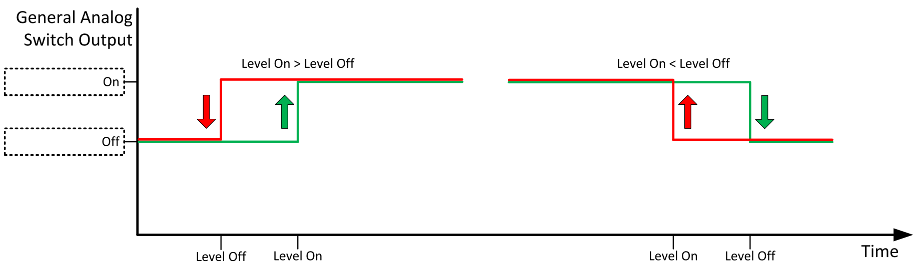


Image 8.34 General analog input 4 switch

back to List of setpoints

Subgroup: General Analog Inputs 5

Analog Protection 5 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9271	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT05 (PAGE 816)** is configured		
Description			

Warning or history threshold level for **AIN PROT05 (PAGE 816)**.

Note: *These setpoints are used only if LAI **AIN PROT05 (PAGE 816)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 5 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9272	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT05 (PAGE 816)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT05 (PAGE 816)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT05 (PAGE 816)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 5 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9273	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT05 (PAGE 816)** is configured		
Description			
Delay for **AIN PROT05 (PAGE 816)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT05 (PAGE 816)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 5 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14963	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH05 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH05 (PAGE 755)** on. The value is measured from **AIN SWITCH 05 (PAGE 833)** analog input.			

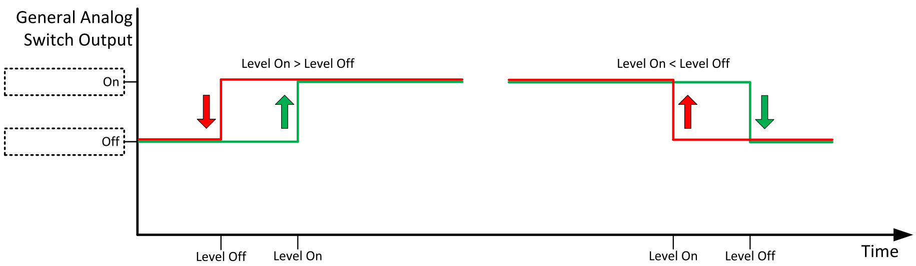


Image 8.35 General analog input 5 switch

back to List of setpoints

Analog Switch 5 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14979	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH05 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH05 (PAGE 755)** off. The value is measured from **AIN SWITCH 05 (PAGE 833)** analog input.			

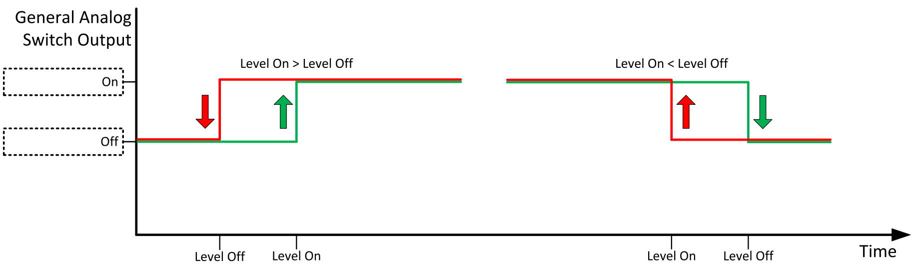


Image 8.36 General analog input 5 switch

back to List of setpoints

Subgroup: General Analog Inputs 6

Analog Protection 6 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9274	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT06 (PAGE 817)** is configured		
Description			
Warning or history threshold level for **AIN PROT06 (PAGE 817)**. *Note: These setpoints are used only if LAI AIN PROT06 (PAGE 817) is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 6 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9275	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT06 (PAGE 817)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT06 (PAGE 817)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT06 (PAGE 817)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 6 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9276	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT06 (PAGE 817)** is configured		
Description			
Delay for **AIN PROT06 (PAGE 817)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT06 (PAGE 817)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 6 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14964	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH06** **(PAGE 756)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH06** **(PAGE 756)** on. The value is measured from **AIN SWITCH 06** **(PAGE 833)** analog input.			

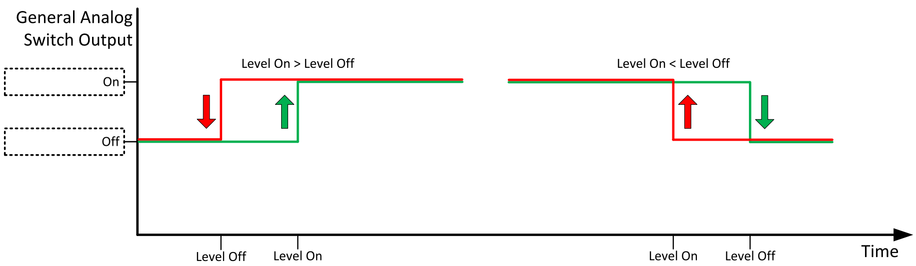


Image 8.37 General analog input 6 switch

back to List of setpoints

Analog Switch 6 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14980	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN Switch06 (page 756)** is configured		
Description			

Threshold level for switching the binary output **AIN Switch06 (page 756)** off. The value is measured from **AIN Switch 06 (page 833)** analog input.

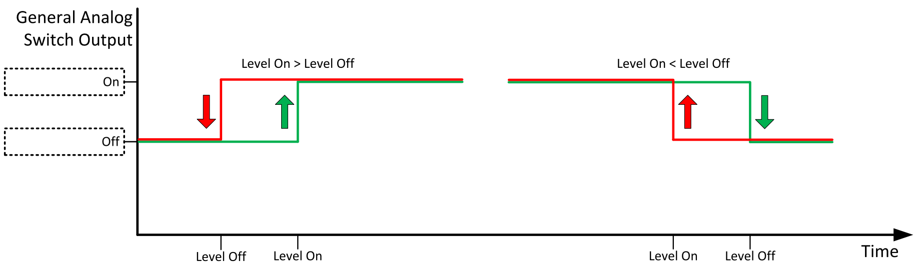


Image 8.38 General analog input 6 switch

back to List of setpoints

Subgroup: General Analog Inputs 7

Analog Protection 7 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9277	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN Prot07 (page 818)** is configured		
Description			

Warning or history threshold level for **AIN Prot07 (page 818)**.

> ***Note:*** *These setpoints are used only if LAI **AIN Prot07 (page 818)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 7 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9278	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT07 (PAGE 818)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT07 (PAGE 818)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT07 (PAGE 818)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 7 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9279	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT07 (PAGE 818)** is configured		
Description			
Delay for **AIN PROT07 (PAGE 818)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT07 (PAGE 818)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 7 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14965	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH07** **(PAGE 756)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH07** **(PAGE 756)** on. The value is measured from **AIN SWITCH 07** **(PAGE 834)** analog input.			

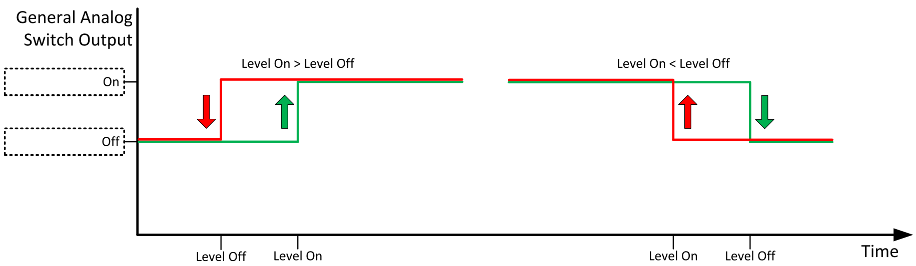


Image 8.39 General analog input 7 switch

back to List of setpoints

Analog Switch 7 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14981	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH07 (PAGE 756)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH07 (PAGE 756)** off. The value is measured from **AIN SWITCH 07 (PAGE 834)** analog input.

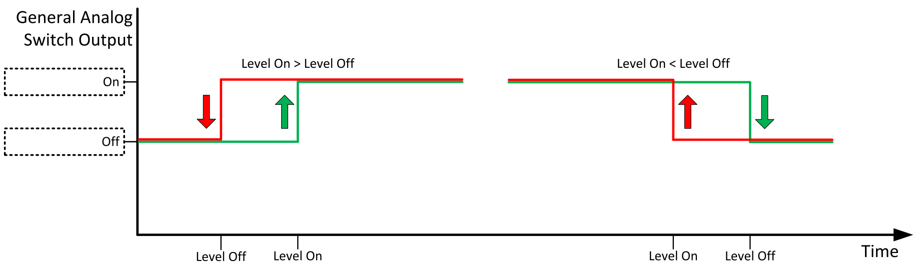


Image 8.40 General analog input 7 switch

back to List of setpoints

Subgroup: General Analog Inputs 8

Analog Protection 8 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9280	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT08 (PAGE 819)** is configured		
Description			

Warning or history threshold level for **AIN PROT08 (PAGE 819)**.

Note: *These setpoints are used only if LAI **AIN PROT08 (PAGE 819)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 8 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9281	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT08 (PAGE 819)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT08 (PAGE 819)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT08 (PAGE 819)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 8 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9282	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT08 (PAGE 819)** is configured		
Description			
Delay for **AIN PROT08 (PAGE 819)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT08 (PAGE 819)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 8 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14966	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH08 (PAGE 757)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH08 (PAGE 757)** on. The value is measured from **AIN SWITCH 08 (PAGE 834)** analog input.

Image 8.41 General analog input 8 switch

back to List of setpoints

Analog Switch 8 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14982	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH08 (PAGE 757)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH08 (PAGE 757)** off. The value is measured from **AIN SWITCH 08 (PAGE 834)** analog input.

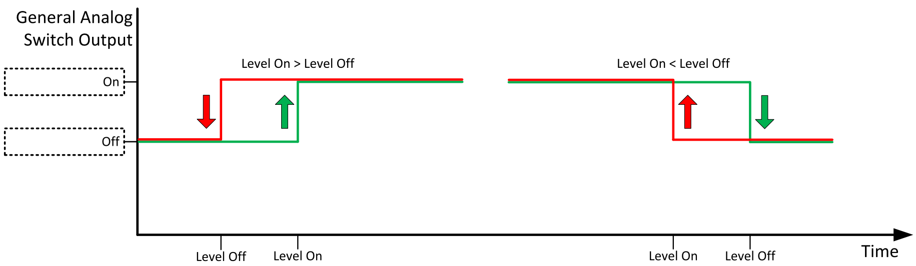


Image 8.42 General analog input 8 switch

back to List of setpoints

Subgroup: General Analog Inputs 9

Analog Protection 9 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9283	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT09 (PAGE 820)** is configured		
Description			

Warning or history threshold level for **AIN PROT09 (PAGE 820)**.

Note: *These setpoints are used only if LAI* ***AIN PROT09 (PAGE 820)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 9 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9284	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT09 (PAGE 820)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT09 (PAGE 820)**. *Note: These setpoints are used only if LAI* ***AIN PROT09 (PAGE 820)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 9 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9285	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT09 (PAGE 820)** is configured		
Description			
Delay for **AIN PROT09 (PAGE 820)**. *Note: These setpoints are used only if LAI* ***AIN PROT09 (PAGE 820)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 9 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14967	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH09 (PAGE 757)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH09 (PAGE 757)** on. The value is measured from **AIN SWITCH 09 (PAGE 834)** analog input.

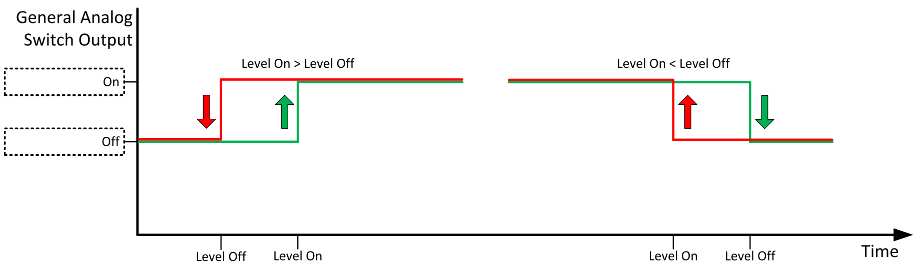


Image 8.43 General analog input 9 switch

back to List of setpoints

Analog Switch 9 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14983	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH09 (PAGE 757)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH09 (PAGE 757)** off. The value is measured from **AIN SWITCH 09 (PAGE 834)** analog input.

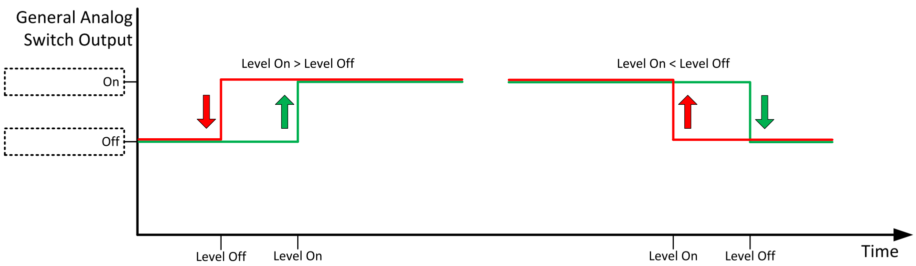


Image 8.44 General analog input 9 switch

back to List of setpoints

Subgroup: General Analog Inputs 10

Analog Protection 10 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9286	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT10 (PAGE 821)** is configured		
Description			

Warning or history threshold level for **AIN PROT10 (PAGE 821)**.

Note: *These setpoints are used only if LAI **AIN PROT10 (PAGE 821)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 10 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9287	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT10 (PAGE 821)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT10 (PAGE 821)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT10 (PAGE 821)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 10 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9288	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT10 (PAGE 821)** is configured		
Description			
Delay for **AIN PROT10 (PAGE 821)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT10 (PAGE 821)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 10 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14968	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH10 (PAGE 758)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH10 (PAGE 758)** on. The value is measured from **AIN SWITCH 10 (PAGE 835)** analog input.

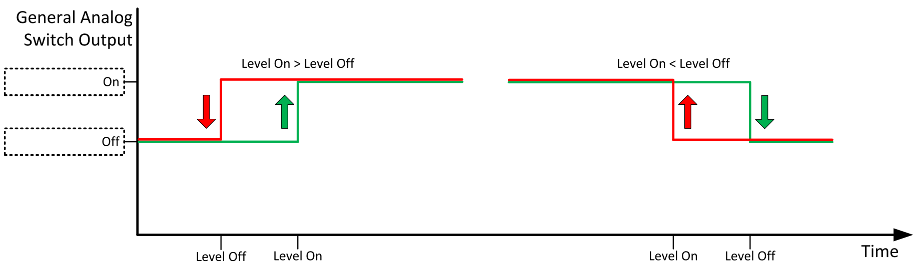


Image 8.45 General analog input 10 switch

back to List of setpoints

Analog Switch 10 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14984	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH10 (PAGE 758)** is configured		

Description

Threshold level for switching the binary output **AIN SWITCH10 (PAGE 758)** off. The value is measured from **AIN SWITCH 10 (PAGE 835)** analog input.

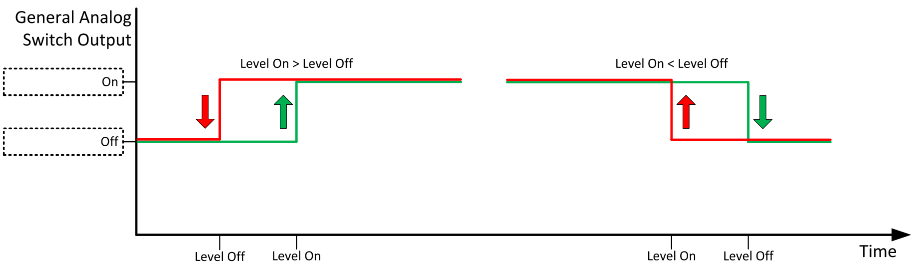


Image 8.46 General analog input 10 switch

back to List of setpoints

Subgroup: General Analog Input 11

Analog Protection 11 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9289	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT11 (PAGE 822)** is configured		

Description

Warning or history threshold level for **AIN PROT11 (PAGE 822)**.

> ***Note:*** *These setpoints are used only if LAI* ***AIN PROT11 (PAGE 822)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 11 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9290	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT11 (PAGE 822)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT11 (PAGE 822)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT11 (PAGE 822)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 11 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9291	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT11 (PAGE 822)** is configured		
Description			
Delay for **AIN PROT11 (PAGE 822)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT11 (PAGE 822)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 11 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14969	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH 11 (PAGE 835)** on. The value is measured from **AIN SWITCH 11 (PAGE 835)** analog input.

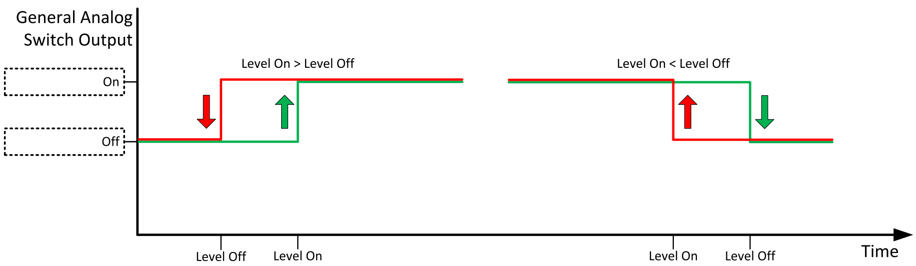


Image 8.47 General analog input 4 switch

back to List of setpoints

Analog Switch 11 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14985	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH 11 (PAGE 835)** off. The value is measured from **AIN SWITCH 11 (PAGE 835)** analog input.

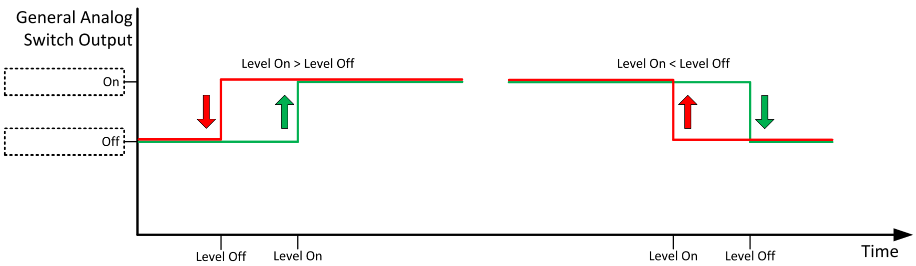


Image 8.48 General analog input 4 switch

back to List of setpoints

Subgroup: General Analog Input 12

Analog Protection 12 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9292	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT12 (PAGE 823)** is configured		
Description			

Warning or history threshold level for **AIN PROT12 (PAGE 823)**.

Note: *These setpoints are used only if LAI **AIN PROT12 (PAGE 823)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 12 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9293	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT12 (PAGE 823)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT12 (PAGE 823)**. *Note: These setpoints are used only if LAI **AIN PROT12 (PAGE 823)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 12 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9294	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT12 (PAGE 823)** is configured		
Description			
Delay for **AIN PROT12 (PAGE 823)**. *Note: These setpoints are used only if LAI **AIN PROT12 (PAGE 823)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 12 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14970	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH 12 (PAGE 835)** on. The value is measured from **AIN SWITCH 12 (PAGE 835)** analog input.

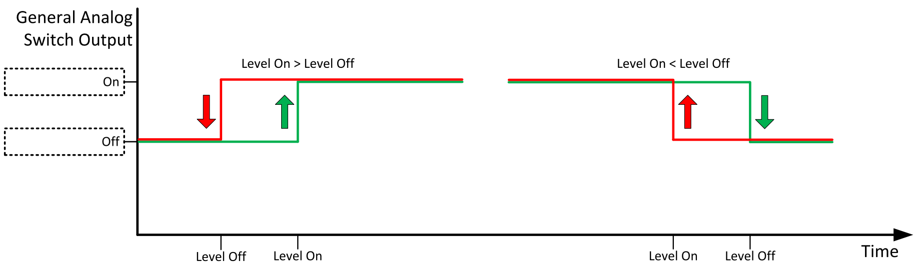


Image 8.49 General analog input 4 switch

back to List of setpoints

Analog Switch 12 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14986	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH 12 (PAGE 835)** off. The value is measured from **AIN SWITCH 12 (PAGE 835)** analog input.

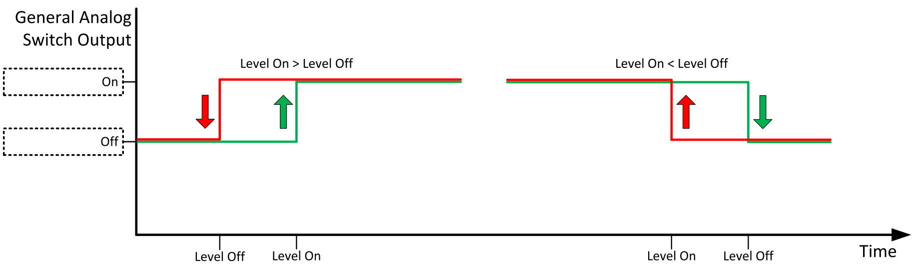


Image 8.50 General analog input 4 switch

back to List of setpoints

Subgroup: General Analog Input 13

Analog Protection 13 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9295	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT13 (PAGE 824)** is configured		
Description			

Warning or history threshold level for **AIN PROT13 (PAGE 824)**.

Note: *These setpoints are used only if LAI* ***AIN PROT13 (PAGE 824)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 13 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9296	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT13 (PAGE 824)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT13 (PAGE 824)**. *Note: These setpoints are used only if LAI* ***AIN PROT13 (PAGE 824)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 13 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9297	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT13 (PAGE 824)** is configured		
Description			
Delay for **AIN PROT13 (PAGE 824)**. *Note: These setpoints are used only if LAI* ***AIN PROT13 (PAGE 824)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 13 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14971	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH 13 (PAGE 836)** on. The value is measured from **AIN SWITCH 13 (PAGE 836)** analog input.

Image 8.51 General analog input 4 switch

back to List of setpoints

Analog Switch 13 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14987	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		

Description

Threshold level for switching the binary output **AIN SWITCH 13 (PAGE 836)** off. The value is measured from **AIN SWITCH 13 (PAGE 836)** analog input.

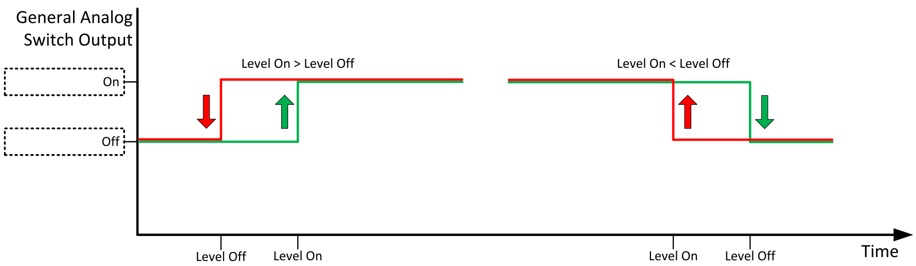


Image 8.52 General analog input 4 switch

back to List of setpoints

Subgroup: General Analog Input 14

Analog Protection 14 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9298	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT14 (PAGE 825)** is configured		

Description

Warning or history threshold level for **AIN PROT14 (PAGE 825)**.

Note: *These setpoints are used only if LAI **AIN PROT14 (PAGE 825)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 14 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9299	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT14 (PAGE 825)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT14 (PAGE 825)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT14 (PAGE 825)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 14 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9300	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT14 (PAGE 825)** is configured		
Description			
Delay for **AIN PROT14 (PAGE 825)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT14 (PAGE 825)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 14 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14972	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH 14 (PAGE 836)** on. The value is measured from **AIN SWITCH 14 (PAGE 836)** analog input.			

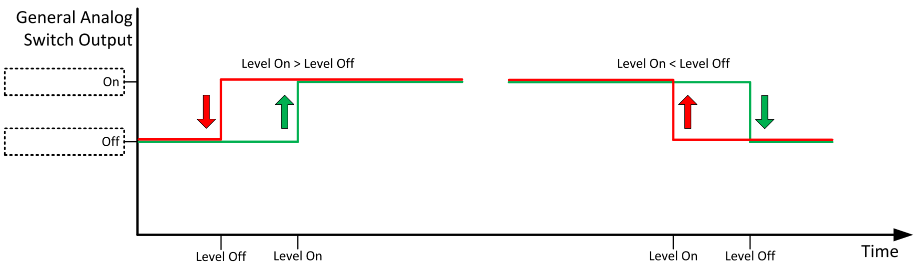


Image 8.53 General analog input 4 switch

back to List of setpoints

Analog Switch 14 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14988	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH 14 (PAGE 836)** off. The value is measured from **AIN SWITCH 14 (PAGE 836)** analog input.			

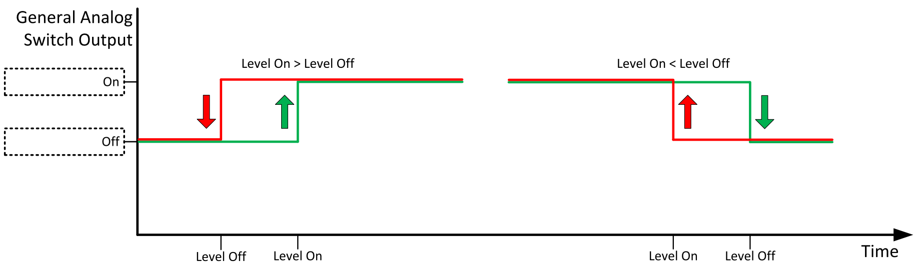


Image 8.54 General analog input 4 switch

back to List of setpoints

Subgroup: General Analog Input 15

Analog Protection 15 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9301	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT15 (PAGE 826)** is configured		
Description			
Warning or history threshold level for **AIN PROT15 (PAGE 826)**. *Note: These setpoints are used only if LAI **AIN PROT15 (PAGE 826)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 15 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9302	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT15 (PAGE 826)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT15 (PAGE 826)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT15 (PAGE 826)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 15 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9303	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT15 (PAGE 826)** is configured		
Description			
Delay for **AIN PROT15 (PAGE 826)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT15 (PAGE 826)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 15 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14973	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH 15 (PAGE 836)** on. The value is measured from **AIN SWITCH 15 (PAGE 836)** analog input.

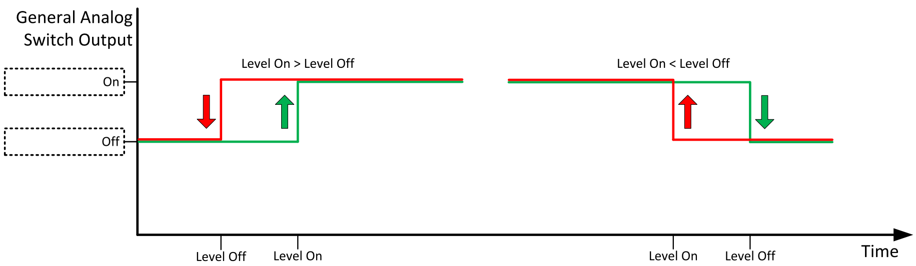


Image 8.55 General analog input 4 switch

back to List of setpoints

Analog Switch 15 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14989	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH 15 (PAGE 836)** off. The value is measured from **AIN SWITCH 15 (PAGE 836)** analog input.

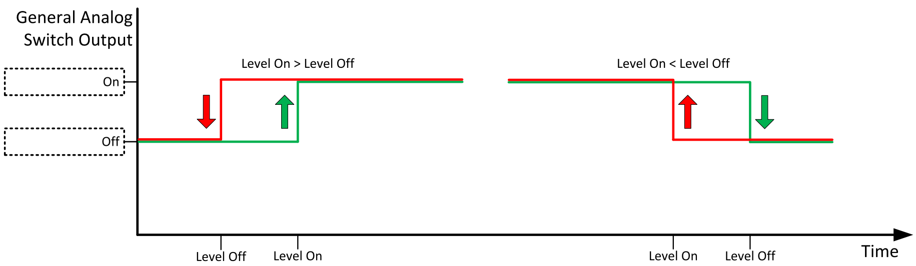


Image 8.56 General analog input 4 switch

back to List of setpoints

Subgroup: General Analog Input 16

Analog Protection 16 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9304	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT16 (PAGE 827)** is configured		
Description			

Warning or history threshold level for **AIN PROT16 (PAGE 827)**.

Note: *These setpoints are used only if LAI* ***AIN PROT16 (PAGE 827)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 16 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9305	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT16 (PAGE 827)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT16 (PAGE 827)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT16 (PAGE 827)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 16 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9306	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT16 (PAGE 827)** is configured		
Description			
Delay for **AIN PROT16 (PAGE 827)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT16 (PAGE 827)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 16 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14974	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH 16 (PAGE 837)** on. The value is measured from **AIN SWITCH 16 (PAGE 837)** analog input.			

Image 8.57 General analog input 4 switch

back to List of setpoints

Analog Switch 16 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14990	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH 16 (PAGE 837)** off. The value is measured from **AIN SWITCH 16 (PAGE 837)** analog input.			

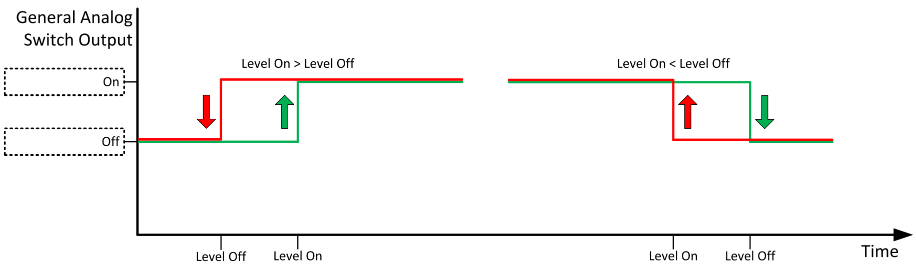


Image 8.58 General analog input 4 switch

back to List of setpoints

Subgroup: General Analog Input 17

Analog Protection 17 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9307	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT17 (PAGE 828)** is configured		
Description			
Warning or history threshold level for **AIN PROT17 (PAGE 828)**.			

> ***Note:*** *These setpoints are used only if LAI* ***AIN PROT17 (PAGE 828)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 17 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9308	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT17 (PAGE 828)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT17 (PAGE 828)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT17 (PAGE 828)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 17 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9309	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT17 (PAGE 828)** is configured		
Description			
Delay for **AIN PROT17 (PAGE 828)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT17 (PAGE 828)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 17 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14975	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH 17 (PAGE 837)** on. The value is measured from **AIN SWITCH 17 (PAGE 837)** analog input.			

Image 8.59 General analog input 4 switch

back to List of setpoints

Analog Switch 17 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14991	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH 17 (PAGE 837)** off. The value is measured from **AIN SWITCH 17 (PAGE 837)** analog input.			

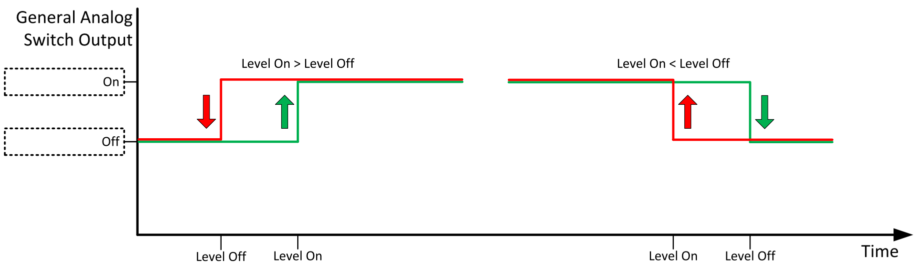


Image 8.60 General analog input 4 switch

back to List of setpoints

Subgroup: General Analog Input 18

Analog Protection 18 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9310	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT18 (PAGE 829)** is configured		
Description			
Warning or history threshold level for **AIN PROT18 (PAGE 829)**. *Note: These setpoints are used only if LAI **AIN PROT18 (PAGE 829)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 18 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9311	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT18 (PAGE 829)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT18 (PAGE 829)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT18 (PAGE 829)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 18 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9312	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT18 (PAGE 829)** is configured		
Description			
Delay for **AIN PROT18 (PAGE 829)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT18 (PAGE 829)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 18 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14976	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH 18 (PAGE 837)** on. The value is measured from **AIN SWITCH 18 (PAGE 837)** analog input.

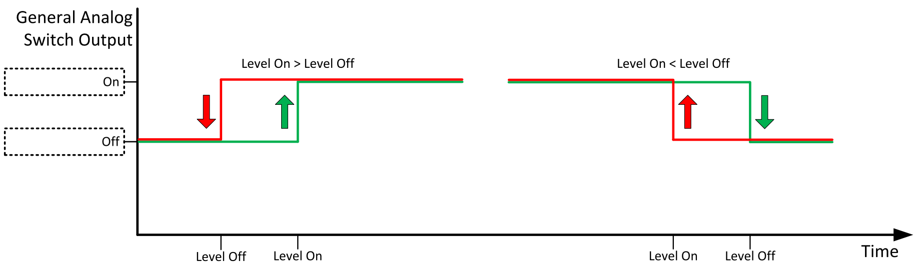


Image 8.61 General analog input 4 switch

back to List of setpoints

Analog Switch 18 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14992	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH 18 (PAGE 837)** off. The value is measured from **AIN SWITCH 18 (PAGE 837)** analog input.

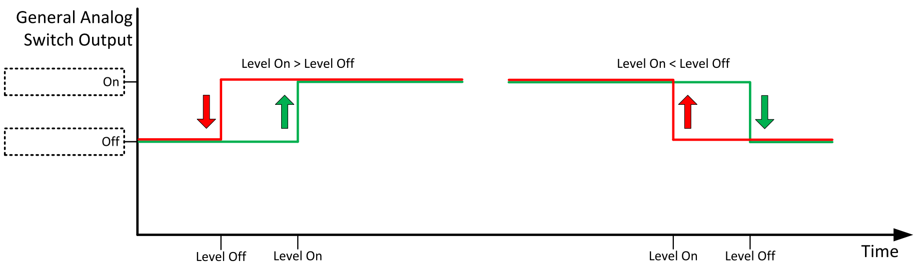


Image 8.62 General analog input 4 switch

back to List of setpoints

Subgroup: General Analog Input 19

Analog Protection 19 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9313	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT19 (PAGE 830)** is configured		
Description			

Warning or history threshold level for **AIN PROT19 (PAGE 830)**.

***Note:** These setpoints are used only if LAI **AIN PROT19 (PAGE 830)** is adjusted to required protection type. Otherwise these setpoints are useless.*

back to List of setpoints

Analog Protection 19 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9314	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT19 (PAGE 830)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT19 (PAGE 830)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT19 (PAGE 830)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 19 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9315	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT19 (PAGE 830)** is configured		
Description			
Delay for **AIN PROT19 (PAGE 830)**. ***Note:*** *These setpoints are used only if LAI **AIN PROT19 (PAGE 830)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 19 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14977	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH 19 (PAGE 838)** on. The value is measured from **AIN SWITCH 19 (PAGE 838)** analog input.

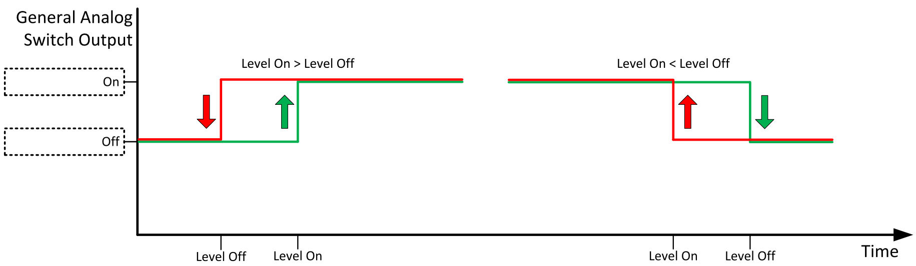


Image 8.63 General analog input 4 switch

back to List of setpoints

Analog Switch 19 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14993	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH 19 (PAGE 838)** off. The value is measured from **AIN SWITCH 19 (PAGE 838)** analog input.			

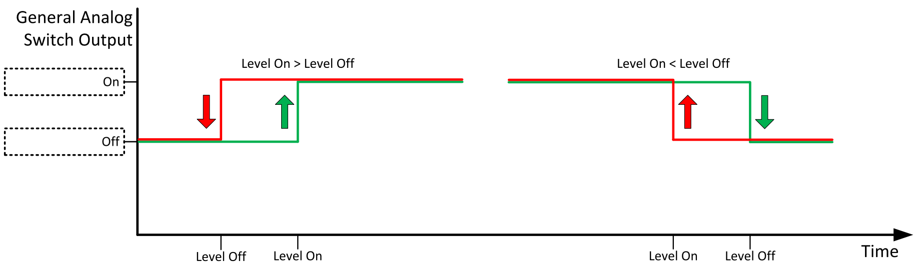


Image 8.64 General analog input 4 switch

back to List of setpoints

Subgroup: General Analog Input 20

Analog Protection 20 Wrn

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9316	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT20 (PAGE 831)** is configured		
Description			
Warning or history threshold level for **AIN PROT20 (PAGE 831)**. *Note: These setpoints are used only if LAI **AIN PROT20 (PAGE 831)** is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 20 Sd

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	9317	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT20 (PAGE 831)** is configured		
Description			
Shutdown or BOC threshold level for **AIN PROT20 (PAGE 831)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT20 (PAGE 831)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Protection 20 Delay

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	0 .. 900 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	9318	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical analog input **AIN PROT20 (PAGE 831)** is configured		
Description			
Delay for **AIN PROT20 (PAGE 831)**. ***Note:*** *These setpoints are used only if LAI* ***AIN PROT20 (PAGE 831)*** *is adjusted to required protection type. Otherwise these setpoints are useless.*			

back to List of setpoints

Analog Switch 20 On

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14978	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH 20 (PAGE 838)** on. The value is measured from **AIN SWITCH 20 (PAGE 838)** analog input.			

Image 8.65 General analog input 4 switch

back to List of setpoints

Analog Switch 20 Off

Setpoint group	General Analog Inputs	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14994	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 755)** is configured		
Description			
Threshold level for switching the binary output **AIN SWITCH 20 (PAGE 838)** off. The value is measured from **AIN SWITCH 20 (PAGE 838)** analog input.			

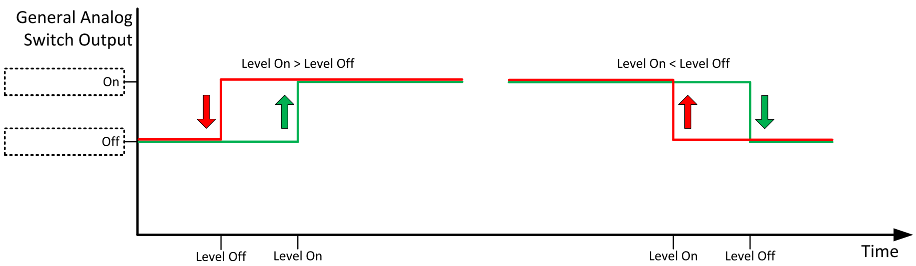


Image 8.66 General analog input 4 switch

back to List of setpoints

Group: Scheduler

Subgroup: Time & Date

Time

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	HH:MM:SS [-]		
Default value	00:00:00	**Alternative config**	NO
Step	[-]		
Comm object	24554	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Real time clock adjustment. *Note: RTC has no backup battery. This setpoint needs to be set-up after connection of +/- terminal.*			

back to List of setpoints

Date

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	DD/MM/YYYY [-]		
Default value	1.1.2015	**Alternative config**	NO
Step	[-]		
Comm object	24553	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Actual date adjustment. ***Note:*** *RTC has no backup battery. This setpoint needs to be set-up after connection of +/- terminal.*			

back to List of setpoints

Time Stamp Period

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	0 .. 240 [min]		
Default value	60 min	**Alternative config**	NO
Step	1 min		
Comm object	8979	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Time interval for periodic history records. ***Note:*** *History record is made only when engine is running.*			

back to List of setpoints

#Summer Time Mode

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Disabled / Winter / Summer / Winter - S / Summer - S [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	8727	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

Behavior of switching between winter and summer time.

Disable	Automatic switching between summer and wintertime is disabled.
Winter (Summer)	Automatic switching between summer and wintertime is enabled and it is set to winter (summer) season.
Winter - S (Summer - S)	Modification for southern hemisphere.

back to List of setpoints

Subgroup: Timer 1

Timer 1 Function

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Disable / No Func / TEST / Test OnLd / MFail Blk / /Auto Run / Mode OFF [-]		
Default value	Disable	**Alternative config**	NO
Step	[-]		
Comm object	15358	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

It is possible to choose from following timer functions. Binary output **Exercise Timer 1 (page 773)** is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.

Timer 1 has higher priority over Timer 2. So if **Timer 1 Function (page 476)** is configured for OFF mode and **Timer 2 Function (page 483)** is over the same time configured for AUTO mode, controller will work in OFF mode.

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

Disable	The Timer is disabled.
No Func	There is no any other function, only binary output of timer is activated.
Mode OFF	When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input.

back to List of setpoints

Timer 1 Setup

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	10969	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

Related setpoints for timer 1 are:

- **Timer 1 Function (page 476)**
- **Timer 1 Repetition (page 477)**
- **Timer 1 First Occur. Date (page 478)**
- **Timer 1 First Occur. Time (page 478)**
- **Timer 1 Duration (page 478)**
- **Timer 1 Repeated (page 479)**
- **Timer 1 Repeat Day (page 482)**
- **Timer 1 Day (page 481)**
- **Timer 1 Repeated Day In Week (page 482)**
- **Timer 1 Repeat Day In Month (page 482)**
- **Timer 1 Repeat Week In Month (page 483)**
- **Timer 1 Refresh Period (page 480)**
- **Timer 1 Weekends (page 481)**

back to List of setpoints

Timer 1 Repetition

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		

Description

Defines repetition of **Timer 1 Function (page 476)**.

Off	**Timer 1 Function (page 476)** will not be activated.
Once	**Timer 1 Function (page 476)** will be activated only one time.
Repeated	**Timer 1 Function (page 476)** will be repeatedly activated.

back to List of setpoints

Timer 1 First Occur. Date

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			
Date of first occurrence of **Timer 1 Function (page 476)**.			

back to List of setpoints

Timer 1 First Occur. Time

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			
Time of first occurrence of **Timer 1 Function (page 476)**.			

back to List of setpoints

Timer 1 Duration

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			
Timer 1 Function (page 476) duration time.			

back to List of setpoints

Timer 1 Repeated

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			

Repeated interval of **Timer 1 Function (page 476)**.

Daily	**Timer 1 Function (page 476)** is repeated every day.
Weekly	**Timer 1 Function (page 476)** is repeated every week in chosen days.
Monthly	**Timer 1 Function (page 476)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 1 Function (page 476)** is repeated in adjusted period.

back to List of setpoints

Timer 1 Refresh Period

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			

Refresh period of **Timer 1 Function (page 476)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 1 Repeated (page 479)**.

Daily	Range [units]: 1 .. 1000 [day]. This setpoint adjust that every X day the timer will be activated. **Example:** If you have daily repetition and you set this setpoint to 2, then every second day from first occurrence of **Timer 1 Function (page 476)**, the **Timer 1 Function (page 476)** will be activated.
Weekly	Range [units]: 1 .. 60 [week]. This setpoint adjust that every X week the timer will be activated. **Example:** If you have weekly repetition and you set this setpoint to 2, then every second week from first occurrence of **Timer 1 Function (page 476)**, the **Timer 1 Function (page 476)** will be activated in selected days adjusted by **Timer 1 Day (page 481)**.
Monthly	Range [units]: 1 .. 12 [month]. This setpoint adjust that every X month the timer will be activated. **Example:** If you have monthly repetition and you set this setpoint to 2, then every second month from first occurrence of **Timer 1 Function (page 476)**, the **Timer 1 Function (page 476)** will be activated in selected day of month adjusted by **Timer 1 Repeat Day In Month (page 482)** or in selected days of week of month adjusted by **Timer 1 Day (page 481)** and **Timer 1 Repeat Week In Month (page 483)**.
Short Period	Range [units]: [HH:MM]. This setpoint adjust that every X short period the timer will be activated. **Example:** If you have short period repetition and you set this setpoint to 2, then every second minute from first occurrence of **Timer 1 Function (page 476)**, the **Timer 1 Function (page 476)** will be activated.

back to List of setpoints

Timer 1 Weekends

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			

Behavior of **Timer 1 Function (page 476)** on weekends.

Including	**Timer 1 Function (page 476)** counter is running on the weekends and **Timer 1 Function (page 476)** can be active.
Skip	**Timer 1 Function (page 476)** counter is running on the weekends but **Timer 1 Function (page 476)** isn't active.
Postpone	**Timer 1 Function (page 476)** counter isn't running on the weekends and **Timer 1 Function (page 476)** isn't active. If the activation of timer is counted on the weekend, than timer will be activated after weekend. Another activation of timer is counted from original date of first occurrence date.

back to List of setpoints

Timer 1 Day

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			

Use this setpoint to include or exclude individual days of week. To select the day use Up and Down buttons. To change the value of day use Enter button.

back to List of setpoints

Timer 1 Repeat Day

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 1 Function (page 476)**.

Repeated Day	Chose one day in month when **Timer 1 Function (page 476)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 1 Function (page 476)** will be activated.

back to List of setpoints

Timer 1 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			

Use this setpoint to select the day of week when timer will be activated.

***Note:** More day can be selected. Timer will be activated on the day which happened like the first.*

back to List of setpoints

Timer 1 Repeat Day In Month

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	1..31 [day]		
Default value	0	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			

Use this setpoint to chose the day in month when the **Timer 1 Function (page 476)** will be activated.

back to List of setpoints

Timer 1 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 476)**		
Description			
This setpoint adjust the week of month in which the **Timer 1 Function (page 476)** will be activated.			

back to List of setpoints

Subgroup: Timer 2

Timer 2 Function

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Disable / No Func / TEST / Test OnLd / MFail Blk / /Auto Run / Mode OFF [-]		
Default value	No Func	**Alternative config**	NO
Step	[-]		
Comm object	15359	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

***Note:** It is possible to choose from following Timer functions. Binary output* **EXERCISE TIMER 2 (PAGE 774)** *is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.*

Timer 1 has higher priority over Timer 2. So if **Timer 1 Function (page 476)** is configured for OFF mode and **Timer 2 Function (page 483)** is over the same time configured for AUTO mode, controller will work in OFF mode.

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

Disable	The Timer is disabled.
No Func	There is no any other function, only binary output of timer is activated.
Mode OFF	When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input.

back to List of setpoints

Timer 2 Setup

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	10970	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Related setpoints for timer 2 are:

- **Timer 2 Function (page 483)**
- **Timer 2 Repetition (page 484)**
- **Timer 2 First Occur. Date (page 485)**
- **Timer 2 First Occur. Time (page 485)**
- **Timer 2 Duration (page 485)**
- **Timer 2 Repeated (page 486)**
- **Timer 2 Repeat Day (page 489)**
- **Timer 2 Day (page 488)**
- **Timer 2 Repeated Day In Week (page 489)**
- **Timer 2 Repeat Day In Month (page 489)**
- **Timer 2 Repeat Week In Month (page 490)**
- **Timer 2 Refresh Period (page 487)**
- **Timer 2 Weekends (page 488)**

back to List of setpoints

Timer 2 Repetition

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			

Defines repetition of **Timer 2 Function (page 483)**.

Off	**Timer 2 Function (page 483)** will not be activated.
Once	**Timer 2 Function (page 483)** will be activated only one time.
Repeated	**Timer 2 Function (page 483)** will be repeatedly activated.

back to List of setpoints

Timer 2 First Occur. Date

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			
Date of first occurrence of**Timer 2 Function (page 483)**.			

back to List of setpoints

Timer 2 First Occur. Time

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			
Time of first occurrence of **Timer 2 Function (page 483)**.			

back to List of setpoints

Timer 2 Duration

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[HH:MM]		
Default value	00:00	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			
Timer 2 Function (page 483) duration time.			

back to List of setpoints

Timer 2 Repeated

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			

Repeated interval of **Timer 2 Function (page 483)**.

Daily	**Timer 2 Function (page 483)** is repeated every day.
Weekly	**Timer 2 Function (page 483)** is repeated every week in chosen days.
Monthly	**Timer 2 Function (page 483)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 2 Function (page 483)** is repeated in adjusted period.

back to List of setpoints

Timer 2 Refresh Period

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			

Refresh period of **Timer 2 Function (page 483)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 2 Repeated (page 486)**.

Daily	Range [units]: 1 .. 1000 [day]. This setpoint adjust that every X day the timer will be activated. **Example:** If you have daily repetition and you set this setpoint to 2, then every second day from first occurrence of **Timer 2 Function (page 483)**, the **Timer 2 Function (page 483)** will be activated.
Weekly	Range [units]: 1 .. 60 [week]. This setpoint adjust that every X week the timer will be activated. **Example:** If you have weekly repetition and you set this setpoint to 2, then every second week from first occurrence of **Timer 2 Function (page 483)**, the **Timer 2 Function (page 483)** will be activated in selected days adjusted by **Timer 2 Day (page 488)**.
Monthly	Range [units]: 1 .. 12 [month]. This setpoint adjust that every X month the timer will be activated. **Example:** If you have monthly repetition and you set this setpoint to 2, then every second month from first occurrence of **Timer 2 Function (page 483)**, the **Timer 2 Function (page 483)** will be activated in selected day of month adjusted by **Timer 2 Repeat Day In Month (page 489)** or in selected days of week of month adjusted by **Timer 2 Day (page 488)** and **Timer 2 Repeat Week In Month (page 490)**.
Short Period	Range [units]: [HH:MM]. This setpoint adjust that every X short period the timer will be activated. **Example:** If you have short period repetition and you set this setpoint to 2, then every second minute from first occurrence of **Timer 2 Function (page 483)**, the **Timer 2 Function (page 483)** will be activated.

back to List of setpoints

Timer 2 Weekends

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			

Behavior of **Timer 2 Function (page 483)** on weekends.

Including	**Timer 2 Function (page 483)** counter is running on the weekends and **Timer 2 Function (page 483)** can be active.
Skip	**Timer 2 Function (page 483)** counter is running on the weekends but **Timer 2 Function (page 483)** isn't active.
Postpone	**Timer 2 Function (page 483)** counter isn't running on the weekends and **Timer 2 Function (page 483)** isn't active. If the activation of timer is counted on the weekend, than timer will be activated after weekend. Another activation of timer is counted from original date of first occurrence date.

back to List of setpoints

Timer 2 Day

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			

Use this setpoint to include or exclude individual days of week. To select the day use Up and Down buttons. To change the value of day use Enter button.

back to List of setpoints

Timer 2 Repeat Day

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			
Use this setpoint to adjust behavior of monthly repetition of the **Timer 2 Function (page 483)**.			

Repeated Day	Chose one day in month when **Timer 2 Function (page 483)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 2 Function (page 483)** will be activated.

back to List of setpoints

Timer 2 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			
Use this setpoint to select the day of week when timer will be activated.			

Note: *More day can be selected. Timer will be activated on the day which happened like the first.*

back to List of setpoints

Timer 2 Repeat Day In Month

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	1..31 [day]		
Default value	0	**Alternative config**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			
Use this setpoint to chose the day in month when the **Timer 2 Function (page 483)** will be activated.			

back to List of setpoints

Timer 2 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Alternative config**	NO
Step	1 week		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 483)**		
Description			
This setpoint adjust the week of month in which the **Timer 2 Function (page 483)** will be activated.			

back to List of setpoints

Subgroup: Rental Timers

Rental Timer 1

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Disabled / 1 .. 8 760 [h]		
Default value	Disabled	**Alternative config**	NO
Step	1 h		
Comm object	14326	**Related applications**	MINT, SPtM
Config level	Advanced		

Setpoint visibility	Always
Description	

Another engine start is not allowed when this timer elapsed. This timer is based on engine running hours. The alarm Rental Timer 1 Elapsed (page 887) will be recorded in alarm list and the binary output **AL RENTAL TIMER 1 (PAGE 751)** will be activated.

> **IMPORTANT: To reset Rental Timer 1 (page 490) we have to set up Rental Timer 1 (page 490) again. It means go to setpoint group Scheduler and to the setpoint Rental Timer 1 (page 490). Then press enter button ↵, change the value if it is necessary and press enter button ↵ again.**

When the **Rental Timer 1 (page 490)** elapsed during engine run the Gen-set will not stop immediately. The adjustable **Rental Timer BOC (page 494)** timer will start in this moment. The engine will be cooled and stopped when the **Rental Timer BOC (page 494)** time elapsed.

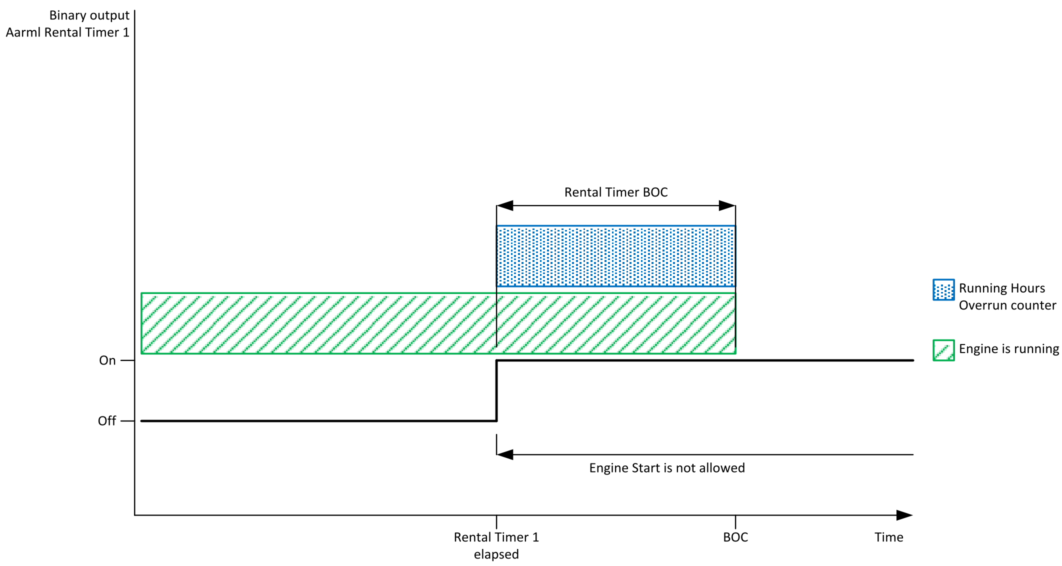


Image 8.67 Rental Timer 1

The Running Hours Overrun counter will start increment when the engine is continue running after the **Rental Timer 1 (page 490)** elapsed.

> ***Note:*** *There is no priority between Rental Timer 1 and Rental Timer 2. The sooner timer will activated the* ***Rental Timer BOC (page 494)*** *protection.*

back to List of setpoints

Rental Timer 1 Wrn

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Disabled / 1.. **Rental Timer 1 (page 490)** [h]		
Default value	Disabled	**Alternative config**	NO
Step	1 h		
Comm object	14332	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Rental Timer 1 (page 490)**		
Description			

Alarm **Wrn Rental Timer 1 (page 892)** comes up after xx running hours from adjusting the **Rental Timer 1 (page 490)**. Hours are adjusted by this setpoint.

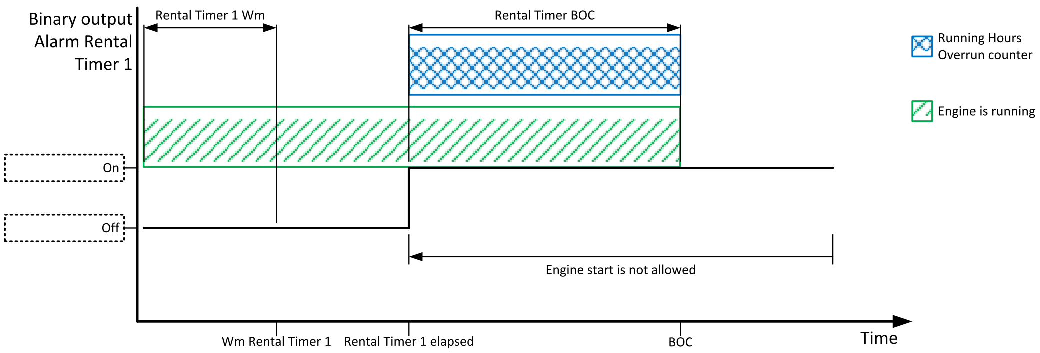


Image 8.68 Rental Timer 1 Wrn

back to List of setpoints

Rental Timer 2

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2015	**Alternative config**	NO
Step	1 day		
Comm object	14367	**Related applications**	MINT, SPtM
Config level	Advanced		

Setpoint visibility	Always
Description	

Another engine start is not allowed when this timer elapsed. This timer is based on date. At the midnight of the last day the alarm Rental Timer 2 Elapsed (page 887) will be recorded in alarm list and the binary output **AL RENTAL TIMER 2 (PAGE 751)** will be activated.

> **IMPORTANT: To reset Rental Timer 2 (page 492) we have to set up Rental Timer 2 (page 492) again. It means go to setpoint group Scheduler and to the setpoint Rental Timer 2 (page 492). Then press enter button ↵, change the value if it is necessary and press enter button ↵ again.**

> **IMPORTANT: To disable Rental Timer 2 (page 492) set date to 01/01/2015.**

When the **Rental Timer 2 (page 492)** elapsed during engine run the Gen-set will not stop immediately. The adjustable **Rental Timer BOC (page 494)** timer will start in this moment. The engine will be cooled and stopped when the **Rental Timer BOC (page 494)** time elapsed.

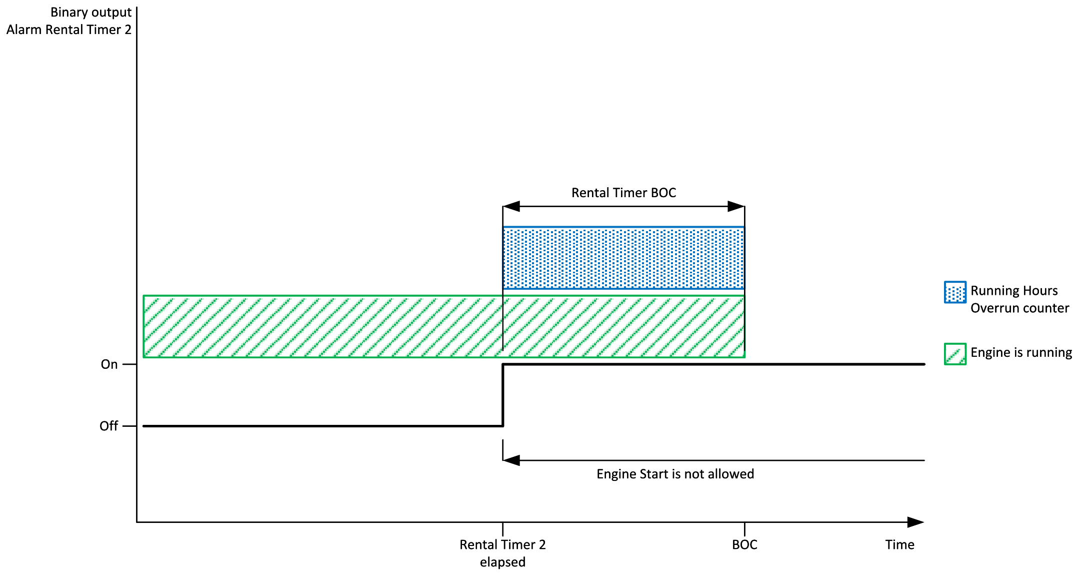


Image 8.69 Rental Timer 2

The Running Hours Overrun counter will start increment when the engine is continue running after the **Rental Timer 2 (page 492)** elapsed.

> ***Note:*** *There is no priority between Rental Timer 1 and Rental Timer 2. The sooner timer will activated the **Rental Timer BOC (page 494)** protection.*

back to List of setpoints

Rental Timer 2 Wrn

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Disabled / 01/01/2015 .. **Rental Timer 2 (page 492)** [DD/MM/YYYY]		
Default value	01/01/2015	**Alternative config**	NO
Step	1 day		
Comm object	14368	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Rental Timer 2 (page 492)**		
Description			

Alarm **Wrn Rental Timer 2 (page 892)** comes up xx days before the **Rental Timer 2 (page 492)**. Days are adjusted by this setpoint.

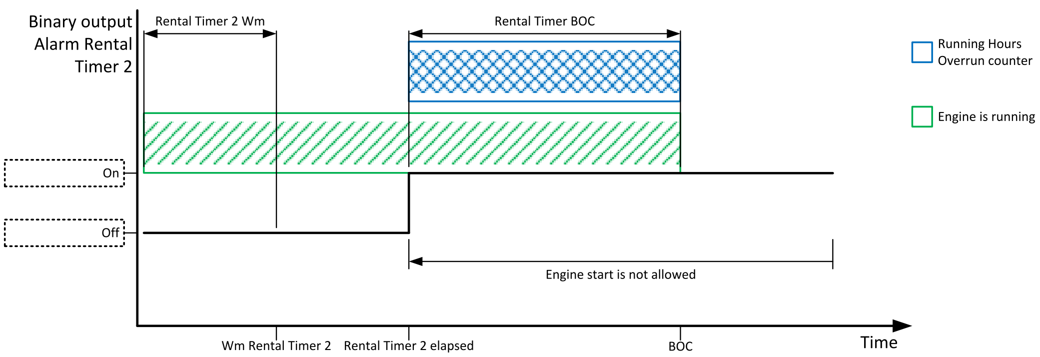


Image 8.70 Rental Timer 2 Wrn

back to List of setpoints

Rental Timer BOC

Setpoint group	Scheduler	**Related FW**	1.6.0
Range [units]	Disabled / 1 .. 210 [h]		
Default value	24 h	**Alternative config**	NO
Step	1 h		
Comm object	14334	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoints **Rental Timer 1 (page 490)** and **Rental Timer 2 (page 492)**		
Description			

This timer will start after **Rental Timer 1 (page 490)** or **Rental Timer 2 (page 492)** elapsed in case that the engine is still running. When this timer elapsed the engine is cooled and stopped.

back to List of setpoints

Group: Geo-Fencing

Subgroup: Geo Fencing

Home Latitude

Setpoint group	Geo-Fencing	**Related FW**	1.6.0
Range [units]	-90,0000..90,0000 [°]		
Default value	0,0000 °	**Alternative config**	NO
Step	0,0001 °		
Comm object	14606	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjust latitude of "home" position. Home is position where gen-set should runs. Positions on north hemisphere have positive value, position on south hemisphere have negative value. ***Note:*** *This value with **Home Longitude (page 495)** are used for counting **Fence Radius 1 (page 496)** and **Fence Radius 2 (page 496)**.* ***Note:*** *This value can be also obtained automatically via logical binary input **GEO HOME POSITION (PAGE 723)**. In case of activation of this binary input for at least 2 seconds, setpoint will be adjusted automatically from actual coordinates from GPS signal.*			

back to List of setpoints

Home Longitude

Setpoint group	Geo-Fencing	**Related FW**	1.6.0
Range [units]	-180,0000..180,0000 [°]		
Default value	0,0000 °	**Alternative config**	NO
Step	0,0001 °		
Comm object	14607	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjust longitude of "home" position. Home is position where gen-set should runs. Positions on east hemisphere have positive value, position on west hemisphere have negative value. ***Note:*** *This value with **Home Latitude (page 495)** are used for counting **Fence Radius 1 (page 496)** and **Fence Radius 2 (page 496)**.* ***Note:*** *This value can be also obtained automatically via logical binary input **GEO HOME POSITION (PAGE 723)**. In case of activation of this binary input for at least 2 seconds, setpoint will be adjusted automatically from actual coordinates from GPS signal.*			

back to List of setpoints

Fence Radius 1

Setpoint group	Geo-Fencing	**Related FW**	1.6.0
Range [units]	0,0..99,9 [km]		
Default value	0,0 km	**Alternative config**	NO
Step	0,1 km		
Comm object	11677	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Radius for circle area 1. When the Gen-set leaves this area, **Fence 1 Protection (page 499)** is activated after **Fence 1 Delay (page 497)**. ***Note:*** *The center of this circle area is defined by "Home" position – setpoints **Home Longitude (page 495)** and **Home Latitude (page 495)**.*			

back to List of setpoints

Fence Radius 2

Setpoint group	Geo-Fencing	**Related FW**	1.6.0
Range [units]	0,0..99,9 [km]		
Default value	0,0 km	**Alternative config**	NO
Step	0,1 km		
Comm object	14608	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Radius for circle area 2. When the gen-set leaves this area, **Fence 2 Protection (page 500)** is activated after **Fence 2 Delay (page 497)**. ***Note:*** *The center of this circle area is defined by "Home" position - setpoints **Home Longitude (page 495)** and **Home Latitude (page 495)**.*			

back to List of setpoints

Fence 1 Delay

Setpoint group	Geo-Fencing	**Related FW**	1.6.0
Range [units]	0..3600 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	11682	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Delay for **Fence 1 Protection (page 499)**.			

back to List of setpoints

Fence 2 Delay

Setpoint group	Geo-Fencing	**Related FW**	1.6.0
Range [units]	0..3600 [s]		
Default value	0 s	**Alternative config**	NO
Step	1 s		
Comm object	14609	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Delay for **Fence 2 Protection (page 500)**.			

back to List of setpoints

Geo-Fencing

Setpoint group	Geo-Fencing	**Related FW**	1.6.0
Range [units]	Disabled / Enabled / LBI Enable [-]		
Default value	Disabled	**Alternative config**	NO
Step	[-]		
Comm object	11681	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint enables or disables geo-fencing function.

Disabled	**Fence 1 Protection (page 499)** and **Fence 2 Protection (page 500)** are disabled.
Enabled	**Fence 1 Protection (page 499)** and **Fence 2 Protection (page 500)** are enabled.
LBI Enable	**Fence 1 Protection (page 499)** and **Fence 2 Protection (page 500)** are enabled only when logical binary input .**GEO-FENCING ENABLE (PAGE 724)** is active.

back to List of setpoints

Fence 1 Protection

Setpoint group	Geo-Fencing	**Related FW**	1.6.0
Range [units]	HistRecOnl / Wrn / Sd / BOC[-]		
Default value	HistRecOnl	**Alternative config**	NO
Step	[-]		
Comm object	14610	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

Protection type for geo-fencing 1 protection. Fence of circle area is adjusted by setpoint **Fence Radius 1 (page 496)**. Delay for protection is adjusted by setpoint **Fence 1 Delay (page 497)**.

Protection types

HistRecOnl	Position of gen-set is only measured and displayed on the LCD screen but not used for protection. History record is made if position is out of **Fence Radius 1 (page 496)**.
Wrn	Position of gen-set is used for warning protection only. Protection is activated when position of the gen-set is out of **Fence Radius 1 (page 496)**.
Sd	Position of gen-set is used for shutdown protection. Protection is activated when position of the gen-set is out of **Fence Radius 1 (page 496)**.
BOC	Position of gen-set is used for BOC (Breaker Open and Cooling) protection. Protection is activated when position of the gen-set is out of **Fence Radius 1 (page 496)**.

Note: *Protection is activated also when GPS signal is lost for* ***Fence 1 Delay (page 497)****.*

back to List of setpoints

Fence 2 Protection

Setpoint group	Geo-Fencing	**Related FW**	1.6.0
Range [units]	HistRecOnl / Wrn / Sd / BOC[-]		
Default value	HistRecOnl	**Alternative config**	NO
Step	[-]		
Comm object	14611	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

Protection type for geo-fencing 2 protection. Fence of circle area is adjusted by setpoint **Fence Radius 2 (page 496)**. Delay for protection is adjusted by setpoint **Fence 2 Delay (page 497)**.

Protection types

HistRecOnl	Position of gen-set is only measured and displayed on the LCD screen but not used for protection. History record is made if position is out of **Fence Radius 2 (page 496)**.
Wrn	Position of gen-set is used for warning protection only. Protection is activated when position of the gen-set is out of **Fence Radius 2 (page 496)**.
Sd	Position of gen-set is used for shutdown protection. Protection is activated when position of the gen-set is out of **Fence Radius 2 (page 496)**.
BOC	Position of gen-set is used for BOC (Breaker Open and Cooling) protection. Protection is activated when position of the gen-set is out of **Fence Radius 2 (page 496)**.

Note: *Protection is activated also when GPS signal is lost for* ***Fence 2 Delay (page 497)****.*

back to List of setpoints

Group: Plug-In Modules

Slot A

Setpoint group	Plug-In Modules	**Related FW**	1.6.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	24280	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint enable or disable module in slot A.

back to List of setpoints

Slot B

Setpoint group	Plug-In Modules	Related FW	1.6.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	Alternative config	NO
Step	[-]		
Comm object	24279	Related applications	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enable or disable module in slot B.			

back to List of setpoints

Group: CU AIN Calibration

Subgroup: Analog Input 1

CU AIN1 Calibration

Setpoint group	CU AIN Calibration	Related FW	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	0 (number of decimal is given by sensor curve)	Alternative config	NO
Step	the step is defined by an analog sensor curve		
Comm object	8431	Related applications	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Calibrating constant to adjust the measured value of controller analog inputs. Physical dimension of calibrating constant is corresponding to Analog input. **Note:** *Unit is adjusted via InteliConfig in configuration of analog input 1.*			

back to List of setpoints

Subgroup: Analog Input 2

CU AIN2 Calibration

Setpoint group	CU AIN Calibration	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	0 (number of decimal is given by sensor curve)	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	8407	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Calibrating constant to adjust the measured value of controller analog inputs. Physical dimension of calibrating constant is corresponding to Analog input. ***Note:*** *Unit is adjusted via InteliConfig in configuration of analog input 2.*			

back to List of setpoints

Subgroup: Analog Input 3

CU AIN3 Calibration

Setpoint group	CU AIN Calibration	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	0 (number of decimal is given by sensor curve)	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	8467	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Calibrating constant to adjust the measured value of controller analog inputs. Physical dimension of calibrating constant is corresponding to Analog input. ***Note:*** *Unit is adjusted via InteliConfig in configuration of analog input 3.*			

back to List of setpoints

Subgroup: Analog Input 4

CU AIN4 Calibration

Setpoint group	CU AIN Calibration	**Related FW**	1.6.0
Range [units]	the range is defined by an analog sensor curve		
Default value	0 (number of decimal is given by sensor curve)	**Alternative config**	NO
Step	the step is defined by an analog sensor curve		
Comm object	8793	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Calibrating constant to adjust the measured value of controller analog inputs. Physical dimension of calibrating constant is corresponding to Analog input. ***Note:*** *Unit is adjusted via InteliConfig in configuration of analog input 4.*			

back to List of setpoints

Group: Alternate Configuration

Subgroup: Configuration 1

Connection Type 1

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	12058	**Related applications**	MINT, SPtM
Config level	Standard		

Setpoint visibility	Always
Description	

Connection type:

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)
SplPhL1L2	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
SplPhL1L3	Double Delta connection Split Phase Two phase voltage measurement L1,L3 with 180° phase shift 2x CT (Current Transformer)
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)

3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)
Autodetect	High Leg Delta: L1 >=100 V; L1 <=140 V L2 >=140 V L3 >=100 V; L3 <=140 V 3Ph Low Y: L1 <=160 V L2 <=160 V L3 <=160 V 3Ph High Y: L1 >160 V L2 >160 V L3 >160 V SplPhL1L3: L1 >=100 V L2 <= 20 V L3 >=100 V SplPhL1L2: L1 >=100 V L2 >= 100 V L3 <= 20 V Mono Phase: L1 >=100 V L2 <= 20 V L3 <= 20 V **Voltage Autodetect shutdown** ***Note:*** *Function Autodetect can't be used with the setpoint* ***Gen to Mains/Bus Phase Shift (page 406)*** *simultaneously.*

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 686)*** *is active.*

back to List of setpoints

Nominal Power 1

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	12046	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal power of the Gen-set. Generator **Overload BOC (page 343)** protection is based on this setpoint.

> ***Note:*** *This setpoint is used when setpoint **Connection type (page 264)** is adjusted to Monophase or Splitphase or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.*

> ***Note:*** *This value is used when any other alternate configuration is not active.*

> ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*

back to List of setpoints

Nominal Power Split Phase 1

Setpoint group	Basic settings Alternate Configuration	**Related FW**	1.6.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	15771	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**		
Description			

Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 343)** protection is based on this setpoint.

> ***Note:*** *This setpoint is used when setpoint **Connection type (page 264)** is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.*

> ***Note:*** *This value is used when any other alternate configuration is not active.*

back to List of setpoints

Nominal Current 1

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	1 .. 10 000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	12049	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value. ***Note:*** *This value is used when any other alternate configuration is not active.*			

back to List of setpoints

Nominal Frequency 1

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	45 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	9913	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system frequency (usually 50 or 60 Hz). ***Note:*** *This value is used when any other alternate configuration is not active.*			

back to List of setpoints

Nominal RPM 1

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	100 .. 4000 [RPM]		
Default value	1 500 RPM	**Alternative config**	YES
Step	1 RPM		
Comm object	9915	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Nominal engine speed (RPM revolutions per minute). ***Note:*** *This value is used when any other alternate configuration is not active.*			

back to List of setpoints

Gen Nominal Voltage Ph-N 1

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	80 .. 20000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	12052	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**.		
Description			
Nominal generator voltage (phase to neutral). ***Note:*** *This value is used when any other alternate configuration is not active.*			

back to List of setpoints

Gen Nominal Voltage Ph-Ph 1

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	80 .. 40000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	12055	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection Type 1 (page 503)**.		
Description			
Nominal generator voltage (phase to phase). ***Note:*** *This value is used when any other alternate configuration is not active.*			

back to List of setpoints

Mains/Bus Nominal Voltage Ph-N 1

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	10 .. 34641 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	20820	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**.		
Description			
Nominal Mains/Bus voltage (phase to neutral). ***Note:*** *This value is used when any other alternate configuration is not active.*			

back to List of setpoints

Mains/Bus Nominal Voltage Ph-Ph 1

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	10 .. 60000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	20823	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264).**		
Description			
Nominal Mains/Bus voltage (phase to phase). ***Note:*** *This value is used when any other alternate configuration is not active.*			

back to List of setpoints

Subgroup: Configuration 2

Connection type 2

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	12059	**Related applications**	MINT, SPtM
Config level	Standard		

Setpoint visibility	Always
Description	
Connection type:	

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)
SplPhL1L2	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
SplPhL1L3	Double Delta connection Split Phase Two phase voltage measurement L1,L3 with 180° phase shift 2x CT (Current Transformer)
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)

3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)
Autodetect	High Leg Delta: L1 >=100 V; L1 <=140 V L2 >=140 V L3 >=100 V; L3 <=140 V 3Ph Low Y: L1 <=160 V L2 <=160 V L3 <=160 V 3Ph High Y: L1 >160 V L2 >160 V L3 >160 V SplPhL1L3: L1 >=100 V L2 <= 20 V L3 >=100 V SplPhL1L2: L1 >=100 V L2 >= 100 V L3 <= 20 V Mono Phase: L1 >=100 V L2 <= 20 V L3 <= 20 V **Voltage Autodetect shutdown** ***Note:*** *Function Autodetect can't be used with the setpoint* ***Gen to Mains/Bus Phase Shift (page 406)*** *simultaneously.*

Note: *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 686)*** *is active.*

back to List of setpoints

Nominal Power 2

Setpoint group	Basic settings Alternate Configuration	**Related FW**	1.6.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	12047	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal power of the Gen-set. Generator **Overload BOC (page 343)** protection is based on this setpoint.

> ***Note:*** *This setpoint is used when setpoint **Connection type 2 (page 509)** is adjusted to Monophase or Splitphase or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.*

> ***Note:*** *This value is used when binary input **ALTERNATE CONFIG 2 (PAGE 686)** is active.*

> ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*

back to List of setpoints

Nominal Power Split Phase 2

Setpoint group	Basic settings Alternate Configuration	**Related FW**	1.6.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	15772	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 2 (page 509)**		
Description			

Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 343)** protection is based on this setpoint.

> ***Note:*** *This setpoint is used when setpoint **Connection type 2 (page 509)** is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.*

> ***Note:*** *This value is used when binary input **ALTERNATE CONFIG 2 (PAGE 686)** is active.*

back to List of setpoints

Nominal Current 2

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	1 .. 10000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	12050	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value.

Note:** This value is used when binary input* ***ALTERNATE CONFIG 2 *(**PAGE 686**) is active.*

back to List of setpoints

Nominal Frequency 2

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	45 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	9914	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Nominal system frequency (usually 50 or 60 Hz).

Note:** This value is used when binary input* ***ALTERNATE CONFIG 2 *(**PAGE 686**) is active.*

back to List of setpoints

Nominal RPM 2

Setpoint group	Basic settings Alternate Configuration	**Related FW**	1.6.0
Range [units]	100 .. 4000 [RPM]		
Default value	1 500 RPM	**Alternative config**	YES
Step	1 RPM		
Comm object	9916	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

Nominal engine speed (RPM - revolutions per minute).

Note:** This value is used when binary input* ***ALTERNATE CONFIG 2 *(**PAGE 686**) is active.*

back to List of setpoints

Gen Nominal Voltage Ph-N 2

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	80 .. 20000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	12053	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 2 (page 509)**.		
Description			
Nominal generator voltage (phase to neutral). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 686)*** *is active.*			

back to List of setpoints

Gen Nominal Voltage Ph-Ph 2

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	80 .. 40000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	12056	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 2 (page 509)**.		
Description			
Nominal generator voltage (phase to phase). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 686)*** *is active.*			

back to List of setpoints

Mains/Bus Nominal Voltage Ph-N 2

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	10 .. 34641 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	20821	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**.		
Description			
Nominal Mains/Bus voltage (phase to neutral). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 686)*** *is active.*			

back to List of setpoints

Mains/Bus Nominal Voltage Ph-Ph 2

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	10 .. 60000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	20824	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264).**		
Description			
Nominal Mains/Bus voltage (phase to phase). *Note: This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 686)*** *is active.*			

back to List of setpoints

Subgroup: Configuration 3

Connection type 3

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	**Alternative config**	YES
Step	[-]		
Comm object	12060	**Related applications**	MINT, SPtM
Config level	Standard		

Setpoint visibility	Always

Description

Connection type:

Mono Phase	Single phase voltage measurement L1-N 1x CT (Current Transformer)
SplPhL1L2	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
SplPhL1L3	Double Delta connection Split Phase Two phase voltage measurement L1,L3 with 180° phase shift 2x CT (Current Transformer)
3Ph4Wire	Grounded Star (Grounded Wye) connection – 3PY Three phase voltage measurement L1,L2,L3 with 120° phase shift 3x CT (Current Transformer)

3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye Corner-Grounded Delta Split Phase Delta Three phase voltage measurement L1,L2,L3 with 120° phase shift No neutral is available 3x CT (Current Transformer)
High Leg D	High Leg Delta connection Three phase voltage measurement L1,L2,L3 3x CT (Current Transformer)
Autodetect	High Leg Delta: L1 >=100 V; L1 <=140 V L2 >=140 V L3 >=100 V; L3 <=140 V 3Ph Low Y: L1 <=160 V L2 <=160 V L3 <=160 V 3Ph High Y: L1 >160 V L2 >160 V L3 >160 V SplPhL1L3: L1 >=100 V L2 <= 20 V L3 >=100 V SplPhL1L2: L1 >=100 V L2 >= 100 V L3 <= 20 V Mono Phase: L1 >=100 V L2 <= 20 V L3 <= 20 V **Voltage Autodetect shutdown** ***Note:** Function Autodetect can't be used with the setpoint **Gen to Mains/Bus Phase Shift (page 406)** simultaneously.*

***Note:** This value is used when binary input **ALTERNATE CONFIG 3 (PAGE 686)** is active.*

back to List of setpoints

Nominal Power 3

Setpoint group	Basic settings Alternate Configuration	**Related FW**	1.6.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	12048	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal power of the Gen-set. Generator **Overload BOC (page 343)** protection is based on this setpoint. ***Note:*** *This setpoint is used when setpoint* ***Connection type 3 (page 515)*** *is adjusted to Monophase or Splitphase or 3Ph3Wire or High Leg D or 3Ph4Wire or when Autodetect detects connection type as 3Ph3Wire or High Leg D or 3Ph4Wire.* ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 686)*** *is active.* ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of setpoints

Nominal Power Split Phase 3

Setpoint group	Basic settings Alternate Configuration	**Related FW**	1.6.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Alternative config**	YES
Step	1 kW		
Comm object	15773	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 3 (page 515)**		
Description			
Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 343)** protection is based on this setpoint. ***Note:*** *This setpoint is used when setpoint* ***Connection type 3 (page 515)*** *is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.* ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 686)*** *is active.*			

back to List of setpoints

Nominal Current 3

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	1 .. 10 000 [A]		
Default value	350 A	**Alternative config**	YES
Step	1 A		
Comm object	12051	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
It is current limit for generator current protections and means maximal continuous generator current. Nominal Current can be different from generator rated current value. ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 686)*** *is active.*			

back to List of setpoints

Nominal Frequency 3

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	45 .. 65 [Hz]		
Default value	50 Hz	**Alternative config**	YES
Step	1 Hz		
Comm object	15197	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system frequency (usually 50 or 60 Hz). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 686)*** *is active.*			

back to List of setpoints

Nominal RPM 3

Setpoint group	Basic settings Alternate Configuration	**Related FW**	1.6.0
Range [units]	100 .. 4 000 [RPM]		
Default value	1 500 RPM	**Alternative config**	YES
Step	1 RPM		
Comm object	15196	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Nominal engine speed (RPM - revolutions per minute). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 686)*** *is active.*			

back to List of setpoints

Gen Nominal Voltage Ph-N 3

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	80 .. 20 000 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	12054	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 3 (page 515)**.		
Description			
Nominal generator voltage (phase to neutral). ***Note:*** *This value is used when binary input **ALTERNATE CONFIG 3 (PAGE 686)** is active.*			

back to List of setpoints

Gen Nominal Voltage Ph-Ph 3

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	80 .. 40 000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	12057	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type 3 (page 515)**.		
Description			
Nominal generator voltage (phase to phase). ***Note:*** *This value is used when binary input **ALTERNATE CONFIG 3 (PAGE 686)** is active.*			

back to List of setpoints

Mains/Bus Nominal Voltage Ph-N 3

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	10 .. 34641 [V]		
Default value	231 V	**Alternative config**	YES
Step	1 V		
Comm object	20822	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264)**.		
Description			
Nominal Mains/Bus voltage (phase to neutral). ***Note:*** *This value is used when binary input **ALTERNATE CONFIG 3 (PAGE 686)** is active.*			

back to List of setpoints

Mains/Bus Nominal Voltage Ph-Ph 3

Setpoint group	Alternate Configuration	**Related FW**	1.6.0
Range [units]	10 .. 60000 [V]		
Default value	400 V	**Alternative config**	YES
Step	1 V		
Comm object	20825	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 264).**		
Description			
Nominal Mains/Bus voltage (phase to phase). ***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 686)*** *is active.*			

back to List of setpoints

Group: CM-RS232-485

COM1 Mode

Setpoint group	CM-RS232-485	**Related FW**	1.6.0
Range [units]	Direct / MODBUS / DualSlave / Dual Master [-]		
Default value	Direct	**Alternative config**	NO
Step	[-]		
Comm object	24522	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Communication protocol switch for the COM1 channel.			

Direct	InteliConfig communication protocol via serial cable.
MODBUS	MODBUS protocol.
DualSlave	Dual operation protocol – slave function
DualMaster	Dual operation protocol – master function

back to List of setpoints

COM1 Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	1.6.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24341	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 521)**		
Description			
If the direct mode is selected on COM1 channel, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value. ***Note:*** *WinScope supports only 19200, 38400, 57600 speeds.*			

back to List of setpoints

COM1 MODBUS Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	1.6.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24477	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM1 Mode (page 521)**		
Description			
If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here.			

back to List of setpoints

COM2 Mode

Setpoint group	CM-RS232-485	**Related FW**	1.6.0
Range [units]	Direct / MODBUS / DualSlave / Dual Master [-]		
Default value	Direct	**Alternative config**	NO
Step	[-]		
Comm object	24451	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

Communication protocol switch for the COM2 channel.

Direct	InteliConfig communication protocol via serial cable.
MODBUS	MODBUS protocol.
DualSlave	Dual operation protocol – slave function
DualMaster	Dual operation protocol – master function

back to List of setpoints

COM2 Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	1.6.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24340	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM2 Mode (page 523)**		
Description			

If the direct mode is selected on COM2 channel, the direct communication speed of controller part of line can be adjusted here. Speed of second part of line has to be adjusted to the same value.

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

back to List of setpoints

COM2 MODBUS Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	1.6.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Alternative config**	NO
Step	[-]		
Comm object	24420	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **COM2 Mode (page 523)**		
Description			
If the MODBUS mode is selected on COM2 channel, the MODBUS communication speed can be adjusted here.			

back to List of setpoints

Group: CM-GPRS

Mode

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	Email+SMS / SMS Only [-]		
Default value	Email+SMS	**Alternative config**	NO
Step	[-]		
Comm object	24315	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjust the communication mode of module.			

Email+SMS	Controller is connected to the Internet and is able to send e-mails as well as SMS. The controller is also accessible via AirGate. Internet-enabled SIM card must be used. Also **APN Name (page 537)** has to be adjusted.
SMS Only	Only SMS are sent. Internet-enabled SIM card is not required.

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

back to List of setpoints

APN Name

Setpoint group	CM-GPRS CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	internet	**Alternative config**	NO
Step	[-]		
Comm object	24363	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
APN (Access Point Name) of the GPRS/network, provided by GSM operator.			

back to List of setpoints

APN User Name

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24361	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
User name for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank.			

back to List of setpoints

APN User Password

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24360	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
User password for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank.			

back to List of setpoints

Email Address 1

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24298	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

Email Address 2

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24297	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

Email Address 3

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24145	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

Email Address 4

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24144	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

E-mail/SMS Language

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	Depends on CU languages [-]		
Default value	English	**Alternative config**	NO
Step	[-]		
Comm object	24299	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to set the language of SMS and e-mail. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

SMTP User Name

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0..31 characters [-]		
Default value	"empty"	**Alternative config**	NO
Step	[-]		
Comm object	24313	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

back to List of setpoints

SMTP User Password

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0..15 characters [-]		
Default value	"empty"	**Alternative config**	NO
Step	[-]		
Comm object	24312	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

back to List of setpoints

SMTP Server Address

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	airgate.comap.cz:9925	**Alternative config**	NO
Step	[-]		
Comm object	24311	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information. ***Note:*** *You may use also any public SMTP server which does not require connection over SSL/TLS channels. If the device is connected to AirGate the AirGate SMTP server at "airgate.comap.cz" may be used. Ports 25 and 9925 are supported. After controller connects to AirGate for the first time (or with new public IP address), it may not be able to send emails for first 5-10 minutes.*			

back to List of setpoints

SMTP Sender Address

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24310	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		

Description

Enter an existing email address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller.

Note: *It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.*

IMPORTANT: This item is obligatory when emails are configured.

back to List of setpoints

Time Zone

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Alternative config**	NO
Step	[-]		
Comm object	24366	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		

Description

This setpoint is used to select the time zone where the controller is located. See your computer time zone setting (click on the time indicator located in the rightmost position of the Windows task bar) if you are not sure about your time zone.

Note: *If the time zone is not selected properly the active e-mails may contain incorrect information about sending time, which may result in confusion when the respective problem actually occurred.*

Note: *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

back to List of setpoints

Event Message

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10926	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Event Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

Wrn Message

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8482	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Wrn Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

BOC Message

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10566	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

Sd Messages

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8484	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Sd Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

Telephone Number 1

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24296	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a "+" character followed by the country prefix. **IMPORTANT: Telephone number has to be entered without spaces.**			

back to List of setpoints

Telephone Number 2

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24295	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a "+" character followed by the country prefix. **IMPORTANT: Telephone number has to be entered without spaces.**			

back to List of setpoints

Telephone Number 3

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24143	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix. **IMPORTANT: Telephone number has to be entered without spaces.**			

back to List of setpoints

Telephone Number 4

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24142	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix. **IMPORTANT: Telephone number has to be entered without spaces.**			

back to List of setpoints

DNS IP Address

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	Valid IP address [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24314	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
The setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.			

back to List of setpoints

AirGate Connection

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	Disabled/ Enabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	24273	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			

This setpoint enable or disable AirGate connection via CM-GPRS or via CM-4G-GPS.

DISABLED:	Only SMS are sent. Internet-enabled SIM card is not required. AirGate is not used.
ENABLED	This mode uses the "AirGate" service. Internet-enabled SIM card must be used. The AirGate server address is adjusted by the setpoint **AirGate Address (page 286)**.

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

back to List of setpoints

ComAp TCP Port

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	1.6.0
Range [units]	0 .. 65 535[-]		
Default value	23	**Alternative config**	NO
Step	[-]		
Comm object	24374	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS module)		
Description			

This setpoint is used to adjust the port number, which is used for Ethernet connection to a PC with any of ComAp PC program (i.e. InteliConfig). This setpoint should be adjusted to 23, which is the default port used by all ComAp PC programs. A different value should be used only in special situations as e.g. sharing one public IP address among many controllers or to overcome a firewall restrictions.

> **IMPORTANT: If AirGate is used, this setpoint has to be adjusted to 23.**

Note: *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

back to List of setpoints

Group: CM-4G-GPS

Mode

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	Email+SMS / SMS Only [-]		
Default value	Email+SMS	**Alternative config**	NO
Step	[-]		
Comm object	24315	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint adjust the communication mode of module.

Email+SMS	Controller is connected to the Internet and is able to send e-mails as well as SMS. The controller is also accessible via AirGate. Internet-enabled SIM card must be used. Also **APN Name (page 537)** has to be adjusted.
SMS Only	Only SMS are sent. Internet-enabled SIM card is not required.

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

back to List of setpoints

Required Connection Type

Setpoint group	CM-4G-GPS	**Related FW**	1.6.0
Range [units]	2G / 3G / 4G / Automatic [-]		
Default value	Automatic	**Alternative config**	NO
Step	[-]		
Comm object	24132	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts preferred connection type of CM-4G-GPS module.			

back to List of setpoints

APN Name

Setpoint group	CM-GPRS CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	internet	**Alternative config**	NO
Step	[-]		
Comm object	24363	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
APN (Access Point Name) of the GPRS/network, provided by GSM operator.			

back to List of setpoints

APN User Name

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24361	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
User name for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank.			

back to List of setpoints

APN User Password

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0..15 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24360	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
User password for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank.			

back to List of setpoints

Email Address 1

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24298	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

Email Address 2

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24297	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

Email Address 3

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24145	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

Email Address 4

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	0..63 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24144	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS and CM-4G-GPS modules)		
Description			
Enter in this setpoint a valid e-mail address where the alarm and event e-mails shall be sent. Leave this setpoint blank if alarm and event email should not be send. ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

E-mail/SMS Language

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	Depends on CU languages [-]		
Default value	English	**Alternative config**	NO
Step	[-]		
Comm object	24299	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to set the language of SMS and e-mail. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

SMTP User Name

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0..31 characters [-]		
Default value	"empty"	**Alternative config**	NO
Step	[-]		
Comm object	24313	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

back to List of setpoints

SMTP User Password

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0..15 characters [-]		
Default value	"empty"	**Alternative config**	NO
Step	[-]		
Comm object	24312	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication.			

back to List of setpoints

SMTP Server Address

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	airgate.comap.cz:9925	**Alternative config**	NO
Step	[-]		
Comm object	24311	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information. ***Note:*** *You may use also any public SMTP server which does not require connection over SSL/TLS channels. If the device is connected to AirGate the AirGate SMTP server at "airgate.comap.cz" may be used. Ports 25 and 9925 are supported. After controller connects to AirGate for the first time (or with new public IP address), it may not be able to send emails for first 5-10 minutes.*			

back to List of setpoints

SMTP Sender Address

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0..31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24310	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			
Enter an existing email address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller. ***Note:*** *It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.* **IMPORTANT: This item is obligatory when emails are configured.**			

back to List of setpoints

Time Zone

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Alternative config**	NO
Step	[-]		
Comm object	24366	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint is used to select the time zone where the controller is located. See your computer time zone setting (click on the time indicator located in the rightmost position of the Windows task bar) if you are not sure about your time zone.

Note: *If the time zone is not selected properly the active e-mails may contain incorrect information about sending time, which may result in confusion when the respective problem actually occurred.*

Note: *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

back to List of setpoints

Event Message

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10926	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint enables or disables Event Messages.

This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.

back to List of setpoints

Wrn Message

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8482	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Wrn Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

BOC Message

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	10566	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

Sd Messages

Setpoint group	CM-GPRS CM-4G-GPS CM-Ethernet	**Related FW**	1.6.0
Range [units]	ON / OFF [-]		
Default value	ON	**Alternative config**	NO
Step	[-]		
Comm object	8484	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Sd Messages. This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.			

back to List of setpoints

Telephone Number 1

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24296	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix. **IMPORTANT: Telephone number has to be entered without spaces.**			

back to List of setpoints

Telephone Number 2

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24295	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a "+" character followed by the country prefix. **IMPORTANT: Telephone number has to be entered without spaces.**			

back to List of setpoints

Telephone Number 3

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24143	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a "+" character followed by the country prefix. **IMPORTANT: Telephone number has to be entered without spaces.**			

back to List of setpoints

Telephone Number 4

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Alternative config**	NO
Step	[-]		
Comm object	24142	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

Enter in this setpoint either a valid GSM phone number where the alarm messages shall be sent. For GSM numbers use either the national format (i.e. the number you would dial if you wanted to make a local call) or the full international format beginning with a “+” character followed by the country prefix.

> **IMPORTANT: Telephone number has to be entered without spaces.**

back to List of setpoints

AirGate Connection

Setpoint group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Range [units]	Disabled/ Enabled [-]		
Default value	Enabled	**Alternative config**	NO
Step	[-]		
Comm object	24273	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)**		
Description			

This setpoint enable or disable AirGate connection via CM-GPRS or via CM-4G-GPS.

DISABLED:	Only SMS are sent. Internet-enabled SIM card is not required. AirGate is not used.
ENABLED	This mode uses the "AirGate" service. Internet-enabled SIM card must be used. The AirGate server address is adjusted by the setpoint **AirGate Address (page 286)**.

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

back to List of setpoints

ComAp TCP Port

Setpoint group	CM-GPRS; CM-4G-GPS; CM-Ethernet	**Related FW**	1.6.0
Range [units]	0 .. 65 535[-]		
Default value	23	**Alternative config**	NO
Step	[-]		
Comm object	24374	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Mode (page 536)** (CM-GPRS module)		
Description			
This setpoint is used to adjust the port number, which is used for Ethernet connection to a PC with any of ComAp PC program (i.e. InteliConfig). This setpoint should be adjusted to 23, which is the default port used by all ComAp PC programs. A different value should be used only in special situations as e.g. sharing one public IP address among many controllers or to overcome a firewall restrictions. **IMPORTANT: If AirGate is used, this setpoint has to be adjusted to 23.** ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*			

back to List of setpoints

Group: EM-BIO8-EFCP

Earth Fault Current Protection

Setpoint group	EM-BIO8-EFCP	**Related FW**	1.6.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Alternative config**	NO
Step	[-]		
Comm object	11631	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint can block or allow Earth fault Current protection.			

DISABLED	Earth fault current protection is blocked.
ENABLED	Earth fault current protection is allowed. Behavior of Earth fault current protection is set by these setpoints: **Earth Fault CT Input Range (page 549)**, **Earth Fault CT Ratio (page 549)**, **Earth Fault Delay (page 549)** and **Earth Fault Sd (page 550)**.

back to List of setpoints

Earth Fault Delay

Setpoint group	EM-BIO8-EFCP	**Related FW**	1.6.0
Range [units]	0,03 .. 5,00 [s]		
Default value	0,10 s	**Alternative config**	NO
Step	0,01 s		
Comm object	11633	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Delay for Earth Fault Current protection.			

back to List of setpoints

Earth Fault CT Input Range

Setpoint group	EM-BIO8-EFCP	**Related FW**	1.6.0
Range [units]	1 [A] / 5 [A]		
Default value	5 A	**Alternative config**	NO
Step	[-]		
Comm object	14340	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
There are 2 physical inputs for **Earth Fault Current Protection (page 548)**. Value of this setpoint has to be set on value of physical input which is presently in use.			

back to List of setpoints

Earth Fault CT Ratio

Setpoint group	EM-BIO8-EFCP	**Related FW**	1.6.0
Range [units]	1 .. 2000 [1/(1or5) A]		
Default value	500 1/(1or5)A	**Alternative config**	NO
Step	1 A/ 1A; 1 A/5 A		
Comm object	14339	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Earth Fault current transformer ratio. ***Note:*** *Type of units depends on setpoint **Earth Fault CT Input Range (page 549)** which have to be set before this setpoint.*			

back to List of setpoints

Earth Fault Sd

Setpoint group	EM-BIO8-EFCP	**Related FW**	1.6.0
Range [units]	0,03 .. 5,00 [A]		
Default value	0,30 A	**Alternative config**	NO
Step	0,01 [A]		
Comm object	11632	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Limit value for Earth Fault Current protection.			

back to List of setpoints

Group: PLC

PLC Setpoint 1

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10440	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

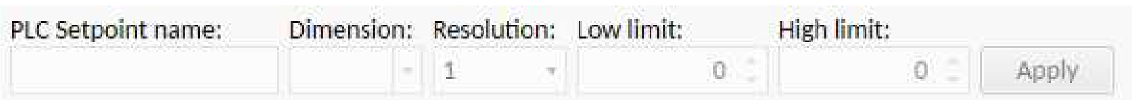


Image 8.71 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 2

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10441	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

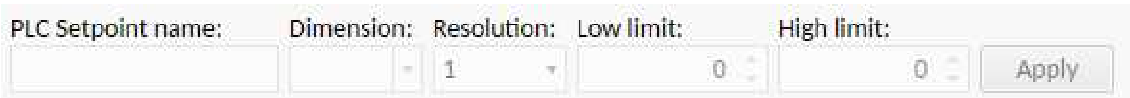


Image 8.72 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 3

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10442	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

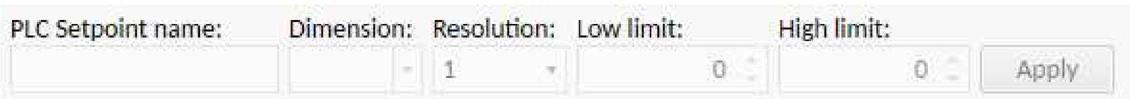


Image 8.73 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 4

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10443	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

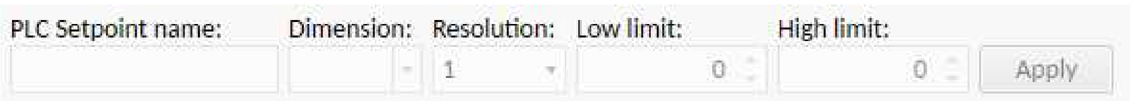


Image 8.74 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 5

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10444	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

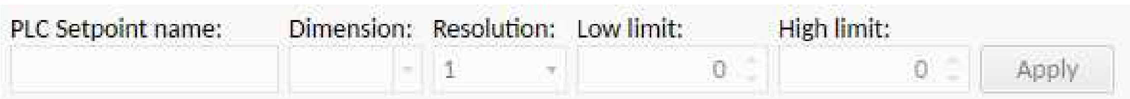


Image 8.75 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 6

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10445	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

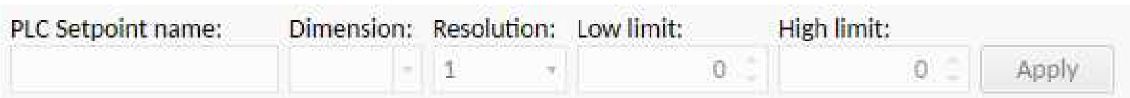


Image 8.76 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 7

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10446	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

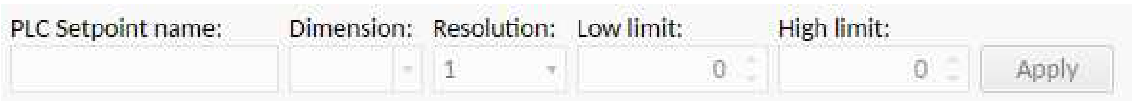


Image 8.77 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 8

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10447	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

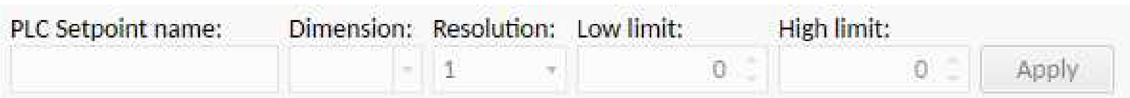


Image 8.78 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 9

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10448	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

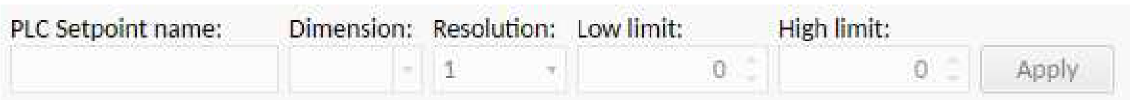


Image 8.79 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 10

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10449	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

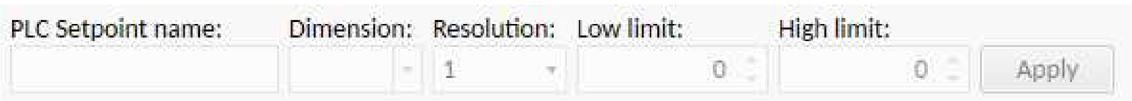


Image 8.80 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 11

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10450	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

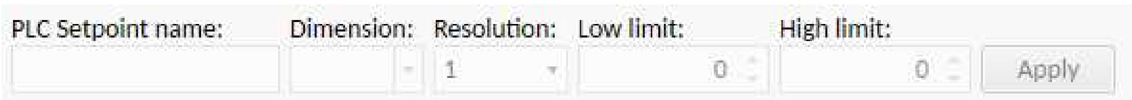


Image 8.81 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 12

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10451	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

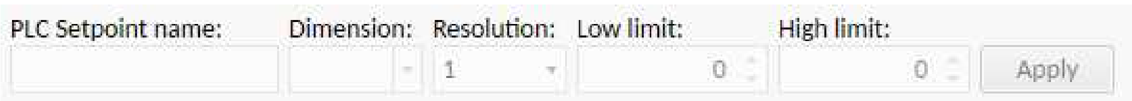


Image 8.82 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 13

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10452	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

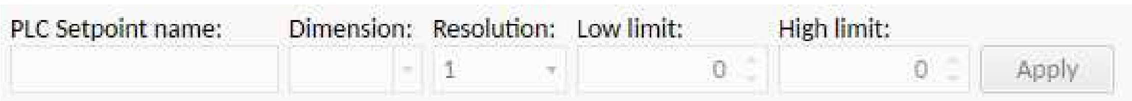


Image 8.83 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 14

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10453	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

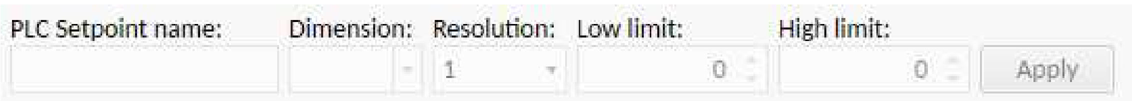


Image 8.84 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 15

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10454	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

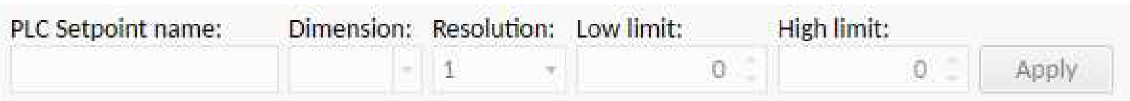


Image 8.85 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 16

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10455	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

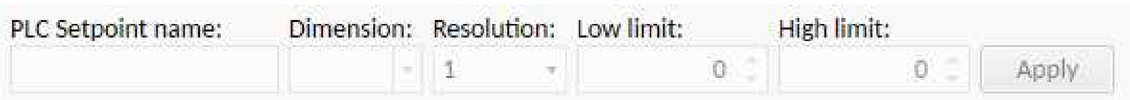


Image 8.86 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 17

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10456	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

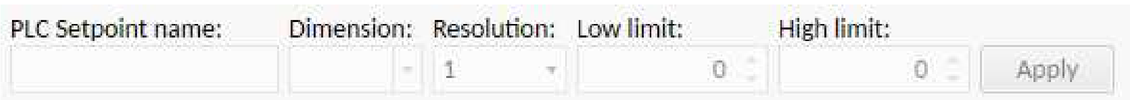


Image 8.87 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 18

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10457	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

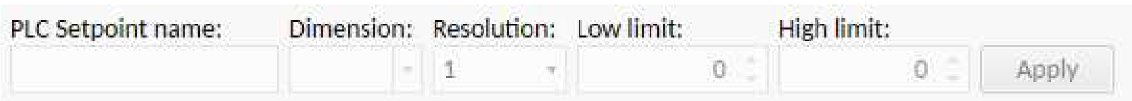


Image 8.88 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 19

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10458	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

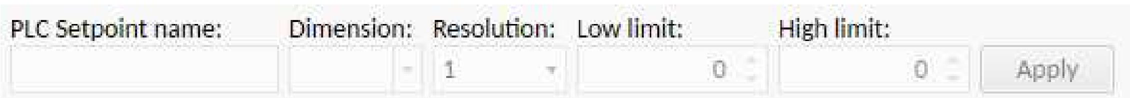


Image 8.89 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 20

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10459	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

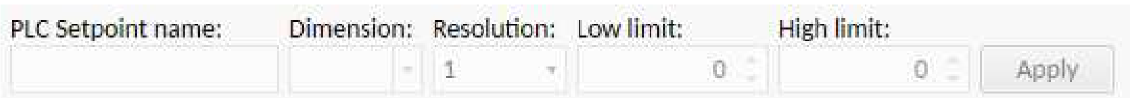


Image 8.90 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 21

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10460	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

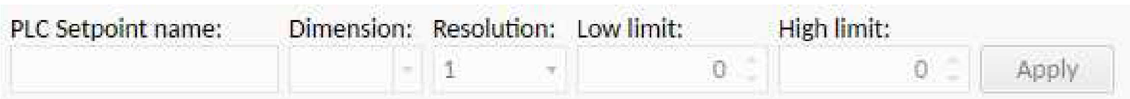


Image 8.91 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 22

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10461	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

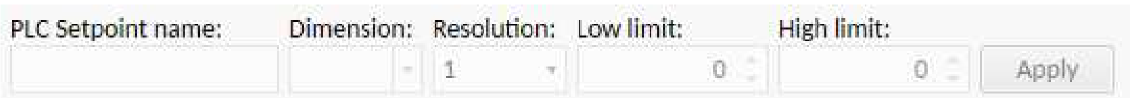


Image 8.92 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 23

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10462	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

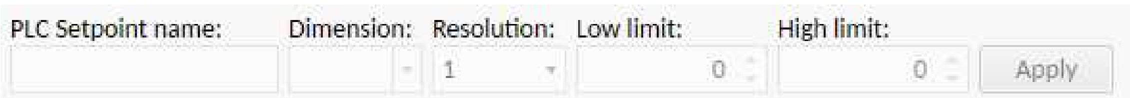


Image 8.93 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 24

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10463	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

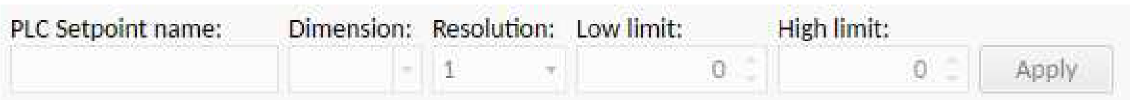


Image 8.94 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 25

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10464	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

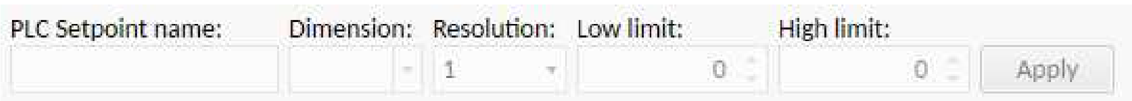


Image 8.95 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 26

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10465	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

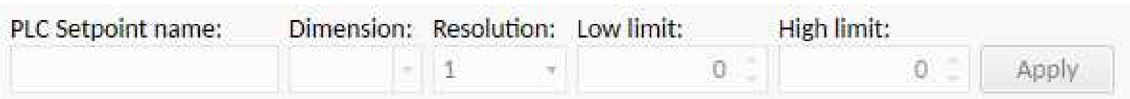


Image 8.96 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 27

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10466	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

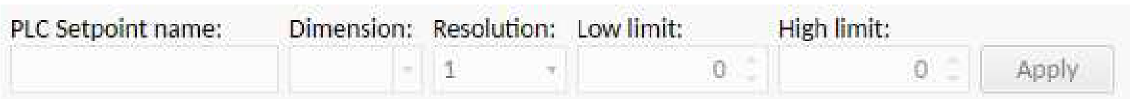


Image 8.97 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 28

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10467	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

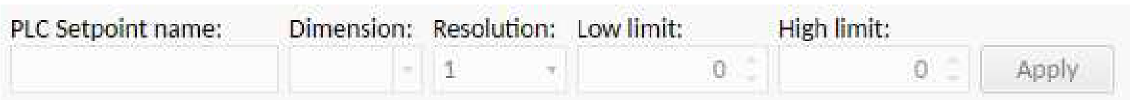


Image 8.98 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 29

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10468	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

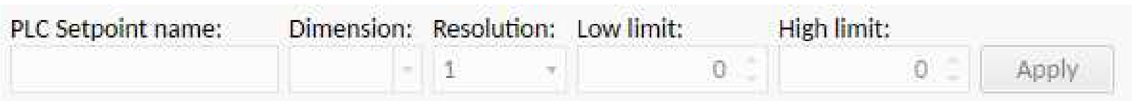


Image 8.99 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 30

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10469	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

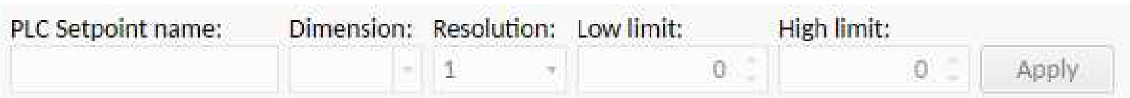


Image 8.100 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 31

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10470	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

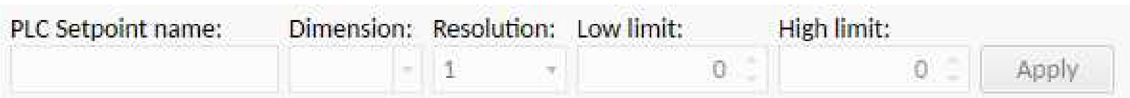


Image 8.101 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 32

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10471	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

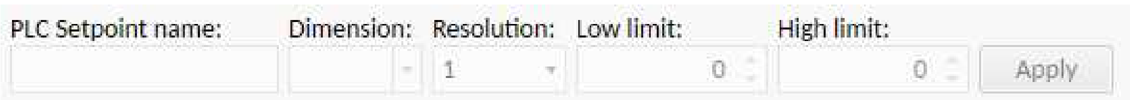


Image 8.102 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 33

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10472	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

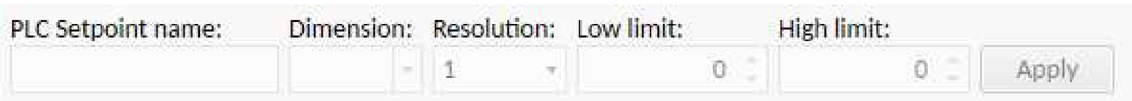


Image 8.103 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 34

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10473	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

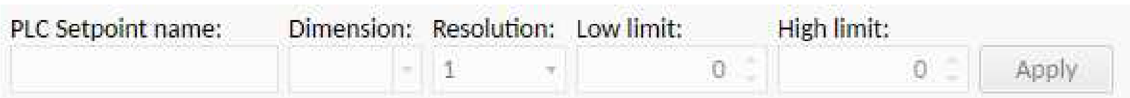


Image 8.104 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 35

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10474	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

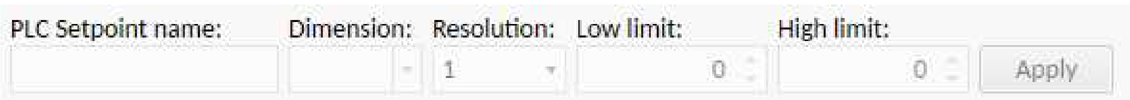


Image 8.105 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 36

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10475	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

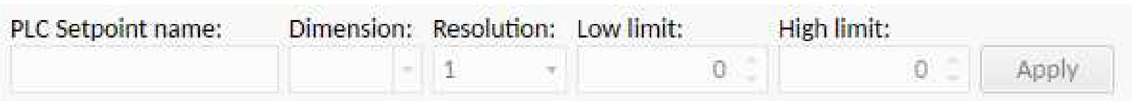


Image 8.106 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 37

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10476	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

Image 8.107 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 38

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10477	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

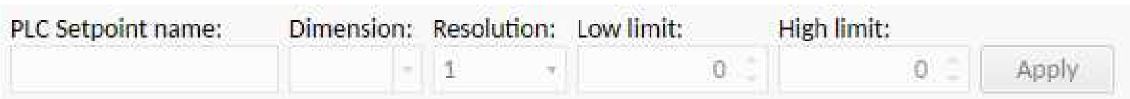


Image 8.108 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 39

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10478	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

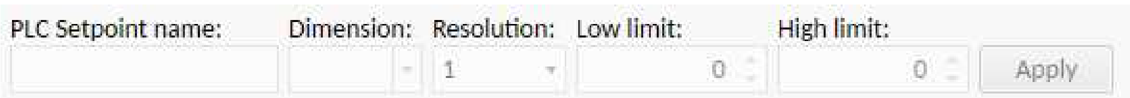


Image 8.109 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 40

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10479	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

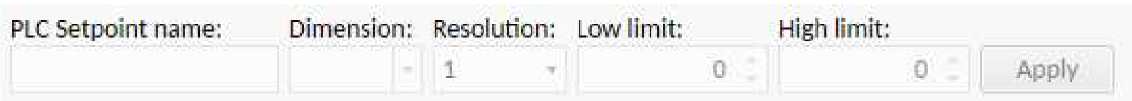


Image 8.110 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 41

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10480	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

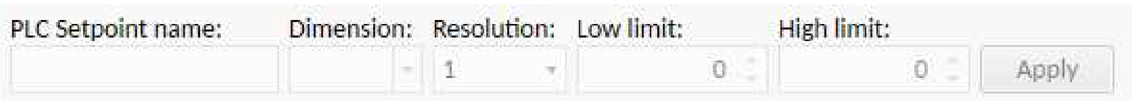


Image 8.111 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 42

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10481	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

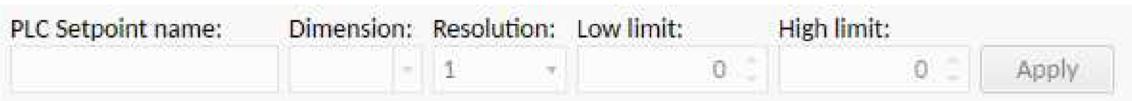


Image 8.112 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 43

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10482	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

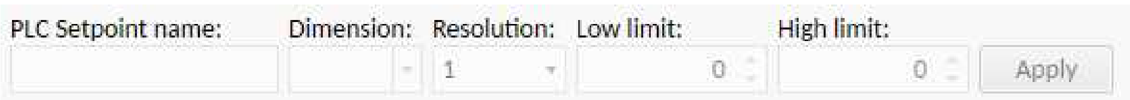


Image 8.113 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 44

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10483	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

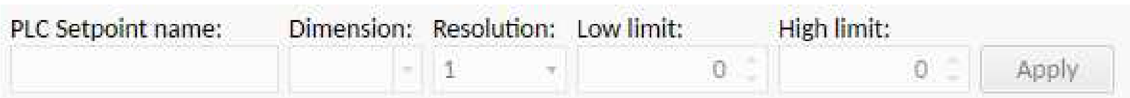


Image 8.114 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 45

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10484	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

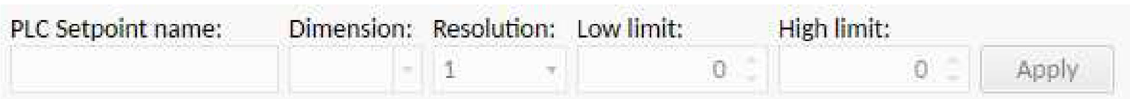


Image 8.115 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 46

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10485	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

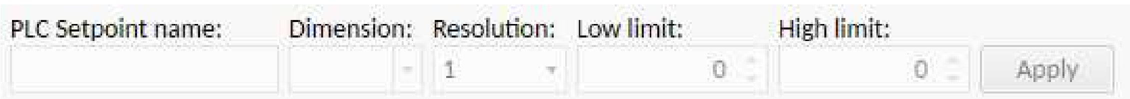


Image 8.116 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 47

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10486	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

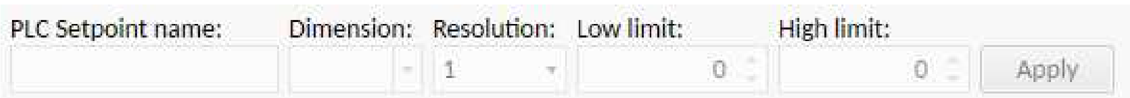


Image 8.117 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 48

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10487	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

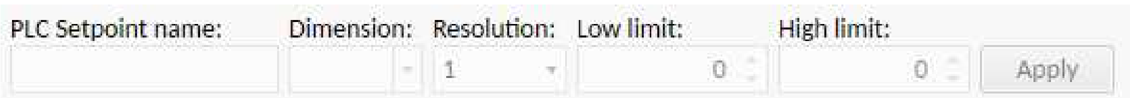


Image 8.118 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 49

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10488	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

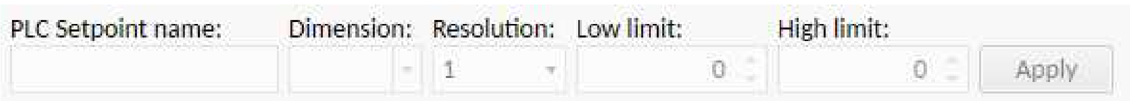


Image 8.119 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 50

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10489	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

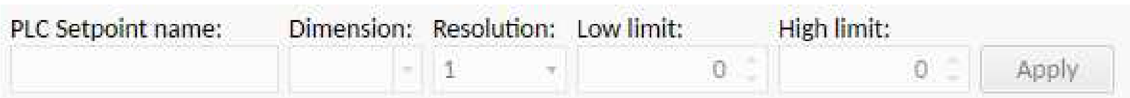


Image 8.120 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 51

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10490	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

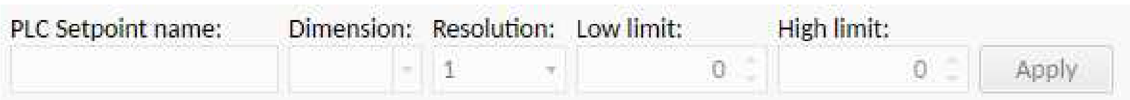


Image 8.121 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 52

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10491	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

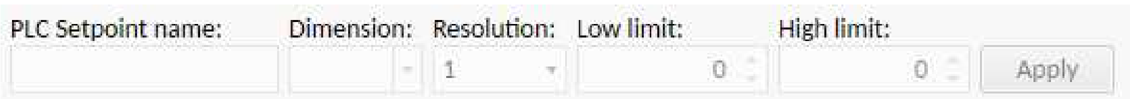


Image 8.122 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 53

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10492	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

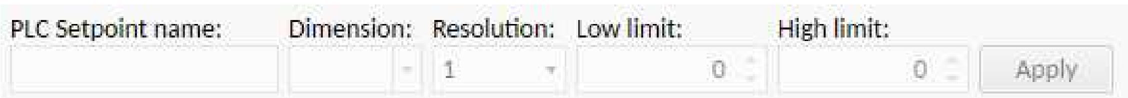


Image 8.123 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 54

Setpoint group	PLC	Related FW	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	Alternative config	NO
Step	Depends on resolution of value [-]		
Comm object	10493	Related applications	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

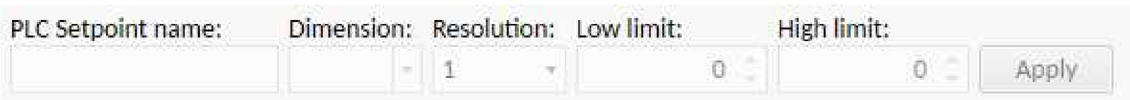


Image 8.124 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 55

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10494	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

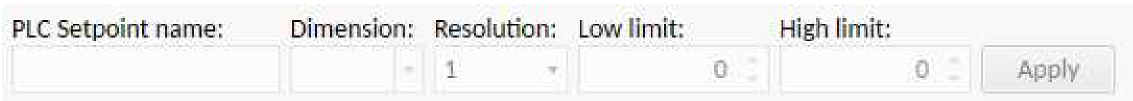


Image 8.125 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 56

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10495	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

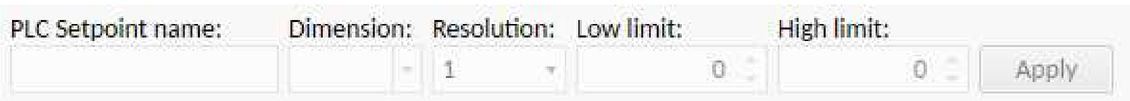


Image 8.126 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 57

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10496	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

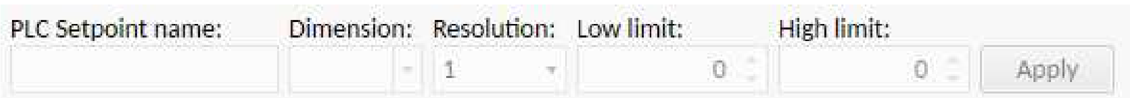


Image 8.127 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 58

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10497	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

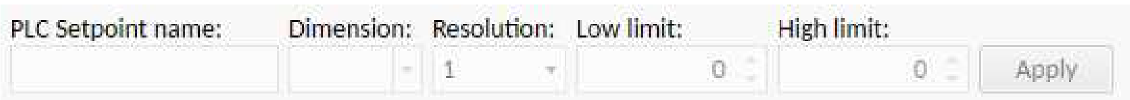


Image 8.128 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 59

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10498	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

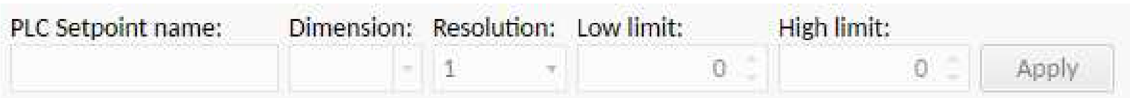


Image 8.129 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 60

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10499	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

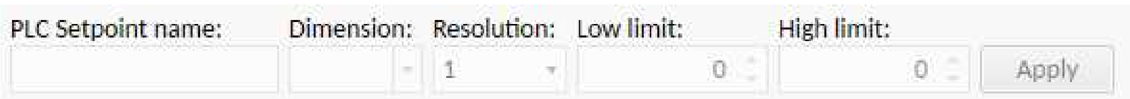


Image 8.130 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 61

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10500	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

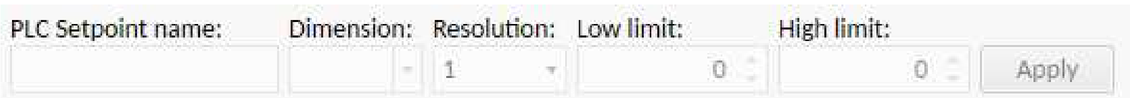


Image 8.131 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 62

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10501	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

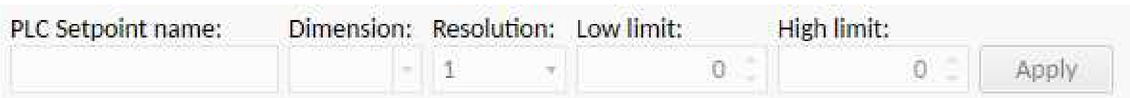


Image 8.132 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 63

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10502	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		

Description

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

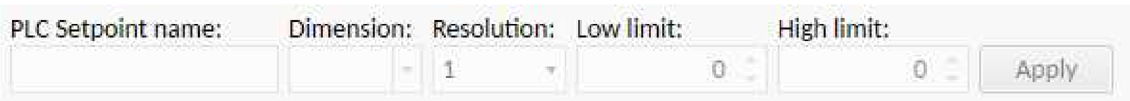


Image 8.133 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

PLC Setpoint 64

Setpoint group	PLC	**Related FW**	1.6.0
Range [units]	Depends on resolution of value [-]		
Default value	Depends on resolution of value [-]	**Alternative config**	NO
Step	Depends on resolution of value [-]		
Comm object	10503	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant setpoint is used in PLC		
Description			

Adjustable value for input in PLC logic.

Configuration of setpoint:

Configuration is made via configuration PC tool InteliConfig

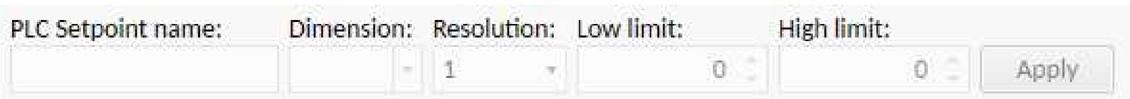


Image 8.134 Screen of configuration from InteliConfig

PLC Setpoint name	Name of the setpoint (0..32 characters)
Dimension	Dimension of value of the setpoint.
Resolution	Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit.
Low limit	The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.
High limit	The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint.

back to List of setpoints

8.1.3 Values

What values are:

Values (or quantities) are analog or binary data objects, measured or computed by the controller, that are intended for reading from the controller screen, PC, MODBUS, etc. Values are organized into groups according to their meaning.

For a full list of values go to the chapter **List of values (page 615)**.

Invalid flag

If valid data is not available for a particular value, the invalid flag is set to it. This situation may be due to the following:

- The value is not being evaluated in the scope of the current application and configuration.
- Sensor failure has been detected on an analog input.
- The configured ECU or extension module does not provide the particular value.
- The communication with the ECU or extension module is interrupted.

A value containing the invalid flag is displayed as "####" in InteliConfig and on the controller screen. If such a value is read out via MODBUS, it will contain the data 32768 in the case of signed values and 65535 in the case of unsigned values.

List of values

back to Controller objects

Group: Engine

DEF Level

Value group	Engine	**Related FW**	1.6.0
Units	%		
Comm object	14522	**Related applications**	MINT, SPtM
Description			
The level of diesel exhaust fluid tank.			

back to List of values

DPF Ash Load

Value group	Engine	**Related FW**	1.6.0
Units	%		
Comm object	12483	**Related applications**	MINT, SPtM
Description			
Indicates the ash load percentage of diesel particulate filter (DPF).			

back to List of values

DPF Soot Load

Value group	Engine	**Related FW**	1.6.0
Units	%		
Comm object	12484	**Related applications**	MINT, SPtM
Description			
Indicates the soot load percentage of diesel particulate filter (DPF).			

back to List of values

ECU AIN 1

Value group	Engine	**Related FW**	1.6.0
Units	Depends on ECU value		
Comm object	10153	**Related applications**	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

back to List of values

ECU AIN 2

Value group	Engine	**Related FW**	1.6.0
Units	Depends on ECU value		
Comm object	10154	**Related applications**	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. *Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

back to List of values

ECU AIN 3

Value group	Engine	**Related FW**	1.6.0
Units	Depends on ECU value		
Comm object	10155	**Related applications**	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. *Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

back to List of values

ECU AIN 4

Value group	Engine	**Related FW**	1.6.0
Units	Depends on ECU value		
Comm object	10156	**Related applications**	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. *Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

back to List of values

ECU AIN 5

Value group	Engine	**Related FW**	1.6.0
Units	Depends on ECU value		
Comm object	10157	**Related applications**	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. *Note: Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

back to List of values

ECU AIN 6

Value group	Engine	**Related FW**	1.6.0
Units	Depends on ECU value		
Comm object	10158	**Related applications**	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. *__Note:__ Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

back to List of values

ECU AIN 7

Value group	Engine	**Related FW**	1.6.0
Units	Depends on ECU value		
Comm object	10159	**Related applications**	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. *__Note:__ Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

back to List of values

ECU AIN 8

Value group	Engine	**Related FW**	1.6.0
Units	Depends on ECU value		
Comm object	10160	**Related applications**	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. *__Note:__ Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

back to List of values

ECU AIN 9

Value group	Engine	**Related FW**	1.6.0
Units	Depends on ECU value		
Comm object	10161	**Related applications**	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. *__Note:__ Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

back to List of values

ECU-AIN-EXT-1

Value group	Engine	**Related FW**	1.6.0
Units	Depends on ECU value		
Comm object	10173	**Related applications**	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

back to List of values

ECU Frequency Select

Value group	Engine	**Related FW**	1.6.0
Units	-		
Comm object	12926	**Related applications**	MINT, SPtM
Description			
Shows selected frequency of ECU. The value is calculated from setpoint **Nominal Frequency (page 271)** › If is **Nominal Frequency (page 271)** in range from 45 Hz to 54 Hz, is considered as 50 Hz application. The value is set to 0. › If is **Nominal Frequency (page 271)** in range from 55 Hz to 65 Hz, is considered as 60 Hz application. The value is set to 1.			

back to List of values

ECU State

Value group	Engine	**Related FW**	1.6.0
Units	-		
Comm object	10034	**Related applications**	MINT, SPtM
Description			
Shows binary status (0 or 1) of ECU: › ECU Yellow Lamp › ECU Red Lamp › Wait To Start			

back to List of values

RPM

Value group	Engine	**Related FW**	1.6.0
Units	RPM		
Comm object	10123	**Related applications**	MINT, SPtM
Description			
This value contains the current engine speed. The value is obtained from one of the following sources: › ECU, if an ECU is configured › Pickup input › Generator frequency			

back to List of values

Requested RPM

Value group	Engine	**Related FW**	1.6.0
Units	RPM		
Comm object	10006	**Related applications**	MINT, SPtM
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.			

back to List of values

Maintenance Timer 1 Runhours

Value group	Engine	**Related FW**	1.6.0
Units	hours		
Comm object	13853	**Related applications**	MINT, SPtM
Description			
Actual value of Maintenance Timer 1.			

back to List of values

Maintenance Timer 2 Runhours

Value group	Engine	**Related FW**	1.6.0
Units	hours		
Comm object	13854	**Related applications**	MINT, SPtM
Description			
Actual value of Maintenance Timer 2.			

back to List of values

Maintenance Timer 3 Runhours

Value group	Statistics	**Related FW**	1.6.0
Units	hours		
Comm object	13855	**Related applications**	MINT, SPtM
Description			
Actual value of Maintenance Timer 3.			

back to List of values

Maintenance Timer 1 Interval

Value group	Engine	**Related FW**	1.6.0
Units	hours		
Comm object	16387	**Related applications**	MINT, SPtM
Description			
Remaining value of Maintenance Timer 1.			

back to List of values

Maintenance Timer 2 Interval

Value group	Engine	**Related FW**	1.6.0
Units	hours		
Comm object	16388	**Related applications**	MINT, SPtM
Description			
Remaining value of Maintenance Timer 2.			

back to List of values

Maintenance Timer 3 Interval

Value group	Engine	**Related FW**	1.6.0
Units	hours		
Comm object	16389	**Related applications**	MINT, SPtM
Description			
Remaining value of Maintenance Timer 3.			

back to List of values

Group: Generator

Generator kW L1

Value group	Generator	**Related FW**	1.6.0
Units	kW		
Comm object	8524	**Related applications**	MINT, SPtM
Description			
Generator active power in phase L2. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator kW L2

Value group	Generator	**Related FW**	1.6.0
Units	kW		
Comm object	8525	**Related applications**	MINT, SPtM
Description			
Generator active power in phase L2. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator kW L3

Value group	Generator	**Related FW**	1.6.0
Units	kW		
Comm object	8526	**Related applications**	MINT, SPtM
Description			
Generator active power in phase L3. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator kVA

Value group	Generator	**Related FW**	1.6.0
Units	kVA		
Comm object	8565	**Related applications**	MINT, SPtM
Description			
Apparent power of generator. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator kVA L1

Value group	Generator	**Related FW**	1.6.0
Units	kVA		
Comm object	8530	**Related applications**	MINT, SPtM
Description			
Generator apparent power L1. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator kVA L2

Value group	Generator	**Related FW**	1.6.0
Units	kVA		
Comm object	8531	**Related applications**	MINT, SPtM
Description			
Generator apparent power L2. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator kVA L3

Value group	Generator	**Related FW**	1.6.0
Units	kVA		
Comm object	8532	**Related applications**	MINT, SPtM
Description			
Generator apparent power L3. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator kVAr L1

Value group	Generator	**Related FW**	1.6.0
Units	kVAr		
Comm object	8527	**Related applications**	MINT, SPtM
Description			
Generator reactive power in phase L1. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator kVAr L2

Value group	Generator	**Related FW**	1.6.0
Units	kVAr		
Comm object	8528	**Related applications**	MINT, SPtM
Description			
Generator reactive power in phase L2. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator kVAr L3

Value group	Generator	**Related FW**	1.6.0
Units	kVAr		
Comm object	8529	**Related applications**	MINT, SPtM
Description			
Generator reactive power in phase L3. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator Load Character

Value group	Generator	**Related FW**	1.6.0
Units	[-]		
Comm object	8395	**Related applications**	MINT, SPtM
Description			
Character of the generator load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

back to List of values

Generator Load Character L1

Value group	Generator	**Related FW**	1.6.0
Units	[-]		
Comm object	8626	**Related applications**	MINT, SPtM
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).			

back to List of values

Generator Load Character L2

Value group	Generator	**Related FW**	1.6.0
Units	[-]		
Comm object	8627	**Related applications**	MINT, SPtM
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).			

back to List of values

Generator Load Character L3

Value group	Generator	**Related FW**	1.6.0
Units	[-]		
Comm object	8628	**Related applications**	MINT, SPtM
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).			

back to List of values

Generator Voltage THD L1

Value group	Generator	**Related FW**	1.6.0
Units	%		
Comm object	16052	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Voltage L1-N (page 629)**.			

back to List of values

Generator Voltage THD L1-L2

Value group	Generator	**Related FW**	1.6.0
Units	%		
Comm object	16119	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Voltage L1-L2 (page 629)**.			

back to List of values

Generator Voltage THD L2

Value group	Generator	**Related FW**	1.6.0
Units	%		
Comm object	16053	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Voltage L2-N (page 630)**.			

back to List of values

Generator Voltage THD L2-L3

Value group	Generator	**Related FW**	1.6.0
Units	%		
Comm object	16120	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Voltage L2-L3 (page 630)**.			

back to List of values

Generator Voltage THD L3

Value group	Generator	**Related FW**	1.6.0
Units	%		
Comm object	16054	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Voltage L3-N (page 630)**.			

back to List of values

Generator Voltage THD L3-L1

Value group	Generator	**Related FW**	1.6.0
Units	%		
Comm object	16121	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Voltage L3-L1 (page 630)**.			

back to List of values

Generator Power Factor L1

Value group	Generator	**Related FW**	1.6.0
Units	[-]		
Comm object	8533	**Related applications**	MINT, SPtM
Description			
Generator power factor in phase L1.			

back to List of values

Generator Power Factor L2

Value group	Generator	**Related FW**	1.6.0
Units	[-]		
Comm object	8534	**Related applications**	MINT, SPtM
Description			
Generator power factor in phase L2.			

back to List of values

Generator Power Factor L3

Value group	Generator	**Related FW**	1.6.0
Units	[-]		
Comm object	8535	**Related applications**	MINT, SPtM
Description			
Generator power factor in phase L3.			

back to List of values

Generator Frequency

Value group	Generator	**Related FW**	1.6.0
Units	Hz		
Comm object	8210	**Related applications**	MINT, SPtM
Description			
Frequency of generator.			

back to List of values

Generator Voltage L1-L2

Value group	Generator	**Related FW**	1.6.0
Units	V		
Comm object	9628	**Related applications**	MINT, SPtM
Description			
Generator phase to phase voltage between L1 and L2 phases.			

back to List of values

Generator Voltage L1-N

Value group	Generator	**Related FW**	1.6.0
Units	V		
Comm object	8192	**Related applications**	MINT, SPtM
Description			
Generator voltage on phase 1.			

back to List of values

Generator Voltage L2-L3

Value group	Generator	**Related FW**	1.6.0
Units	V		
Comm object	9629	**Related applications**	MINT, SPtM
Description			
Generator phase to phase voltage between L2 and L3 phases.			

back to List of values

Generator Voltage L2-N

Value group	Generator	**Related FW**	1.6.0
Units	V		
Comm object	8193	**Related applications**	MINT, SPtM
Description			
Generator voltage on phase 2.			

back to List of values

Generator Voltage L3-L1

Value group	Generator	**Related FW**	1.6.0
Units	V		
Comm object	9630	**Related applications**	MINT, SPtM
Description			
Generator phase to phase voltage between L3 and L1 phases.			

back to List of values

Generator Voltage L3-N

Value group	Generator	**Related FW**	1.6.0
Units	V		
Comm object	8194	**Related applications**	MINT, SPtM
Description			
Generator voltage on phase 3.			

back to List of values

Generator Current THD L1

Value group	Generator	**Related FW**	1.6.0
Units	%		
Comm object	16056	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Current L1 (page 631)**.			

back to List of values

Generator Current THD L2

Value group	Generator	**Related FW**	1.6.0
Units	%		
Comm object	16057	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Current L2 (page 631)**.			

back to List of values

Generator Current THD L3

Value group	Generator	**Related FW**	1.6.0
Units	%		
Comm object	16058	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Current L3 (page 632)**.			

back to List of values

Generator Current L1

Value group	Generator	**Related FW**	1.6.0
Units	A		
Comm object	8198	**Related applications**	MINT, SPtM
Description			
Current phase L1 of Generator. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator Current L2

Value group	Generator	**Related FW**	1.6.0
Units	A		
Comm object	8199	**Related applications**	MINT, SPtM
Description			
Current phase L2 of Generator. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Generator Current L3

Value group	Generator	**Related FW**	1.6.0
Units	A		
Comm object	8200	**Related applications**	MINT, SPtM
Description			
Current phase L3 of Generator.			

Note: *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*

back to List of values

Slip Frequency

Value group	Generator	**Related FW**	1.6.0
Units	Hz		
Comm object	8224	**Related applications**	MINT, SPtM
Description			
Slip frequency during synchronization.			

back to List of values

Slip Angle

Value group	Generator	**Related FW**	1.6.0
Units	°		
Comm object	8225	**Related applications**	MINT, SPtM
Description			
Slip angle during synchronization.			

back to List of values

Nominal Current

Value group	Generator	**Related FW**	1.6.0
Units	A		
Comm object	9978	**Related applications**	MINT, SPtM
Description			
Generator nominal current.			

back to List of values

Nominal Power

Value group	Generator	**Related FW**	1.6.0
Units	V		
Comm object	9018	**Related applications**	MINT, SPtM
Description			
Generator nominal power.			

back to List of values

Nominal Voltage

Value group	Generator	**Related FW**	1.6.0
Units	V		
Comm object	9917	**Related applications**	MINT, SPtM
Description			
Generator nominal voltage.			

back to List of values

Earth Fault Current

Value group	Generator	**Related FW**	1.6.0
Units	A		
Comm object	14325	**Related applications**	MINT, SPtM
Description			
Measured value of fault for evaluation of earth fault protection.			

back to List of values

Group: Load

Load kW

Value group	Load	**Related FW**	1.6.0
Units	kW		
Comm object	8202	**Related applications**	MINT, SPtM
Description			
Load active power. ***Note:*** *This value stands for Generator kW as well.* ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Load kVAr

Value group	Load	**Related FW**	1.6.0
Units	kVAr		
Comm object	8203	**Related applications**	MINT, SPtM
Description			
Load reactive power. ***Note:*** *This value stands for Generator kVAr as well.* ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Load Power Factor

Load	Load	**Related FW**	1.6.0
Units	[-]		
Comm object	8204	**Related applications**	MINT, SPtM
Description			
Generator power factor. ***Note:*** *This value stands for Generator Power Factor as well.*			

back to List of values

Load Character

Value group	Load	**Related FW**	1.6.0
Units	[-]		
Comm object	9026	**Related applications**	MINT, SPtM
Description			
Character of the load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

back to List of values

Group: Mains/Bus

Mains Frequency

Value group	Mains/Bus	**Related FW**	1.6.0
Units	Hz		
Comm object	8211	**Related applications**	MINT, SPtM
Description			
Frequency of Mains.			

back to List of values

Mains Voltage L1-L2

Value group	Mains/Bus	**Related FW**	1.6.0
Units	V		
Comm object	9631	**Related applications**	MINT, SPtM
Description			
Mains phase to phase voltage between L1 and L2 phases.			

back to List of values

Mains Voltage L1-N

Value group	Mains/Bus	**Related FW**	1.6.0
Units	V		
Comm object	8195	**Related applications**	MINT, SPtM
Description			
Mains voltage on phase 1.			

back to List of values

Mains Voltage L2-L3

Value group	Mains/Bus	**Related FW**	1.6.0
Units	V		
Comm object	9632	**Related applications**	MINT, SPtM
Description			
Mains phase to phase voltage between L2 and L3 phases.			

back to List of values

Mains Voltage L2-N

Value group	Mains/Bus	**Related FW**	1.6.0
Units	V		
Comm object	8196	**Related applications**	MINT, SPtM
Description			
Mains voltage on phase 2.			

back to List of values

Mains Voltage L3-L1

Value group	Mains/Bus	**Related FW**	1.6.0
Units	V		
Comm object	9633	**Related applications**	MINT, SPtM
Description			
Mains phase to phase voltage between L3 and L1 phases.			

back to List of values

Mains Voltage L3-N

Value group	Mains/Bus	**Related FW**	1.6.0
Units	V		
Comm object	8197	**Related applications**	MINT, SPtM
Description			
Mains voltage on phase 3.			

back to List of values

Mains L1/Aux Current

Value group	Mains/Bus	**Related FW**	1.6.0
Units	V		
Comm object	8208	**Related applications**	MINT, SPtM
Description			
SPtM – Mains current in phase L1 MINT – Auxiliary current			

back to List of values

Mains Import kW

Value group	Mains/Bus	**Related FW**	1.6.0
Units	kW		
Comm object	8703	**Related applications**	SPtM
Description			
Imported kW from Mains.			

back to List of values

Mains Import kVAr

Value group	Mains/Bus	**Related FW**	1.6.0
Units	kVAr		
Comm object	8704	**Related applications**	SPtM
Description			
Imported kVAr from mains.			

back to List of values

Mains Power Factor

Value group	Mains/Bus	**Related FW**	1.6.0
Units	Hz		
Comm object	8705	**Related applications**	SPtM
Description			
Mains power factor.			

back to List of values

Mains Load Character

Value group	Mains/Bus	**Related FW**	1.6.0
Units	Hz		
Comm object	8709	**Related applications**	SPtM
Description			
Character of Mains load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

back to List of values

Mains Voltage THD L1

Value group	Mains/Bus	**Related FW**	1.6.0
Units	%		
Comm object	16060	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Mains Voltage L1-N (page 635)**.			

back to List of values

Mains Voltage THD L1-L2

Value group	Mains/Bus	**Related FW**	1.6.0
Units	%		
Comm object	16122	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Mains Voltage L1-L2 (page 635)**.			

back to List of values

Mains Voltage THD L2

Value group	Mains/Bus	**Related FW**	1.6.0
Units	%		
Comm object	16061	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Mains Voltage L2-N (page 635)**.			

back to List of values

Mains Voltage THD L2-L3

Value group	Mains/Bus	**Related FW**	1.6.0
Units	%		
Comm object	16123	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Mains Voltage L2-L3 (page 635)**.			

back to List of values

Mains Voltage THD L3

Value group	Mains/Bus	**Related FW**	1.6.0
Units	%		
Comm object	16063	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Mains Voltage L3-N (page 636)**.			

back to List of values

Mains Voltage THD L3-L1

Value group	Mains/Bus	**Related FW**	1.6.0
Units	%		
Comm object	16124	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Mains Voltage L3-L1 (page 635)**.			

back to List of values

Mains Current THD L1

Value group	Mains/Bus	**Related FW**	1.6.0
Units	%		
Comm object	16064	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Mains L1/Aux Current (page 636)**.			

back to List of values

Max Vector Shift

Value group	Mains/Bus	**Related FW**	1.6.0
Units	Hz		
Comm object	9847	**Related applications**	SPtM
Description			
This is maximal measured value of vector shift of the generator voltage. It is set to zero always when Controller goes to parallel to mains operation (When Vector Shift Protection = PARALLEL ONLY) or when MCB gets closed (when Vector shift protection = ENABLED).			

back to List of values

Group: Power Management

Engine Priority

Value group	Power Management	**Related FW**	1.6.0
Units	Hz		
Comm object	8624	**Related applications**	MINT
Description			
This value shows current priority number. It corresponds to the setpoint **Priority (page 375)** except following situations: - If at least one of binary inputs **TOP PRIORITY (PAGE 736)** is configured on some source and is active - **#Priority Auto Swap (page 376)** is active			

back to List of values

Actual Reserve

Value group	Power Management	**Related FW**	1.6.0
Units	kW		
Comm object	15805	**Related applications**	MINT
Description			
Actual absolute reserve in power management.			

back to List of values

Actual Relative Reserve

Value group	Power Management	**Related FW**	1.6.0
Units	%		
Comm object	10788	**Related applications**	MINT
Description			
Actual relative reserve in power management.			

back to List of values

Active Power Required

Value group	Power Management	**Related FW**	1.6.0
Units	kW		
Comm object	8663	**Related applications**	MINT, SPtM
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.			

back to List of values

Start Reserve

Value group	Power Management	**Related FW**	1.6.0
Units	kW		
Comm object	15806	**Related applications**	MINT
Description			
Actual absolute reserve for start.			

back to List of values

Stop Reserve

Value group	Power Management	**Related FW**	1.6.0
Units	kW		
Comm object	15807	**Related applications**	MINT
Description			
Actual absolute reserve – when the reserve is higher than this value the last started Gen-set (the Gen-set with the highest priority) is stopped.			

back to List of values

Dynamic Spinning Reserve

Value group	Power Management	**Related FW**	1.6.0
Units	-32768 .. 32767		
Comm object		**Related applications**	MINT
Description			

Dynamic Spinning Reserve – DSR is a value, which is used to influence standard power management operation by adding DSR to currently used starting and stopping thresholds given by parameters **#Starting Load Reserve 1 (page 378)**, **#Starting Load Reserve 2 (page 380)** and **#Stopping Load Reserve 1 (page 378)**, **#Stopping Load Reserve 2 (page 380)**.

Actual thresholds used by power management are then values **Start Reserve (page 640)** and **Stop Reserve (page 640)**. DSR is used by power management, if **Dynamic Spinning Reserve (page 374)** is set to ENABLED and valid value is received from the IS-NTC HYBRID controller. DSR is 0, if **Dynamic Spinning Reserve (page 374)** is set to DISABLED or the value received from the IS-NTC HYBRID controller is invalid (#####).

> **Example:** Power management operates with **#Starting Load Reserve 1 (page 378)** = 100 kW and **#Stopping Load Reserve 1 (page 378)** = 200 kW. DSR value received from the IS-NTC HYBRID controller is 50 kW. It means that actual starting threshold **Start Reserve (page 640)** is 150 kW and actual stopping threshold **Stop Reserve (page 640)** is 250 kW.

***Note:** DSR is used by power management only when it operates in the absolute mode (**#Power Management Mode (page 374)** is set to ABS (kW)).*

***Note:** DSR is received automatically from the IS-NTC HYBRID controller via CAN2 bus.*

back to List of values

Dynamic Spinning Reserve Offset

Value group	Power Management	**Related FW**	1.6.0
Units	-32 768 .. 32 767		
Comm object		**Related applications**	MINT
Description			

Dynamic Spinning Reserve Offset – DSRO is a value, which is used to influence standard power management operation by adding DSRO together with **Dynamic Spinning Reserve (page 640)** to currently used stopping threshold given by parameter **#Stopping Load Reserve 1 (page 378)**, **#Stopping Load Reserve 2 (page 380)**, #LoadResStop 3 or #LoadResStop 4.

Actual threshold used by power management is then value **Stop Reserve (page 640)**. DSRO is used by power management, if **Dynamic Spinning Reserve (page 374)** is set to ENABLED and valid value is received from the IS-NTC HYBRID controller. DSRO is 0, if **Dynamic Spinning Reserve (page 374)** is set to DISABLED or the value received from the IS-NTC HYBRID controller is invalid (#####).

> **Example:** Power management operates with **#Stopping Load Reserve 1 (page 378)** = 200 kW. DSRO received from the IS-NTC HYBRID controller is 20 kW and DSR value received from the IS-NTC HYBRID controller is 50 kW. It means that actual stopping threshold **Stop Reserve (page 640)** is 270 kW (**#Stopping Load Reserve 1 (page 378)** + **Dynamic Spinning Reserve (page 640)** + **Dynamic Spinning Reserve Offset (page 641)** = 200 + 50 + 20 = 270).

Note: *DSRO is used by power management only when it operates in the absolute mode (**#Power Management Mode (page 374)** is set to ABS (kW)).*

Note: *DSRO is received automatically from the IS-NTC HYBRID controller via CAN2 bus.*

back to List of values

Start Relative Reserve

Value group	Power Management	**Related FW**	1.6.0
Units	%		
Comm object	10786	**Related applications**	MINT
Description			
Actual relative reserve for start.			

back to List of values

Stop Relative Reserve

Value group	Power Management	**Related FW**	1.6.0
Units	%		
Comm object	10787	**Related applications**	MINT
Description			
Actual relative reserve – when the relative reserve is higher than this value the last started Gen-set (the Gen-set with the highest priority) is stopped.			

back to List of values

Actual Active Power In PM

Value group	Power Management	**Related FW**	1.6.0
Units	kW		
Comm object	10657	**Related applications**	MINT
Description			
Actual value of active power from all Gen-sets running in power management.			

back to List of values

Actual Reactive Power In PM

Value group	Power Management	**Related FW**	1.6.0
Units	kVAr		
Comm object	10656	**Related applications**	MINT
Description			
Actual value of reactive power from all Gen-sets running in power management.			

back to List of values

Running Nominal Power In PM

Value group	Power Management	**Related FW**	1.6.0
Units	kW		
Comm object	10658	**Related applications**	MINT
Description			
Actual nominal power of all Gen-sets in power management, which are running.			

back to List of values

Running Nominal Power Of All

Value group	Power Management	**Related FW**	1.6.0
Units	kW		
Comm object	10999	**Related applications**	MINT
Description			
Actual nominal power of all Gen-sets, which are running.			

back to List of values

Available Nominal Power

Value group	Power Management	**Related FW**	1.6.0
Units	kW		
Comm object	10998	**Related applications**	MINT
Description			
Available nominal power of all Gen-sets in power management.			

back to List of values

Minimal Running Nominal Power

Value group	Power Management	**Related FW**	1.6.0
Units	kW		
Comm object	10012	**Related applications**	MINT
Description			
Actual minimal nominal power of all Gen-sets, which are running.			

back to List of values

Actual Power Band

Value group	Power Management	**Related FW**	1.6.0
Units	-		
Comm object	8974	**Related applications**	MINT
Description			
State of all Gen-sets in actual power band of power management. 1 means that Gen-set is running, 0 means that Gen-set is stopped. ***Note:*** *This value is evaluated only in controller with the lowest CAN address.*			

back to List of values

Next Power Band

Value group	Power Management	**Related FW**	1.6.0
Units	-		
Comm object	8975	**Related applications**	MINT
Description			
State of all Gen-sets in next higher power band of power management. 1 means that Gen-set is running, 0 means that Gen-set is stopped. ***Note:*** *This value is evaluated only in controller with the lowest CAN address.*			

back to List of values

Group: Speed/Load Control

Active Power Required

Value group	Speed/Load Control	**Related FW**	1.6.0
Units	kW		
Comm object	8663	**Related applications**	MINT, SPtM
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.			

back to List of values

Speed Regulator Output

Value group	Speed/Load Control	**Related FW**	1.6.0
Units	Hz		
Comm object	9052	**Related applications**	MINT, SPtM
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 10 V ~ 100 % PWM. -10 V is 0 % PWM			

back to List of values

Speed Request

Value group	Speed/Load Control	**Related FW**	1.6.0
Units	%		
Comm object	10137	**Related applications**	MINT, SPtM
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 %.			

back to List of values

Requested RPM

Value group	Engine	**Related FW**	1.6.0
Units	RPM		
Comm object	10006	**Related applications**	MINT, SPtM
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.			

back to List of values

Group: Voltage/PF Control

Reactive Power Required

Value group	Voltage/PF Control	**Related FW**	1.6.0
Units	kVAr		
Comm object	12877	**Related applications**	MINT, SPtM
Description			
Requested reactive power.			

back to List of values

Voltage Regulator Output

Value group	Voltage/PF Control	**Related FW**	1.6.0
Units	V		
Comm object	9053	**Related applications**	MINT, SPtM
Description			
Actual voltage between the AVR OUT and AVR COM terminals.			

back to List of values

Voltage Request

Value group	Voltage/PF Control	**Related FW**	1.6.0
Units	%		
Comm object	14997	**Related applications**	MINT, SPtM
Description			
Internal Voltage request of internal Voltage regulator.			

back to List of values

Group: Controller I/O

E-Stop

Value group	Controller I/O	**Related FW**	1.6.0
Units	%		
Comm object	15780	**Related applications**	MINT, SPtM
Description			
Shows number of E-STOP input – the same principle of visualization like binary inputs. Principle of value (principle of normally close binary input): › 1 – E-STOP has voltage – state is OK › 0 – E-STOP has no voltage – protection is active			

back to List of values

Analog Input 1

Value group	Controller I/O	**Related FW**	1.6.0
Units	Configurable		
Comm object	9151	**Related applications**	MINT, SPtM
Description			
This is the value of the analog input 1 of the controller.			

back to List of values

Analog Input 2

Value group	Controller I/O	**Related FW**	1.6.0
Units	Configurable		
Comm object	9152	**Related applications**	MINT, SPtM
Description			
This is the value of the analog input 2 of the controller.			

back to List of values

Analog Input 3

Value group	Controller I/O	**Related FW**	1.6.0
Units	Configurable		
Comm object	9153	**Related applications**	MINT, SPtM
Description			
This is the value of the analog input 3 of the controller.			

back to List of values

Analog Input 4

Value group	Controller I/O	**Related FW**	1.6.0
Units	Configurable		
Comm object	9154	**Related applications**	MINT, SPtM
Description			
This is the value of the analog input 4 of the controller.			

back to List of values

Battery Volts

Value group	Controller I/O	**Related FW**	1.6.0
Units	V		
Comm object	8213	**Related applications**	MINT, SPtM
Description			
Controller supply voltage.			

back to List of values

Binary Inputs

Value group	Controller I/O	**Related FW**	1.6.0
Units	[-]		
Comm object	8235	**Related applications**	MINT, SPtM
Description			
State of the binary inputs of the controller.			

back to List of values

Binary Outputs

Value group	Controller I/O	**Related FW**	1.6.0
Units	[-]		
Comm object	8239	**Related applications**	MINT, SPtM
Description			
State of the binary outputs of the controller.			

back to List of values

D+

Value group	Controller I/O	**Related FW**	1.6.0
Units	V		
Comm object	10603	**Related applications**	MINT, SPtM
Description			
D+ terminal voltage.			

back to List of values

Group: Statistics

Genset kVArh

Value group	Statistics	**Related FW**	1.6.0
Units	kVArh		
Comm object	8539	**Related applications**	MINT, SPtM
Description			
Counter of Gen-set reactive power. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Genset kWh

Value group	Statistics	**Related FW**	1.6.0
Units	kWh		
Comm object	8205	**Related applications**	MINT, SPtM
Description			
Counter of Gen-set active power. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Mains kVArh

Value group	Statistics	**Related FW**	1.6.0
Units	kVArh		
Comm object	11026	**Related applications**	MINT, SPtM
Description			
Counter of mains reactive power. ***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.*			

back to List of values

Num E-Stops

Value group	Statistics	**Related FW**	1.6.0
Units	[-]		
Comm object	11195	**Related applications**	MINT, SPtM
Description			
Emergency stop alarms counter.			

back to List of values

Num Starts

Value group	Statistics	**Related FW**	1.6.0
Units	[-]		
Comm object	8207	**Related applications**	MINT, SPtM
Description			
Engine start commands counter. The counter is increased by 1 even if the particular start command will take more than one attempt.			

back to List of values

Maintenance 1

Value group	Statistics	**Related FW**	1.6.0
Units	hours		
Comm object	11616	**Related applications**	MINT, SPtM
Description			
Countdown until next maintenance 1.			

back to List of values

Maintenance 2

Value group	Statistics	**Related FW**	1.6.0
Units	hours		
Comm object	11617	**Related applications**	MINT, SPtM
Description			
Countdown until next maintenance 2.			

back to List of values

Maintenance 3

Value group	Statistics	**Related FW**	1.6.0
Units	hours		
Comm object	11618	**Related applications**	MINT, SPtM
Description			
Countdown until next maintenance 3.			

back to List of values

Maintenance 4

Value group	Statistics	**Related FW**	1.6.0
Units	days		
Comm object	16387	**Related applications**	MINT, SPtM
Description			
Countdown until next maintenance 4.			

back to List of values

Maintenance 5

Value group	Statistics	**Related FW**	1.6.0
Units	days		
Comm object	16388	**Related applications**	MINT, SPtM
Description			
Countdown until next maintenance 5.			

back to List of values

Maintenance 6

Value group	Statistics	**Related FW**	1.6.0
Units	days		
Comm object	16389	**Related applications**	MINT, SPtM
Description			
Countdown until next maintenance 6.			

back to List of values

Rental 1

Value group	Statistics	**Related FW**	1.6.0
Units	hours		
Comm object	14328	**Related applications**	MINT, SPtM
Description			
Remaining hours of **Rental Timer 1 (page 490)**.			

back to List of values

Rental 2

Value group	Statistics	**Related FW**	1.6.0
Units	days		
Comm object	14369	**Related applications**	MINT, SPtM
Description			
Remaining days of **Rental Timer 2 (page 492)**.			

back to List of values

Running Hours

Value group	Statistics	**Related FW**	1.6.0
Units	hours		
Comm object	8206	**Related applications**	MINT, SPtM
Description			
Engine operation hours counter. The engine hours are incremented in the controller while the engine is running. ***Note:*** *If an ECU is configured and it provides engine hours value, the value is taken from the ECU.*			

back to List of values

Shutdowns

Value group	Statistics	**Related FW**	1.6.0
Units	[-]		
Comm object	11196	**Related applications**	MINT, SPtM
Description			
Shutdown alarms counter. This counter counts all occurrences of a shutdown alarm, not only real shutdowns of the Gen-set, i.e. the counter is increased by 2 if two shutdown alarms appear simultaneously.			

back to List of values

Time Till Empty 1

Value group	Statistics	**Related FW**	1.6.0
Units	days		
Comm object	13770	**Related applications**	MINT, SPtM
Description			
Assessment in days when the fuel tank will be empty. ***Note:*** *This value is based on setpoint* ***Fuel Tank Volume (page 325)*** *and value from ECU Fuel Rate. For correct calculation of this value is necessary to have configured ECU which send Fuel Rate value, otherwise this value can't be calculated.*			

back to List of values

Time Till Empty 2

Value group	Statistics	**Related FW**	1.6.0
Units	hours		
Comm object	13771	**Related applications**	MINT, SPtM
Description			
Assessment in hours when the fuel tank will be empty. ***Note:*** *This value is based on setpoint* ***Fuel Tank Volume (page 325)*** *and value from ECU Fuel Rate. For correct calculation of this value is necessary to have configured ECU which send Fuel Rate value, otherwise this value can't be calculated.*			

back to List of values

Time Till Empty 3

Value group	Statistics	**Related FW**	1.6.0
Units	minutes		
Comm object	13772	**Related applications**	MINT, SPtM
Description			
Assessment in minutes when the fuel tank will be empty. ***Note:*** *This value is based on setpoint* ***Fuel Tank Volume (page 325)*** *and value from ECU Fuel Rate. For correct calculation of this value is necessary to have configured ECU which send Fuel Rate value, otherwise this value can't be calculated.*			

back to List of values

Total Fuel Consumption

Value group	Statistics	**Related FW**	1.6.0
Units	L		
Comm object	9040	**Related applications**	MINT, SPtM
Description			
Value containing total amount of consumed fuel by engine. The controller automatically updates this value every 30 s. The controller can calculate it in three ways: › Direct reading from ECU › Calculation based on actual fuel consumption reading from ECU › Calculation from fuel level drop in tank (using Fuel Level Analog Input + **Fuel Tank Volume (page 325)** setpoint) ***Note:*** *The accuracy of Total Fuel Consumption depends on the precision of ECU values or precision of* ***Fuel Tank Volume (page 325)*** *and fuel level sensor.*			

back to List of values

Group: Info

Application Mode

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	14446	**Related applications**	MINT, SPtM
Description			
This Value mirrors the active application in the controller. The intend of use it is to display the value of the active application in InteliConfig or at the screen of the controller.			

back to List of values

Load Shedding Status

Value group	IL Info Load shedding	**Related FW**	1.6.0
Units	[-]		
Comm object	9591	**Related applications**	MINT, SPtM
Description			
The value contains actual "load shedding stage". The Value can get the values of the range 0 to 5, where 0 means no load shedding stage is active and 1, 2, 3, 4 or 5 means that the corresponding load shedding stage is active.			

back to List of values

Engine State

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	9244	**Related applications**	MINT, SPtM
Description			
The value contains actual "engine state" message which is shown on the main screen of the controller.			

back to List of values

Breaker State

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	9245	**Related applications**	MINT, SPtM
Description			
The value contains actual "breaker state" message which is shown on the main screen of the controller.			

back to List of values

Timer Text

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	10040	**Related applications**	MINT, SPtM
Description			
The value contains the numeric code of the "Current process timer" text which is shown on the main screen of the controller. The assignment of texts to the codes can be obtained using InteliConfig. Open any connection (also offline with a previously saved archive) and go to the Tools ribbon -> Generate CFG image (all). The resulting file will contain the assignment of texts to the codes.			

back to List of values

Connection Type

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	12944	**Related applications**	MINT, SPtM
Description			
The text of this value represents the connection type which is adjusted in setpoint **Connection type (page 264)**.			

back to List of values

SPI Module A

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	14447	**Related applications**	MINT, SPtM
Description			
The name of plug-in module which is inserted in slot A.			

back to List of values

SPI Module B

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	14448	**Related applications**	MINT, SPtM
Description			
The name of plug-in module which is inserted in slot B.			

back to List of values

Timer Value

Value group	IL Info	**Related FW**	1.6.0
Units	[HH:MM:SS]		
Comm object	14147	**Related applications**	MINT, SPtM
Description			
The value contains the "Current process timer" value which is shown on the main screen of the controller.			

back to List of values

ID String

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	24501	**Related applications**	MINT, SPtM
Description			
Name of controller which is used in InteliConfig in command bar.			

back to List of values

FW Version

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	24339	**Related applications**	MINT, SPtM
Description			
Major and minor firmware version number.			

back to List of values

Application

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	8480	**Related applications**	MINT, SPtM
Description			
The value contains actual application in controller.			

back to List of values

FW Branch

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	8707	**Related applications**	MINT, SPtM
Description			
The value contains actual branch of firmware in controller.			

back to List of values

Password Decode

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	24202	**Related applications**	MINT, SPtM
Description			
This value contains a number which can be used for retrieving a lost password. Send this number together with the controller serial number to your distributor if you have lost your password.			

back to List of values

CAN16

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	8546	**Related applications**	MINT, SPtM
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.			

back to List of values

CAN32

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	8827	**Related applications**	MINT, SPtM
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.			

back to List of values

Reg16

Value group	IL Info	**Related FW**	1.6.0
Units	-		
Comm object	11081	**Related applications**	MINT, SPtM
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.			

back to List of values

Reg32

Value group	IL Info	**Related FW**	1.6.0
Units	-		
Comm object	11082	**Related applications**	MINT, SPtM
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.			

back to List of values

Gen Loaded 16

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	10196	**Related applications**	MINT, SPtM
Description			
Bits of this value show "1" if the controller which has address corresponding with the bit position is loaded (GCB closed). Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16.			

back to List of values

Gen Loaded 32

Value group	IL Info	**Related FW**	1.6.0
Units	[-]		
Comm object	10197	**Related applications**	MINT, SPtM
Description			
Bits of this value show "1" if the controller which has address corresponding with the bit position is loaded (GCB closed). Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32.			

back to List of values

Group: Log Bout

Log Bout 1

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	9143	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 2

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	9144	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 3

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	9145	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 4

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	9146	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 5

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	9147	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 6

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	9148	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 7

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	9149	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 8

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	9150	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 9

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	11896	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 10

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	11897	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 11

Value group	Log Bout	**Related FW**	1.6.0
Units	[-]		
Comm object	11898	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Group: CM-Ethernet

AirGate Status

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24344	**Related applications**	MINT, SPtM
Description			
Diagnostic code for AirGate connection. Helps in troubleshooting.			

Code	Description
0	SIM card is not inserted
1	Controller registered, waiting for authorization
2	Not possible to register, controller blacklisted
3	Not possible to register, server has no more capacity
4	Not possible to register, other reason
5	Controller registered and authorized

back to List of values

AirGate ID

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24345	**Related applications**	MINT, SPtM
Description			
Identification string generated by AirGate server for the purpose of establishing communication via InteliConfig or any other supported PC tool.			

back to List of values

Primary DNS

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24181	**Related applications**	MINT, SPtM
Description			
Current domain name server.			

back to List of values

Secondary DNS

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24100	**Related applications**	MINT, SPtM
Description			
Backup domain name server.			

back to List of values

ETH Interface Status

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24180	**Related applications**	MINT, SPtM
Description			
Current status of ethernet communication.			

back to List of values

Ethernet PHY Mode

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24088	**Related applications**	MINT, SPtM
Description			

Ethernet interface mode:

10- HD	10 Mbit Half-Duplex
10- FD	10 Mbit Full-Duplex
100- HD	100 Mbit Half-Duplex
10- FD	100 Mbit Full-Duplex

back to List of values

Current Gateway

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24182	**Related applications**	MINT, SPtM
Description			
Current gateway address.			

back to List of values

Current IP Address

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24184	**Related applications**	MINT, SPtM
Description			
Current IP address of the controller.			

back to List of values

Last Email Results

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24332	**Related applications**	MINT, SPtM
Description			
Result of last email, which was sent by controller.			

Code	Description
0	Email was successfully sent.
2	It is not possible to establish connection with SMTP server.
3	SMTP server is not ready for communication.
8	HELO command was refused.
9	EHLO command was refused.
11	AUTH LOGIN command was refused.
12	Wrong user name.
13	Wrong password.
14	MAIL FROM command was refused.
15	RCPT TO command was refused.
16	DATA command was refused.
17	Sending of email failed.
20	QUIT command was refused.
25	It is impossible to create data for command DATA.
26	It is impossible to read data for command DATA.
27	Email address can't be read.
30	SMTP server address translation error (from DNS server).
31	Error reading email content data (24327).

back to List of values

MAC Address

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24333	**Related applications**	MINT, SPtM
Description			
Current MAC address of the controller ethernet interface.			

back to List of values

Current Subnet Mask

Value group	CM-Ethernet	**Related FW**	1.6.0
Units	[-]		
Comm object	24183	**Related applications**	MINT, SPtM
Description			
Current subnet mask.			

back to List of values

Group: CM-GPRS

AirGate Status

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24308	**Related applications**	MINT, SPtM
Description			
Diagnostic code for AirGate connection. Helps in troubleshooting.			

AirGate Diag – Diagnostic Code for AirGate connection

Code	Description
0	Waiting for connection to AirGate Server
1	Controller registered, waiting for authorization
2	Not possible to register, controller blacklisted
3	Not possible to register, server has no more capacity
4	Not possible to register, other reason
5	Controller registered and authorized

back to List of values

AirGate ID

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24309	**Related applications**	MINT, SPtM
Description			
Identification string generated by AirGate server for the purpose of establishing communication via InteliConfig or any other supported PC tool.			

back to List of values

Connection Type

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24146	**Related applications**	MINT, SPtM
Description			
The type of data connection.			

back to List of values

Cell Diag Codes

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	1.6.0
Units	[-]		
Comm object	24288	**Related applications**	MINT, SPtM

Description
Diagnostic code for the CM-GPRS or CM-4G-GPS module.

GSM Diag Code – Common list of diagnostic codes for cellular modules

Code	Description
0	OK. No error.
1	Not possible to hang up.
2	Modul is switched off
3	Module is switched on
4	Module – error in initialization
5	Module – not possible to set the APN
6	Module – not possible to connect to GPRS network
7	Module – not possible to retrieve IP address
8	Module – not accepted DNS IP address
9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected
19	No CDMA network
20	Unsuccessful registration to CDMA network
21	SIMCom/ME909s: can´t read FW version
22	SIMCom: GSM signal not found
23	SIMCom: can´t detect module speed
24	SIMCom: HW reset issued
25	PUK is required
26	Error of SIM card detected
27	ME909s: can't set module bps
28	ME909s: can't set link configuration
29	ME909s: can't do power-off
30	ME909s: can't do power-on
31	ME909s: can't do hardware reset
32	ME909s: ME909s not started

33	ME909s: switch off issued
34	ME909s: switch on issued
35	ME909s: HW reset issued
36	ME909s: can't switch echo off
37	ME909s: can't find out state of registration
38	ME909s: GSM signal not found
39	ME909s: no SIM memory for SMS
40	ME909s: waiting for registration
41	Can't read operator name
42	ME909s: can't set flow control
43	APN not typed
255	Only running communication is needed to indicate

back to List of values

Cell Error Rate

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	1.6.0
Units	%		
Comm object	24300	**Related applications**	MINT, SPtM
Description			
This value contains information about relative quality of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. The lower value means higher quality of signal.			

back to List of values

Cell Signal Lev

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	%		
Comm object	24302	**Related applications**	MINT, SPtM
Description			
This value contains information about relative strength of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. It is a relative value helping to find the best signal and for troubleshooting cases.			

back to List of values

Cell Status

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24290	**Related applications**	MINT, SPtM
Description			
The text of this value represents the status of the GSM modem.			

back to List of values

Last Email Result

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24307	**Related applications**	MINT, SPtM
Description			

Result of last email, which was sent by controller.

Code	Description
0	Email was successfully sent.
2	It is not possible to establish connection with SMTP server.
3	SMTP server is not ready for communication.
4	Maximum length of data can’t be read.
5	No appeal to send command.
6	Command can’t be send.
7	Command can’t be send.
8	HELO command was refused.
11	AUTH LOGIN command was refused.
12	Wrong user name.
13	Wrong password.
14	MAIL FROM command was refused.
15	RCPT TO command was refused.
16	DATA command was refused.
17	Sending of email failed.
18	SMTP server refused the data of email.
19	SMTP server refused the data of email.
20	QUIT command was refused.
21	Lost of connection.
23	Error during closing the connection.
24	No answer from server.
25	It is impossible to create data for command DATA.
26	It is impossible to read data for command DATA.
28	Error of encoding.
29	There was no attempt to send email.

back to List of values

Operator

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24147	**Related applications**	MINT, SPtM
Description			
The name of operator which to SIM card is connected. ***Note:*** *If roaming service is used then prefix "R" is added before the name of operator.*			

back to List of values

Group: CM-4G-GPS

AirGate Status

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24308	**Related applications**	MINT, SPtM
Description			
Diagnostic code for AirGate connection. Helps in troubleshooting.			

AirGate Diag – Diagnostic Code for AirGate connection

Code	Description
0	Waiting for connection to AirGate Server
1	Controller registered, waiting for authorization
2	Not possible to register, controller blacklisted
3	Not possible to register, server has no more capacity
4	Not possible to register, other reason
5	Controller registered and authorized

back to List of values

AirGate ID

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24309	**Related applications**	MINT, SPtM
Description			
Identification string generated by AirGate server for the purpose of establishing communication via InteliConfig or any other supported PC tool.			

back to List of values

Connection Type

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24146	**Related applications**	MINT, SPtM
Description			
The type of data connection.			

back to List of values

Cell Diag Codes

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	1.6.0
Units	[-]		
Comm object	24288	**Related applications**	MINT, SPtM

Description
Diagnostic code for the CM-GPRS or CM-4G-GPS module.

GSM Diag Code – Common list of diagnostic codes for cellular modules

Code	Description
0	OK. No error.
1	Not possible to hang up.
2	Modul is switched off
3	Module is switched on
4	Module – error in initialization
5	Module – not possible to set the APN
6	Module – not possible to connect to GPRS network
7	Module – not possible to retrieve IP address
8	Module – not accepted DNS IP address
9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected
19	No CDMA network
20	Unsuccessful registration to CDMA network
21	SIMCom/ME909s: can´t read FW version
22	SIMCom: GSM signal not found
23	SIMCom: can´t detect module speed
24	SIMCom: HW reset issued
25	PUK is required
26	Error of SIM card detected
27	ME909s: can't set module bps
28	ME909s: can't set link configuration
29	ME909s: can't do power-off
30	ME909s: can't do power-on
31	ME909s: can't do hardware reset
32	ME909s: ME909s not started

33	ME909s: switch off issued
34	ME909s: switch on issued
35	ME909s: HW reset issued
36	ME909s: can't switch echo off
37	ME909s: can't find out state of registration
38	ME909s: GSM signal not found
39	ME909s: no SIM memory for SMS
40	ME909s: waiting for registration
41	Can't read operator name
42	ME909s: can't set flow control
43	APN not typed
255	Only running communication is needed to indicate

back to List of values

Cell Error Rate

Value group	CM-GPRS; CM-4G-GPS (4G part)	**Related FW**	1.6.0
Units	%		
Comm object	24300	**Related applications**	MINT, SPtM
Description			
This value contains information about relative quality of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. The lower value means higher quality of signal.			

back to List of values

Cell Signal Lev

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	%		
Comm object	24302	**Related applications**	MINT, SPtM
Description			
This value contains information about relative strength of the cellular signal received by the CM-GPRS module or by CM-4G-GPS module. It is a relative value helping to find the best signal and for troubleshooting cases.			

back to List of values

Cell Status

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24290	**Related applications**	MINT, SPtM
Description			
The text of this value represents the status of the GSM modem.			

back to List of values

Last Email Result

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24307	**Related applications**	MINT, SPtM
Description			
Result of last email, which was sent by controller.			

Code	Description
0	Email was successfully sent.
2	It is not possible to establish connection with SMTP server.
3	SMTP server is not ready for communication.
4	Maximum length of data can't be read.
5	No appeal to send command.
6	Command can't be send.
7	Command can't be send.
8	HELO command was refused.
11	AUTH LOGIN command was refused.
12	Wrong user name.
13	Wrong password.
14	MAIL FROM command was refused.
15	RCPT TO command was refused.
16	DATA command was refused.
17	Sending of email failed.
18	SMTP server refused the data of email.
19	SMTP server refused the data of email.
20	QUIT command was refused.
21	Lost of connection.
23	Error during closing the connection.
24	No answer from server.
25	It is impossible to create data for command DATA.
26	It is impossible to read data for command DATA.
28	Error of encoding.
29	There was no attempt to send email.

back to List of values

Operator

Value group	CM-GPRS; CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24147	**Related applications**	MINT, SPtM
Description			
The name of operator which to SIM card is connected. *Note: If roaming service is used then prefix "R" is added before the name of operator.*			

back to List of values

Altitude

Value group	CM-4G-GPS (GPS part)	**Related FW**	1.6.0
Units	m		
Comm object	24266	**Related applications**	MINT, SPtM
Description			
Actual GPS altitude.			

back to List of setpoints

HomePosDist

Value group	CM-4G-GPS	**Related FW**	1.6.0
Units	km		
Comm object	11680	**Related applications**	MINT, SPtM
Description			
Actual distance from home position. Home position is adjusted via setpoints **Home Latitude (page 495)** and **Home Longitude (page 495)** or by binary input **GEO HOME POSITION (PAGE 723)**.			

back to List of values

Latitude

Value group	CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24268	**Related applications**	MINT, SPtM
Description			
Actual GPS latitude. Positions on north hemisphere have positive value, position on south hemisphere have negative value.			

back to List of values

Longitude

Value group	CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24267	**Related applications**	MINT, SPtM
Description			
Actual GPS longitude. Positions on east hemisphere have positive value, position on west hemisphere have negative value.			

back to List of values

Satellites

Value group	CM-4G-GPS	**Related FW**	1.6.0
Units	[-]		
Comm object	24265	**Related applications**	MINT, SPtM
Description			
Number of available satellites for GPS location.			

back to List of values

Group: Date/Time

Time

Value group	Date/Time	**Related FW**	1.6.0
Units	HH:MM:SS		
Comm object	24554	**Related applications**	MINT, SPtM
Description			
Shows setup time.			

back to List of values

Date

Value group	Date/Time	**Related FW**	1.6.0
Units	DD.MM.YYYY		
Comm object	24553	**Related applications**	MINT, SPtM
Description			
Shows setup date.			

back to List of values

Group: Plug-In I/O

EM BIO A

Value group	Plug-In I/O	**Related FW**	1.6.0
Units	[-]		
Comm object	14291	**Related applications**	MINT, SPtM
Description			
Binary inputs from extension module in slot A.			

back to List of values

EM BIO B

Value group	Plug-In I/O	**Related FW**	1.6.0
Units	[-]		
Comm object	14292	**Related applications**	MINT, SPtM
Description			
Binary inputs from extension module in slot B.			

back to List of values

Group: PLC

PLC Resource 1

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10504	**Related applications**	MINT, SPtM
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 2

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10505	**Related applications**	MINT, SPtM
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 3

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10506	**Related applications**	MINT, SPtM
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 4

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10507	**Related applications**	MINT, SPtM
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 5

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10508	**Related applications**	MINT, SPtM
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 6

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10509	**Related applications**	MINT, SPtM
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 7

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10510	**Related applications**	MINT, SPtM
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 8

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10511	**Related applications**	MINT, SPtM
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC-BOUT 1

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10424	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 2

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10425	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 3

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10426	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 4

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10427	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 5

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10428	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 6

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10429	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 7

Value group	PLC	**Related FW**	1.6.0
Units	[-]		
Comm object	10430	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

8.1.4 Logical binary inputs

What Logical binary inputs are:

Logical binary inputs are inputs for binary values and functions.

Alphabetical groups of Logical binary inputs

For a full list of Logical binary inputs go to the chapter **Logical binary inputs alphabetically (page 684)**.

Logical binary inputs alphabetically

back to Controller objects

LBI: A

Access Lock

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1		
Description			

When this input is active, no setpoints can be adjusted from controller's front panel and controller mode (OFF / MAN / AUTO / TEST) cannot be changed. The front panel buttons can not be used as well.

> ***Note:** Access Lock does not protect setpoints and mode changing from InteliConfig. To avoid unqualified changes the selected setpoints have to be password protected.*

back to Logical binary inputs alphabetically

Alternate Config 2

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	859		
Description			

This binary input can switch between configuration sets. When this binary input is active, setpoints in Alternate Configuration group are switched to the second set (setpoints with number 2).

> **IMPORTANT: If LBO ECU POWER RELAY (PAGE 772) is used, change of alternate configuration can be made only in prestart phase. So prestart has to be set up for enough long time.**

back to Logical binary inputs alphabetically

Alternate Config 3

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	860		
Description			

This binary input can switch between configuration sets. When this binary input is active, setpoints in Alternate Configuration group are switched to the third set (setpoints with number 3).

> **IMPORTANT: If LBO ECU POWER RELAY (PAGE 772) is used, change of alternate configuration can be made only in prestart phase. So prestart has to be set up for enough long time.**

back to Logical binary inputs alphabetically

AMF Start Block

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	211		
Description			

This binary input can allow or block the AMF start. In case of running Gen-set in AUTO mode Gen-set goes to cooling procedure and stops.

back to Logical binary inputs alphabetically

ATT DEF Level Lamp Blink

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1076		
Description			
When this LBI is active, there is active alarm ATT DEF Level Lamp (page 869) in alarmlist and DEF Level Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT DEF Level Lamp Fast Blink

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1077		
Description			
When this LBI is active, there is active alarm ATT DEF Level Lamp (page 869) in alarmlist and ATT DEF Level Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT DEF Level Lamp Solid

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1075		
Description			
When this LBI is active, there is active alarm ATT DEF Level Lamp (page 869) in alarmlist and ATT DEF Level Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT Filter Lamp Blink

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1067		
Description			
When this LBI is active, there is active alarm ATT Filter Lamp (page 869) in alarmlist and ECU Filter Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT Filter Lamp Fast Blink

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1068		
Description			
When this LBI is active, there is active alarm ATT Filter Lamp (page 869) in alarmlist and ATT Filter Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT Filter Lamp Solid

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1066		
Description			
When this LBI is active, there is active alarm **ATT Filter Lamp (page 869)** in alarmlist and ATT Filter Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT Force Regen

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	680		
Description			
Aftertreatment Regeneration Force Switch › User manually activates regeneration function › Push-button control – function activated by pulse (signals longer than 5 seconds will be carried as long as the input is active)			

back to Logical binary inputs alphabetically

ATT HEST Lamp Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1070		
Description			
When this LBI is active, there is active alarm **ATT HEST Lamp (page 869)** in alarmlist and ECU HEST Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT HEST Lamp Fast Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1071		
Description			
When this LBI is active, there is active alarm **ATT HEST Lamp (page 869)** in alarmlist and ATT HEST Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT HEST Lamp Solid

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1069		
Description			
When this LBI is active, there is active alarm **ATT HEST Lamp (page 869)** in alarmlist and ATT HEST Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT Inhibit Regen

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	679		
Description			
Aftertreatment Regeneration Inhibit Switch › User blocks automatic regeneration function › 2 state switch control – function activated by still signal			

back to Logical binary inputs alphabetically

ATT Inhibited Lamp Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1079		
Description			
When this LBI is active, there is active alarm **ATT Inhibited Lamp (page 870)** in alarmlist and Inhibited Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT Inhibited Lamp Fast Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1080		
Description			
When this LBI is active, there is active alarm **ATT Inhibited Lamp (page 870)** in alarmlist and Inhibited Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT Inhibited Lamp Solid

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1078		
Description			
When this LBI is active, there is active alarm **ATT Inhibited Lamp (page 870)** in alarmlist and ATT Inhibited Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT Interlock

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	956		
Description			
ATT Regeneration Interlock › User manually allows the regeneration (not same as Regen Force) › 2-state switch control – function activated by still signal › Interlock activates Regeneration State after set of conditions is met, only after that the signal is activated			

back to Logical binary inputs alphabetically

ATT SCR Error Lamp Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1073		
Description			
When this LBI is active, there is active alarm **ATT SCR Error Lamp (page 870)** in alarmlist and SCR Error Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT SCR Error Lamp Fast Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1074		
Description			
When this LBI is active, there is active alarm **ATT SCR Error Lamp (page 870)** in alarmlist and SCR Error Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT SCR Error Lamp Solid

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1072		
Description			
When this LBI is active, there is active alarm **ATT SCR Error Lamp (page 870)** in alarmlist and SCR Error Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

LBI: B

Battery Charger

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	623		
Description			
When binary input is active and its delay **Battery Charger Fail Delay (page 330)** is out of time then alarm **Wrn Battery Charger Fail (page 870)** is activated, written into history log and logical binary output **AL Battery Charger (page 743)** is activated.			

back to Logical binary inputs alphabetically

BIN Protection 1

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	9999		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 02

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	9998		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 03

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9997		

Description

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 04

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9996		

Description

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 05

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9995		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 06

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9994		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 07

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9993		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 08

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9992		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 09

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	9991		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 10

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	9990		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 11

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9989		

Description

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 12

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9988		

Description

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 13

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9987		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 14

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9986		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 15

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9985		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 16

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9984		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 17

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9983		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 18

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9982		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 19

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9981		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 20

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9980		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 21

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9979		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 22

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9978		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 23

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9977		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 24

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9976		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 25

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9975		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 26

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9974		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 27

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9973		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 28

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9972		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 29

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9971		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 30

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9970		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 31

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9969		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 32

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9968		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 33

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9967		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 34

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9966		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 35

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9965		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 36

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9964		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 37

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9963		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 38

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9962		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 39

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9961		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 40

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9960		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 41

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9959		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 42

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9958		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 43

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9957		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 44

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9956		
Description			
This binary input is for general input function used as alarm.			

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 45

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9955		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 46

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9954		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 47

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9953		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

BIN Protection 48

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9952		
Description			

This binary input is for general input function used as alarm.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
AL Indic	Binary input is not used for protection. Only alarmlist record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.
FLS	Sensor fail protection.

back to Logical binary inputs alphabetically

LBI: C

Coolant Temp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	625		
Description			

Binary input for **Coolant Temp (page 839)** protection.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.

back to Logical binary inputs alphabetically

LBI: D

Droop Unload Disl

Related FW	1.6.0	**Related applications**	MINT
Comm object	597		
Description			

Activation of this logical binary input avoids the soft unload function of the Gen-set if it is running in droop. GCB is opened immediately after the stop request or pressing of GCB button. If this input is not active the unloading is given by the setpoint **Load Ramp (page 400)**.

***Note:** This function is used when there is no other Gen-set to take over the load of the Gen-set which is being unloaded.*

back to Logical binary inputs alphabetically

LBI: E

ECU Key Switch

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	951		
Description			

This binary input is used to switch on **ECU Power Relay (page 772)**, when engine start is not requested. It is intended to enable engine values reading, when engine doesn't run.

When this binary input is active, binary output **ECU Power Relay (page 772)** is active too.

When this binary input is inactive, function of **ECU Power Relay (page 772)** is not affected.

back to Logical binary inputs alphabetically

ECU Red Lamp Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1061		
Description			
When this LBI is active, there is active alarm **ECU Red Lamp (page 871)** in alarmlist and ECU Red Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ECU Red Lamp Fast Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1062		
Description			
When this LBI is active, there is active alarm **ECU Red Lamp (page 871)** in alarmlist and ECU Red Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ECU Red Lamp Solid

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1060		
Description			
When this LBI is active, there is active alarm **ECU Red Lamp (page 871)** in alarmlist and ECU Red Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ECU Wait To Start Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1064		
Description			
When this LBI is active, there is active alarm **ECU Wait To Start (page 871)** in alarmlist and ECU Wait To Start Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ECU Wait To Start Fast Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1065		
Description			
When this LBI is active, there is active alarm **ECU Wait To Start (page 871)** in alarmlist and ECU Wait To Start Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ECU Wait To Start Solid

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1063		
Description			
When this LBI is active, there is active alarm **ECU Wait To Start (page 871)** in alarmlist and ECU Wait to Start Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ECU Yellow Lamp Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1058		
Description			
When this LBI is active, there is active alarm **ECU Yellow Lamp (page 871)** in alarmlist and ECU Yellow Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ECU Yellow Lamp Fast Blink

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1059		
Description			
When this LBI is active, there is active alarm **ECU Yellow Lamp (page 871)** in alarmlist and ECU Yellow Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ECU Yellow Lamp Solid

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1057		
Description			
When this LBI is active, there is active alarm **ECU Yellow Lamp (page 871)** in alarmlist and ECU Yellow Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

Emergency MAN

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	45		

Description

This input is designed to allow the Gen-set system or breakers to be controlled externally, not by the controller. This feature can be useful in case of some failure, which disables the Gen-set or breakers to be controlled by the controller, but the gen-set itself is operational.

The controller behaves in the following way:

- Shows the text EmergMan in the engine status on the main screen.
- Stops all functions regarding the Gen-set or breaker control, deactivates all outputs related to it.
- Stop Fail alarm is not being evaluated and stop solenoid is not activated if nonzero speed is detected.
- When the input is deactivated, the controller takes control according to the situation in the moment of deactivation, i.e. the Gen-set remains running loaded if it was running and GCB was closed in the moment the input was deactivated.

back to Logical binary inputs alphabetically

Emergency Stop

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	40		

Description

The shutdown procedure will start immediately when this input is activated. Input is inverted (NC = normally closed) in default configuration.

> ***Note:*** *In case of controller hardware or software fail, safe stop of the engine doesn't have to be ensured. To back-up the Emergency Stop function it is recommended to connect separate circuit for disconnection of Fuel Solenoid and Starter signals.*

For more detail see chapter Recommended wiring.

back to Logical binary inputs alphabetically

External Mains Fail Relay

Related FW	1.6.0	**Related applications**	SPtM
Comm object	197		
Description			

Binary input for external mains fail indication.

When the LBI: External Mains Fail Relay is active:

- Controller accepts that MCB was opened by an external mains fail relay, it means that it does not try to close MCB
- It behaves like in case of a standard mains failure, which is evaluated from the mains voltages measurement (the front panel mains icon is red, LBO: **AL MAINS FAIL (PAGE 748)** is active, Gen-set is started when controller is in the AUT mode etc.)
- Controller displays alarm ALI External Mains Fail

When the LBI: External Mains Fail Relay is deactivated:

- Controller automatically closes MCB, if it is in the OFF/AUT mode and mains is healthy
- It behaves like in case of a standard mains return (if healthy mains voltage is detected)
- Alarm ALI External Mains Fail automatically disappears

back to Logical binary inputs alphabetically

LBI: F

Fault Reset Button

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	191		
Description			

Binary input has the same function as Fault Reset button on the InteliGen 500 front panel.

back to Logical binary inputs alphabetically

Force Droop Oper

Related FW	1.6.0	**Related applications**	MINT
Comm object	788		
Description			

When this logical binary input is active, the regulations is forced to droop (the same behavior like the setpoint **Load/Var Sharing Regulation Type (page 409)** = Droop).

back to Logical binary inputs alphabetically

Force Island

Related FW	1.6.0	**Related applications**	SPtM
Comm object	787		
Description			

Activation of this logical binary input start the Gen-set system and go to island operation. Transition of load from mains is adjusted via setpoint **Transfer Mains To Gen (page 397)**.

back to Logical binary inputs alphabetically

Force Parallel

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	786		
Description			
Activation of this logical binary input start the Gen-set system and go to parallel operation if mains is healthy. Island operation is not allowed.			

back to Logical binary inputs alphabetically

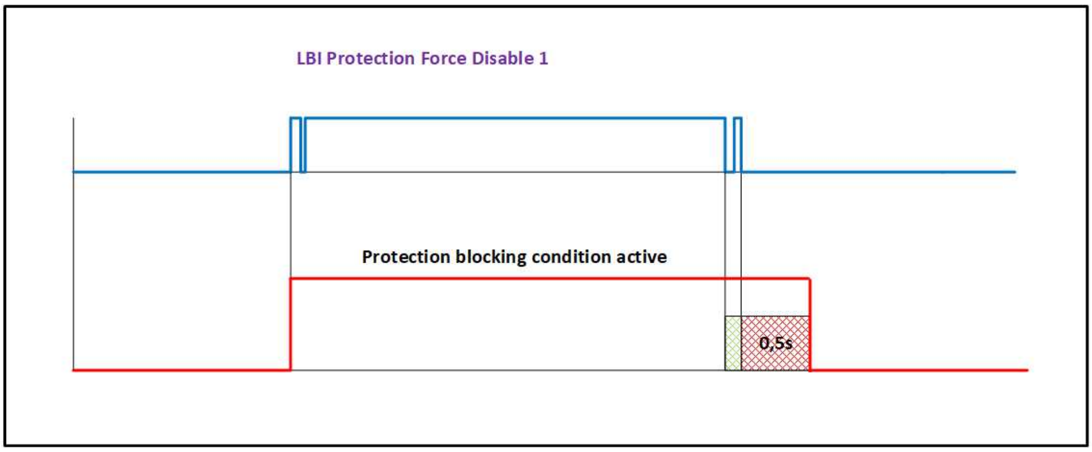
Force Protection Disable

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	16		
Description			

Activation of this LBI disables selected protections.

Proper history record is written to the history log.

- Protection Force Disable active
- Protection Force Disable inactive



Note: *Some of the fixed protections has possibility tu turn off. These protections has dedicated setpoints located in setpoint group Protections. Setpoints have options: Enabled, Disabled (protection is turned off), ExtDisabled (protection is turned off by LBI).*

back to Logical binary inputs alphabetically

Fuel Level

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	626		
Description			

Binary input for **FUEL LEVEL (PAGE 840)** protection.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Stp	Binary input is used for slow stop protection
BOC	Binary input is used for BOC (Breaker Open and Cooling) protection.
Sd	Binary input is used for shutdown protection.

back to Logical binary inputs alphabetically

Fuel Pump

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	694		
Description			

This binary input is used for manual control of binary output **FUEL PUMP (PAGE 775)**. The output is deactivated automatically as soon as fuel level reaches 100 %.

Note: *This binary input is basically designed for ON and OFF switch (switch with arrestment in these positions) because controller reacts to rising and falling edge of signal in this input.*

IMPORTANT: When binary input FUEL PUMP (PAGE 721) is configured then binary output FUEL PUMP (PAGE 775) is control by this binary input.

IMPORTANT: It is necessary to configure analog input FUEL LEVEL (PAGE 840) for proper function of this binary input.

back to Logical binary inputs alphabetically

Fuel Pump On/Off

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	694		
Description			

This binary input is used for manual control of binary output **FUEL PUMP (PAGE 775)**. The output is deactivated automatically as soon as fuel level reaches 100 %.

***Note:** This binary input is basically designed for ON and OFF switch (switch with arrestment in these positions) because controller reacts to rising and falling edge of signal in this input.*

IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 722) is configured then binary output FUEL PUMP (PAGE 775) is control by this binary input.

IMPORTANT: It is necessary to configure analog input FUEL LEVEL (PAGE 840) for proper function of this binary input.

back to Logical binary inputs alphabetically

LBI: G

GCB Button

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	193		
Description			

Binary input has the same function as GCB button I/O on the InteliGen 500 front panel. It is evaluated in MAN mode only.

back to Logical binary inputs alphabetically

GCB Disable

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	62		
Description			

When this LBI is active, it is not possible to close GCB – LBO **GCB CLOSE/OPEN (PAGE 777)**, **GCB ON COIL (PAGE 780)** cannot be activated by panel GCB close button, or close command or by auto command.

back to Logical binary inputs alphabetically

GCB Feedback

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	63		
Description			
Use this input for indication whether the generator circuit breaker is open or closed.			

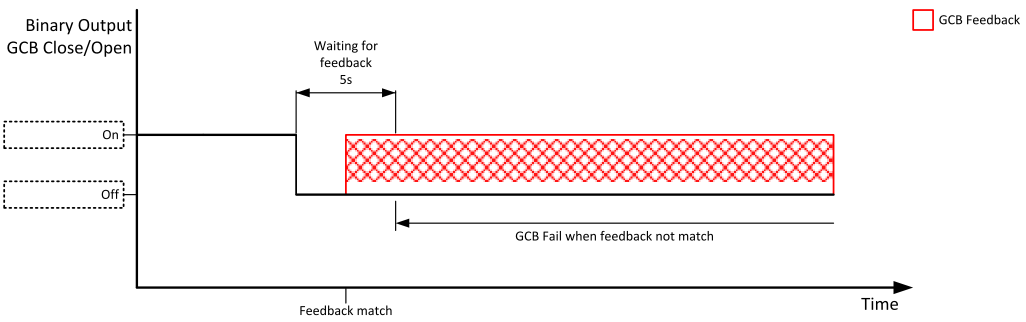


Image 8.135 GCB Feedback 1

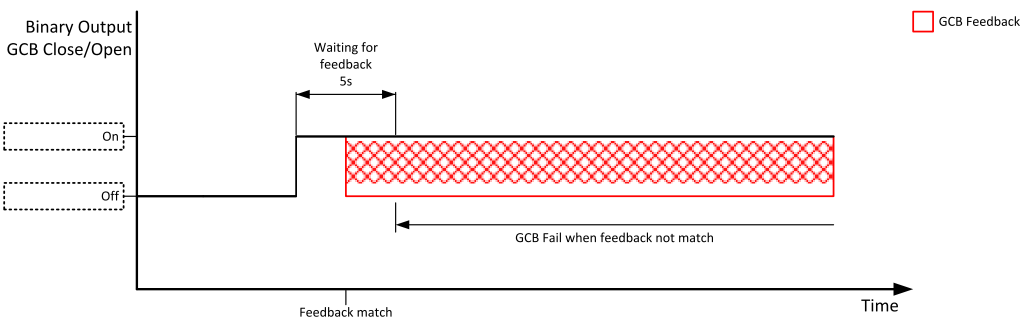


Image 8.136 GCB Feedback 2

Note: *InteliGen 500 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*

back to Logical binary inputs alphabetically

Geo Home Position

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	219		
Description			
This binary input can be used to adjust home position of gen-set. In case that binary input is active, setpoints **Home Latitude (page 495)** and **Home Longitude (page 495)** are adjusted automatically from actual coordinates from GPS signal.			

Note: *Input has to be activated for at least 2 seconds.*

back to Logical binary inputs alphabetically

Geo-Fencing Enable

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	218		
Description			
This binary input enables or disables **Fence 1 Protection (page 499)** and **Fence 2 Protection (page 500)** if **Group: Geo-Fencing (page 495)** is adjusted to value "LBI Enable".			

back to Logical binary inputs alphabetically

Group Link

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	193		
Description			
This input is used for logical connection and disconnection of two Gen-set groups selected with setpoints **Group Link L (page 387)** and **Group Link R (page 388)**. If the input is active, then the two selected groups will perform power management, load sharing and kVAr sharing together as one large group. ***Note:*** *This function is independent on the group which the particular controller belongs to, i.e. the controller can provide linking function e.g. for groups 3,4 although it belongs to group 2.*			

back to Logical binary inputs alphabetically

LBI: H

Horn Reset Button

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	192		
Description			
Binary input has the same function as Horn reset button on the InteliGen 500 front panel.			

back to Logical binary inputs alphabetically

LBI: I

Idle Speed

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	624		
Description			
This binary input changes cooling speed from nominal to idle.			

back to Logical binary inputs alphabetically

LBI: L

Load Res 2 Active

Related FW	1.6.0	**Related applications**	MINT
Comm object	49		
Description			
Activation of this logical binary input changes the set of load reserve setpoint, which are used in **Power management (page 128)**. This input is used to activate the load reserve set 2 instead of the set 1, which is active by default.			

back to Logical binary inputs alphabetically

LBI: M

Mains Fail Block

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	622		
Description			
If the input is active, the automatic start of the Gen-set at Mains failure is blocked. In case of running Gen-set in AUTO mode, timer **Mains Return Delay (page 359)** is started and when it elapses GCB is opened, Gen-set goes to cooling procedure and stops. When GCB is opened after **Open Transfer Min Break (page 394)** the MCB is closed. ***Note:*** *This input simulates healthy Mains.*			

back to Logical binary inputs alphabetically

Maintenance Timer 1 Reset

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9999		
Description			
Reset of both **Maintenance Timer 1 RunHours (page 339)** and **Maintenance Timer 1 Interval (page 339)** is done, when this command is issued. History record Maintenance Timer 1 Reset is done as well and event message is sent. Standard password protection rules applies to this command and it is possible to set its protection level using the Access rules card in InteliConfig. It is as well available for use with the ScreenEditor as a button command.			

back to Logical binary inputs alphabetically

Maintenance Timer 2 Reset

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9999		
Description			
Reset of both **Maintenance Timer 2 RunHours (page 340)** and **Maintenance Timer 2 Interval (page 341)** is done, when this command is issued. History record Maintenance Timer 2 Reset is done as well and event message is sent. Standard password protection rules applies to this command and it is possible to set its protection level using the Access rules card in InteliConfig. It is as well available for use with the ScreenEditor as a button command.			

back to Logical binary inputs alphabetically

Maintenance Timer 3 Reset

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9999		
Description			
Reset of both **Maintenance Timer 3 RunHours (page 342)** and **Maintenance Timer 3 Interval (page 342)** is done, when this command is issued. History record Maintenance Timer 3 Reset is done as well and event message is sent. Standard password protection rules applies to this command and it is possible to set its protection level using the Access rules card in InteliConfig. It is as well available for use with the ScreenEditor as a button command.			

back to Logical binary inputs alphabetically

Manual Load Reconnection

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	60		
Description			
This input is used for manual reconnection of the last disconnected part of the load, if the load has dropped below the setpoint **Load Reconnection Level (page 371)**. This works only if automatic reconnection is disabled, i.e. the setpoint **Auto Load Reconnection (page 372)** = Disabled.			

back to Logical binary inputs alphabetically

MCB Button

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	194		
Description			
This binary input has the same function as MCB button I/O on the InteliGen 500 front panel. It is evaluated in MAN mode only.			

back to Logical binary inputs alphabetically

MCB Disable

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	124		
Description			
When this LBI is active, it is not possible to close MCB – LBO **MCB CLOSE/OPEN (PAGE 789)**, **MCB ON COIL (PAGE 792)** cannot be activated by panel MCB close button, or close command or by auto command.			

back to Logical binary inputs alphabetically

MCB Feedback

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	65		
Description			
Use this input for indication whether the mains circuit breaker is open or closed.			

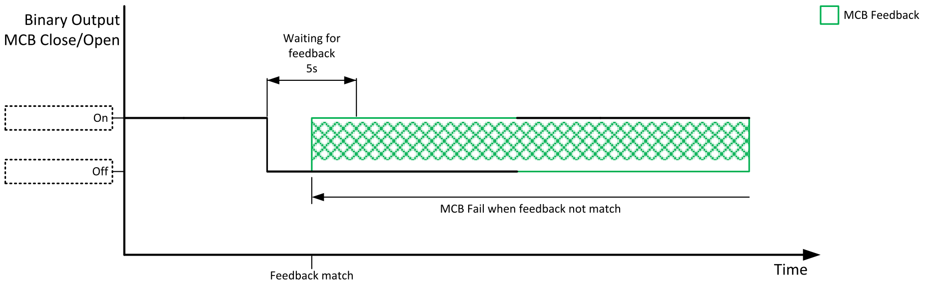


Image 8.137 MCB Feedback 1

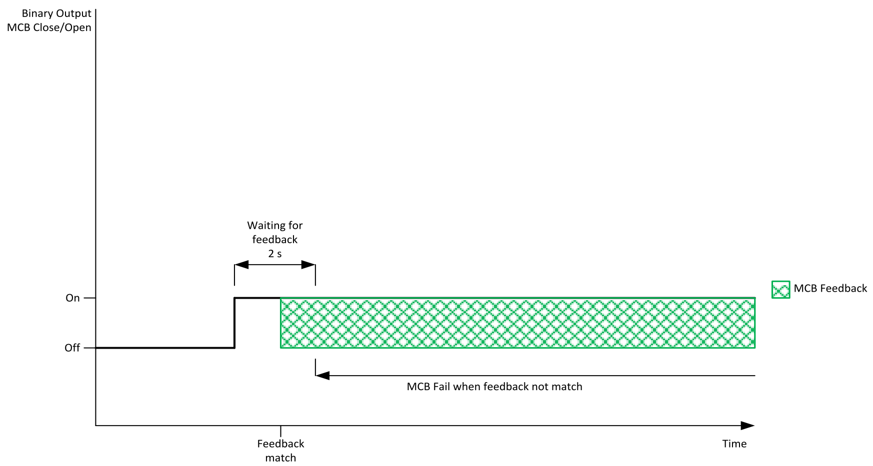


Image 8.138 MCB Feedback 2

Note: *InteliGen 500 controller can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*

back to Logical binary inputs alphabetically

Min Run Power Active

Related FW	1.6.0	**Related applications**	MINT
Comm object	52		
Description			
This input is used to activate the function minimal running power, which is adjusted via setpoint **#Min Run Power (page 382)**.			

back to Logical binary inputs alphabetically

LBI: N

NCB Feedback

Related FW	1.6.0	**Related applications**	MINT
Comm object	67		
Description			
This input is used for connection of feedback contact from the neutral contactor. If the input is active, the controller will consider the neutral contactor as closed and vice versa. See also setpoint **#Neutral Contactor Control (page 256)**.			

back to Logical binary inputs alphabetically

Not Used

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	184		
Description			
Binary input has no function. Use this configuration when binary input is not used.			

back to Logical binary inputs alphabetically

LBI: O

Oil Pressure

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	43		
Description			

Binary input for **OIL PRESSURE** **(PAGE 842)** protection.

Protection types

Monitoring	Binary input is not used for protection or any other function. Signal is only monitored.
HistRecOnl	Binary input is not used for protection. Only history record is made if binary input is active.
Wrn	Binary input is used for warning protection only.
Sd	Binary input is used for shutdown protection.

IMPORTANT: This binary input is also used for evaluating engine running condition.

Example: Normally close connection – when LBI is active then oil pressure is OK and is higher than starting oil pressure.

Note: *In case that you want to use this binary input of oil pressure sensor just for protection please use one of the* ***BIN PROTECTION 1*** ***(PAGE 691)****.*

back to Logical binary inputs alphabetically

LBI: R

Regeneration Force

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	680		
Description			

When this binary input is activated, the controller send request for force regeneration of DPF (diesel particulate filter) to ECU.

Note: *ECU with Tier IV support is required for proper functionality.*

back to Logical binary inputs alphabetically

Regeneration Inhib

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	679		
Description			

When this binary input is activated, the controller sends request to inhibit regeneration of DPF (diesel particulate filter) to ECU.

Note: *ECU with Tier IV support is required for proper functionality.*

back to Logical binary inputs alphabetically

Remote AUTO

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	620		
Description			

The controller is switched to the AUTO mode (there are fourthree modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode.

This binary input has the lowest priority from Remote OFF / MAN / AUTO / TEST binary inputs

Remote control priority:

- Remote OFF (Highest priority)
- Remote TEST
- Remote MAN
- Remote AUTO (Lowest Priority)

back to Logical binary inputs alphabetically

Remote Ctrl Lock

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	4		
Description			

If the input is active, the controller will not accept any actions regarding the system control – e.g. writing of commands and setpoint changes via remote communication interfaces.

back to Logical binary inputs alphabetically

Remote MAN

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	618		
Description			

The controller is switched to the MAN mode (there are fourthree modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode.

Remote control priority:

- Remote OFF (Highest priority)
- Remote TEST
- Remote MAN
- Remote AUTO (Lowest Priority)

back to Logical binary inputs alphabetically

Remote OFF

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	617		
Description			
The controller is switched to the OFF mode (there are fourthree modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode. Remote control priority: › Remote OFF (Highest priority) › Remote TEST › Remote MAN › Remote AUTO (Lowest Priority)			

back to Logical binary inputs alphabetically

Remote Start/Stop

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	38		
Description			

Use this input to start and stop the Gen-set in AUTO mode.

***Note:** If the binary input Remote Start/Stop is active and engine is running and mains failure occurs, the MCB breaker opens, after Transfer Delay the GCB breaker is closed. Once the mains is OK, the **Mains Return Delay (page 359)** elapses and the GCB breaker is opened. Then after Transfer Delay is MCB breaker closed. Gen-set remains running as long as binary input Rem Start/Stop is active. For more details see timing diagram below.*

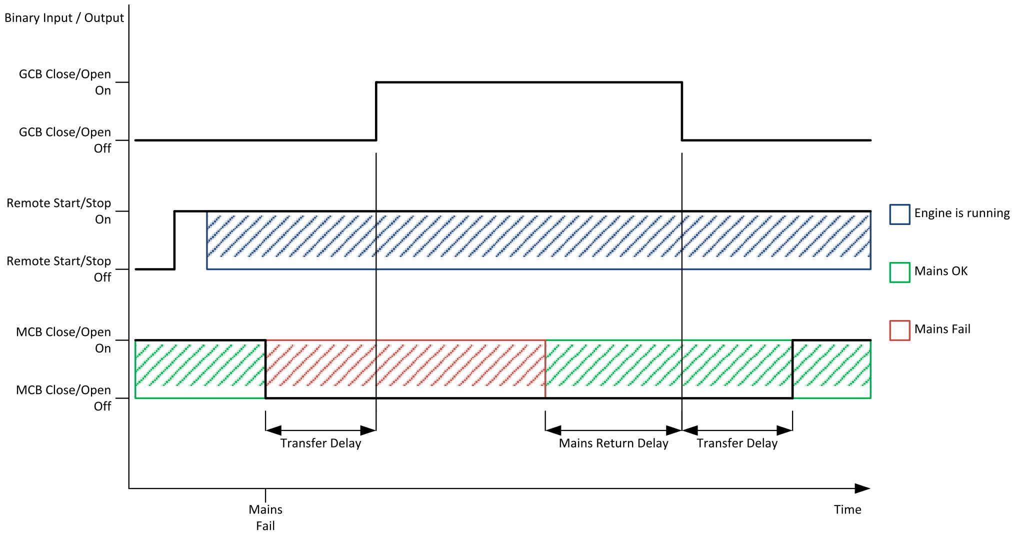


Image 8.139 Remote Start/Stop

Taken action in SPtM application (AUTO Mode)	
Active	Start Gen-set, synchronization, parallel operation (Baseload/Imp/Exp), Regardless the Mains params OK. › Start the Gen-set to Island if Mains Not OK › Reverse synchronisation when mains gets restored
Inactive	Unloading of the Gen-set if it is running in Parallel, stop the Gen-set

Taken action in MINT application (AUTO Mode)	
Active	Start the Gen-set, after #System Start Delay elapses, the system is activated and started by Power management (for more information **see Power management on page 128**).
Inactive	Stop the Gen-set, after #System Stop Delay, the system is deactivated and a Gen-set is stopped.

back to Logical binary inputs alphabetically

Remote TEST

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	621		
Description			

The controller is switched to the TEST mode (there are fourthree modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode.

Remote control priority:

- Remote OFF (Highest priority)
- Remote TEST
- Remote MAN
- Remote AUTO (Lowest Priority)

back to Logical binary inputs alphabetically

Rem TEST On Load

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	61		
Description			

Closing of the GCB in MRS and MINT or transferring of the load from the mains to Gen-set in SPtM and AMF.

Application	TEST	Remote TEST On Load
SPtM	Gen-set started and running until the TEST mode deactivated.	**Active:** Gen-set is put to TEST mode. On the top of it the load is transferred to the Gen-set. The same behavior like the **FORCE ISLAND (PAGE 719)**. The load transfer according to the settings is performed. ***Note:*** *Whenever the **REMOTE START/STOP (PAGE 732)** is active, the LBI **REM TEST ON LOAD (PAGE 733)** has higher priority because it takes the same action like LBI **FORCE ISLAND (PAGE 719)**.* **Inactive:** Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions. (the load can be transfered back to the mains (OFF, AUTO) or stay on the Gen-set (MAN).
MINT	Gen-set started and running until the TEST mode deactivated.	**Active:** Gen-set is put to TEST mode. On the top of it the GCB is closed (synchronized if the common bus bar is not dead). The same behaviour like the **REMOTE START/STOP (PAGE 732)**. **Inactive:** Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions.

back to Logical binary inputs alphabetically

LBI: S

Sd Override

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	44		
Description			

If this input is active, all alarms except Emergency Stop and Overspeed are suppressed. The suppressed alarms will be displayed in the alarm list, but they will not take effect regarding the Gen-set control.

Note: *Sd Override (page 734) is indicated in the alarm list if Sd Override mode is active to inform the operator that the engine is not protected.*

IMPORTANT: MISUSE OF THIS INPUT CAN CAUSE DAMAGE TO THE GEN-SET!

Note: *User protection Sd Override is not blocked*

back to Logical binary inputs alphabetically

SPtM/MINT Mode Select

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	986		
Description			

Use this function to switch between the SPtM and MINT application modes:

- SPtM – SPtM/MINT Mode Select is inactive
- MINT – SPtM/MINT Mode Select is active

Switching can be done only when controller is in the OFF mode and **Application Mode Select (page 277)** is set to External.

back to Logical binary inputs alphabetically

Start Button

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	189		
Description			

Binary input has the same function as Start Button I on the InteliGen 500 front panel. It is evaluated in MAN mode only.

back to Logical binary inputs alphabetically

Stop Button

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	190		
Description			

Binary input has the same function as Stop Button O on the InteliGen 500 front panel. It is evaluated in MAN Mode only.

back to Logical binary inputs alphabetically

SUS Excitation Block

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	140		
Description			
When this LBI is active, LBO **SUS Excitation (page 806)** is blocked. This LBI takes an effect during the SUS start sequence only when the setpoint **Excitation Control (page 337)** = External.			

back to Logical binary inputs alphabetically

SUS Min Power 2

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	983		
Description			
This LBI is for switching between setpoints #SUS Min Power 1-3.			

LBI SUS Min Power 2	LBI **SUS Min Power 3 (page 735)**	Active Setpoint Setpoint
0	0	**#SUS Min Power 1 (page 335)**
1	0	**#SUS Min Power 2 (page 336)**
0	1	**#SUS Min Power 3 (page 337)**
1	1	**#SUS Min Power 3 (page 337)**

back to Logical binary inputs alphabetically

SUS Min Power 3

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	984		
Description			
This LBI is for switching between setpoints #SUS Min Power 1-3.			

LBI **SUS Min Power 2 (page 735)**	LBI SUS Min Power 3	Active Setpoint Setpoint
0	0	**#SUS Min Power 1 (page 335)**
1	0	**#SUS Min Power 2 (page 336)**
0	1	**#SUS Min Power 3 (page 337)**
1	1	**#SUS Min Power 3 (page 337)**

back to Logical binary inputs alphabetically

LBI: T

Top Priority

Related FW	1.6.0	Related applications	MINT
Comm object	199		
Description			
If this input is active, the controller will have the highest priority in the group independent of the setpoint **Priority (page 375)**. **IMPORTANT: This binary input can be used only if setpoint #Priority Auto Swap (page 376) = Disabled.**			

back to Logical binary inputs alphabetically

8.1.5 Logical binary outputs

What Logical binary outputs are:

Logical binary outputs are outputs for binary values and functions.

Alphabetical groups of Logical binary outputs

For a full list of Logical binary inputs go to the chapter **Logical binary outputs alphabetically (page 738)**.

Logical binary outputs alphabetically

back to Controller objects

LBO: A

Air Valves

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1247		
Description			
This output is activated together with binary output **PRESTART (PAGE 797)** and opens after the engine is stopped or in case that engine is not ready.			

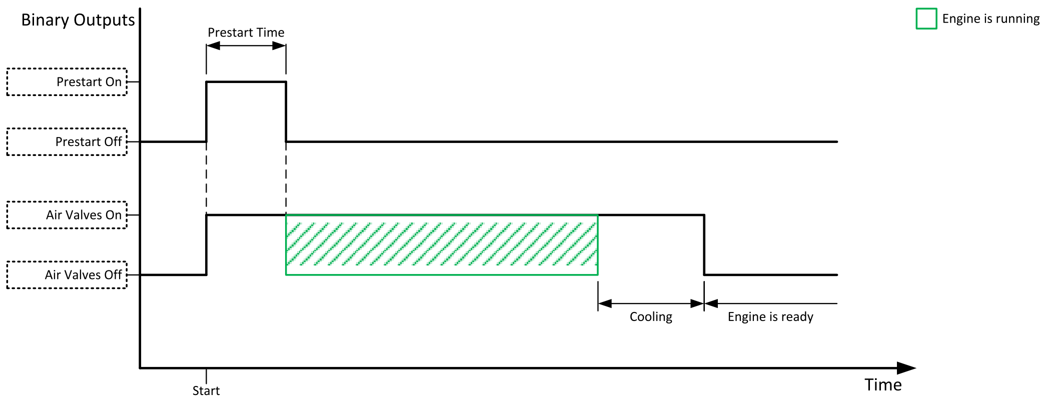


Image 8.140 Air Valves

back to Logical binary outputs alphabetically

AL AIN 1 Fls

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2577		
Description			
The output is active when the alarm **Fls AIN Prot 1 (page 915)** is active.			

back to Logical binary outputs alphabetically

AL AIN 2 Fls

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2578		
Description			
The output is active when the alarm **Fls AIN Protect 2 (page 915)** is active.			

back to Logical binary outputs alphabetically

AL AIN 3 Fls

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2579		
Description			
The output is active when the alarm **Fls AIN Protect 3 (page 916)** is active.			

back to Logical binary outputs alphabetically

AL AIN 4 Fls

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2580		
Description			
The output is active when the alarm **Fls AIN Protect 4 (page 916)** is active.			

back to Logical binary outputs alphabetically

AL AIN 1 Sd+BOC

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1386		
Description			
The output is active when there is the shutdown or BOC alarm from the analog input 1 of the controller present in the alarmlist or isn’t confirmed.			

back to Logical binary outputs alphabetically

AL AIN 1 Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1382		
Description			
the output is active when there is the warning alarm from the analog input 1 of the controller present in the alarmlist or isn’t confirmed.			

back to Logical binary outputs alphabetically

AL AIN 2 Sd+BOC

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1387		
Description			
the output is active when there is the shutdown or BOC alarm from the analog input 2 of the controller present in the alarmlist or isn’t confirmed.			

back to Logical binary outputs alphabetically

AL AIN 2 Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1383		
Description			
the output is active when there is the warning alarm from the analog input 2 of the controller present in the alarmlist or isn't confirmed.			

back to Logical binary outputs alphabetically

AL AIN 3 Sd+BOC

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1388		
Description			
the output is active when there is the shutdown or BOC alarm from the analog input 3 of the controller present in the alarmlist or isn't confirmed.			

back to Logical binary outputs alphabetically

AL AIN 3 Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1384		
Description			
the output is active when there is the warning alarm from the analog input 3 of the controller present in the alarmlist or isn't confirmed.			

back to Logical binary outputs alphabetically

AL AIN 4 Sd+BOC

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1389		
Description			
the output is active when there is the shutdown or BOC alarm from the analog input 4 of the controller present in the alarmlist or isn't confirmed.			

back to Logical binary outputs alphabetically

AL AIN 4 Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1385		
Description			
the output is active when there is the warning alarm from the analog input 4 of the controller present in the alarmlist or isn't confirmed.			

back to Logical binary outputs alphabetically

AL Battery Flat

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1292		
Description			
This output is active when the **Sd Battery Flat (page 910)** or **Wrn Battery Voltage (page 878)** alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Battery Charger

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1272		
Description			
This output is active when the **Wrn Battery Charger Fail (page 870)** alarm is present in the alarmlist or isn't confirmed.			

back to Logical binary outputs alphabetically

AL Battery Voltage

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1293		
Description			
This output is active when the **Wrn Battery Voltage (page 878)** alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Common BOC

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9		
Description			
Output is activated when any BOC alarm appears. The output opens, if: › No BOC alarm is active and › Fault reset button is pressed			

back to Logical binary outputs alphabetically

AL Common Fls

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	6		

Description

Output is activated when any sensor fail alarm appears.

The output opens, if:

- No sensor fail alarm is active and
- Fault reset button is pressed

back to Logical binary outputs alphabetically

AL Common SdMPR

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	4		

Description

Output is activated when any shutdown mains protection with reset alarm appears.

The output opens, if:

- No shutdown mains protection with reset alarm is active and
- Fault reset button is pressed

back to Logical binary outputs alphabetically

AL Common Stp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	4		

Description

Output closes when any slow stop alarm appears.

The output opens, if:

- No slow stop alarm is active and
- Fault reset button is pressed

back to Logical binary outputs alphabetically

AL Common Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	3		

Description

Output is activated when any warning alarm appears.

The output opens, if:

- No warning alarm is active and
- Fault reset button is pressed

back to Logical binary outputs alphabetically

AL CoolantTemp Low

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1295		
Description			
the output is active when there is the **Wrn Coolant Temperature Low (page 889)** alarm from the **COOLANT TEMP (PAGE 839)** in the alarmlist or isn't confirmed.			

back to Logical binary outputs alphabetically

AL CoolantTemp Sd

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1421		
Description			
the output is active when there is the shutdown or BOC alarm from the **COOLANT TEMP (PAGE 839)** in the alarmlist or isn't confirmed.			

Logical binary outputs alphabetically (page 738)

AL CoolantTemp Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1420		
Description			
the output is active when there is the warning alarm from the **COOLANT TEMP (PAGE 839)** in the alarmlist or isn't confirmed. ***Note:*** *Binary output is also active if protection type is set to HistRecOnl and threshold level for history record is reach.*			

back to Logical binary outputs alphabetically

AL D+ Fail

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1260		
Description			
This output is active when the **Wrn Charging Alternator Fail (page 889)** alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Earth Fault

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1294		
Description			
This output is active when the **Sd Earth Fault Current (page 911)** alarm is present in alarm list or isn't confirm. ***Note:*** *It is strongly recommended to use this output only onetime.*			

back to Logical binary outputs alphabetically

AL Excitation Loss

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2309		
Description			
This output is active when the **BOC Excitation Loss (page 897)** alarm is present in the alarmlist.			

back to Logical binary outputs alphabetically

AL Fence 1

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1548		
Description			
This output is active when the **Fence 1 Alarm (page 876)** alarm is present in the alarmlist or isn’t confirm.			

back to Logical binary outputs alphabetically

AL Fence 2

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1549		
Description			
This output is active when the **Fence 2 Alarm (page 876)** alarm is present in the alarmlist or isn’t confirm.			

back to Logical binary outputs alphabetically

AL Fuel Level Sd

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1423		
Description			
the output is active when there is the shutdown or BOC alarm from the **FUEL LEVEL (PAGE 840)** in the alarmlist or isn’t confirmed.			

back to Logical binary outputs alphabetically

AL Fuel Level Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1422		
Description			
The output is active when there is the warning alarm from the **FUEL LEVEL (PAGE 840)** in the alarmlist or isn’t confirmed. ***Note:*** *Binary output is also active if protection type is set to HistRecOnl and threshold level for history record is reach.*			

back to Logical binary outputs alphabetically

AL Gen Freq Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1267		
Description			
This output is active generator frequency warning alarm is present in alarmlist or isn’t confirm.			

back to Logical binary outputs alphabetically

AL Gen Frequency

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1266		
Description			
This output is active when at least one generator frequency BOC or Sd alarm is present in alarmlist or isn’t confirm.			

back to Logical binary outputs alphabetically

AL Gen Overfrequency

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1264		
Description			
This output is active when at least one generator overfrequency alarm is present in alarmlist or isn’t confirm.			

back to Logical binary outputs alphabetically

AL Gen Overvoltage

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1261		
Description			
This output is active when at least one generator overvoltage alarm is present in alarmlist or isn’t confirm.			

back to Logical binary outputs alphabetically

AL Gen Underfrequency

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1265		
Description			
This output is active when at least one generator underfrequency alarm is present in alarmlist or isn’t confirm.			

back to Logical binary outputs alphabetically

AL Gen Undervoltage

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1262		
Description			
This output is active when at least one generator undervoltage alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Gen Voltage Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1289		
Description			
This output is active when at least one generator voltage warning alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Gen Voltage

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1263		
Description			
This output is active when at least one generator voltage BOC or Sd alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Mains Fail

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	197		
Description			
This output is active when at least one mains frequency BOC or SD Alarm is present in alarmlist or in case of Mains undervoltage and Mains underfrequency (doesn't appear in the alarm list).			

back to Logical binary outputs alphabetically

AL Mains Frequency

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1271		
Description			
This output is active when at least one mains frequency BOC or Sd alarm is present in alarmlist or isn't confirm. ***Note:*** *Is activated also for Mains/Bus underfrequency (no alarm in the alarm list).*			

back to Logical binary outputs alphabetically

AL Mains Voltage

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1270		
Description			
This output is active when at least one mains voltage BOC or Sd alarm is present in the alarmlist or isn't confirm. *Note: Is activated also for Mains/Bus undervoltage (no alarm in the alarm list).*			

back to Logical binary outputs alphabetically

AL Maintenance 1

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1254		
Description			
This output is active when the Alarm Maintenance 1 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 1 isn't confirm.			

back to Logical binary outputs alphabetically

AL Maintenance 2

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1255		
Description			
This output is active when the Alarm Maintenance 2 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 2 isn't confirm.			

back to Logical binary outputs alphabetically

AL Maintenance 3

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1256		
Description			
This output is active when the Alarm Maintenance 3 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 3 isn't confirm.			

back to Logical binary outputs alphabetically

AL Oil Press Sd

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1419		
Description			
the output is active when there is the shutdown alarm from the **Oil Pressure (page 842)** in the alarmlist or isn't confirmed.			

back to Logical binary outputs alphabetically

AL Oil Press Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1418		
Description			
the output is active when there is the warning alarm from the **Oil Pressure (page 842)** in the alarmlist or isn't confirmed. ***Note:*** *Binary output is also active if protection type is set to HistRecOnl and threshold level for history record is reach.*			

back to Logical binary outputs alphabetically

AL Overcurrent

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	109		
Description			
This output is active when the **BOC Overcurrent IDMT (page 898)** or alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Overload BOC

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1268		
Description			
This output is active when the **Sd Overload (page 910)** alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Overload Wrn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1269		
Description			
This output is active when the **Wrn Overload (page 887)** alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Overspeed

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	779		
Description			
This output is active when the **Sd Overspeed (page 911)** alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Rental Timer 1

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1370		
Description			

The binary output is activated when the **Rental Timer 1 (page 490)** elapsed.

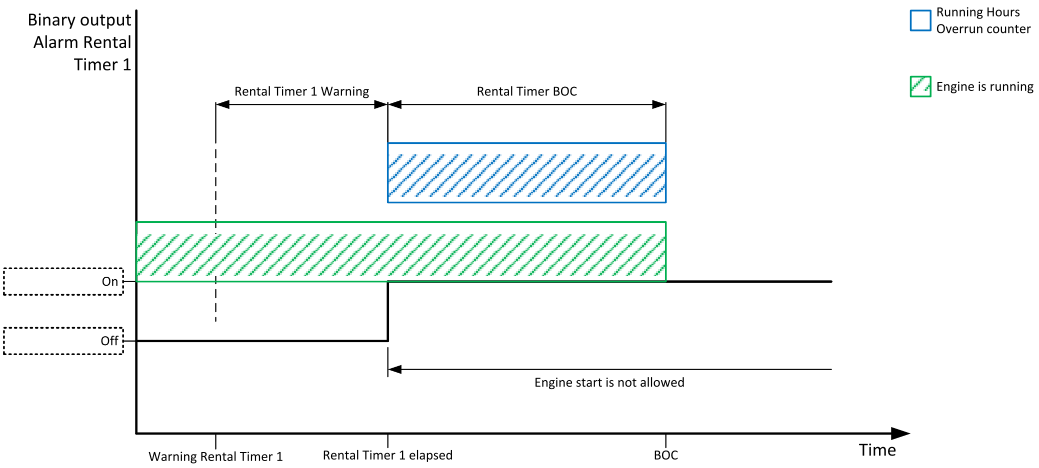


Image 8.141 Rental Timer 1

back to Logical binary outputs alphabetically

AL Rental Timer 2

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1371		
Description			

The binary output is activated when the **Rental Timer 2 (page 492)** elapsed.

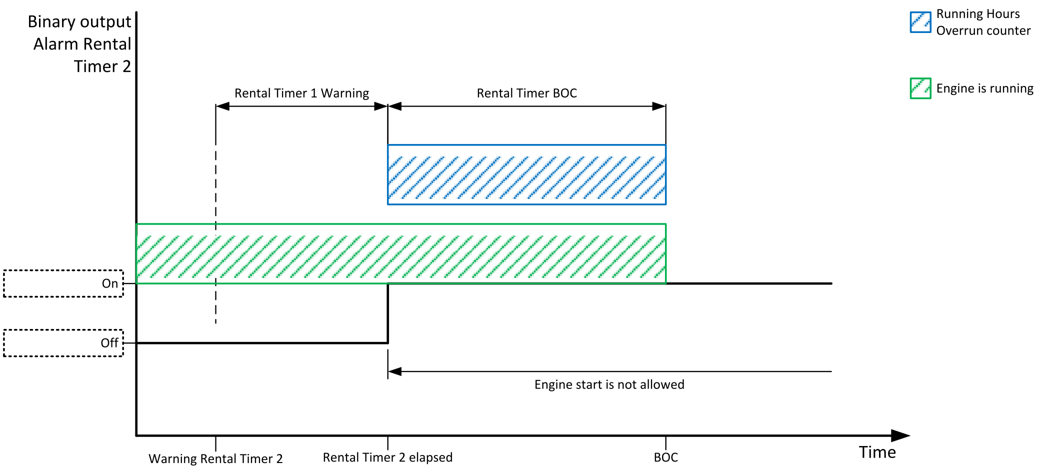


Image 8.142 Rental Timer 2

back to Logical binary outputs alphabetically

AL Reverse Power

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2308		
Description			
This output is active when the **BOC Reverse Power (page 899)** alarm is present in the alarmlist.			

back to Logical binary outputs alphabetically

AL Start Fail

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1291		
Description			
This output is active when the **Sd Start Fail (page 912)** alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Stop Fail

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	339		
Description			
This output is active when the **Wrn Stop Fail (page 892)** alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Synchronisation Fail

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	295		
Description			
This output is active when the **Stp Synchronisation Fail (page 895)** alarm is present in the alarmlist.			

back to Logical binary outputs alphabetically

AL Underspeed

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1296		
Description			
This output is active when the **Sd Underspeed (page 912)** alarm is present in the alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

Alarm

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	2		
Description			
The output is designed to be used as external alarm indication such as a red bulb in the control room etc. The output is active when at least one unconfirmed alarm is present in the alarmlist and remains active until confirmation of alarm.			

back to Logical binary outputs alphabetically

AIN Switch01

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1400		
Description			
This is an output from the General Analog Input 1 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 1 On (page 415)** and **Analog Switch 1 Off (page 416)**. The value is measured from **AIN Switch 01 (page 832)** analog input.			

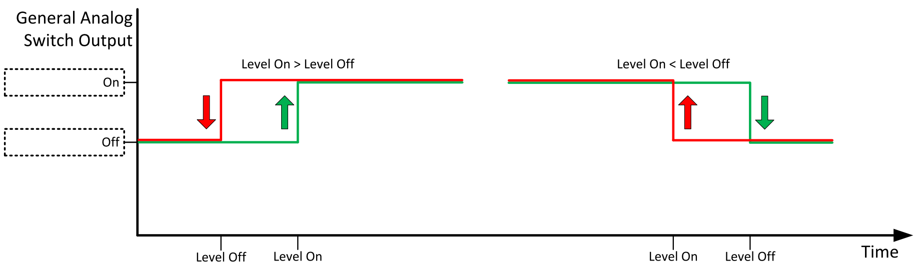


Image 8.143 General analog input 1 switch

back to Logical binary outputs alphabetically

AIN Switch02

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1401		
Description			
This is an output from the General Analog Input 2 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 2 On (page 418)** and **Analog Switch 2 Off (page 419)**. The value is measured from **AIN SWITCH 02 (PAGE 832)** analog input.			

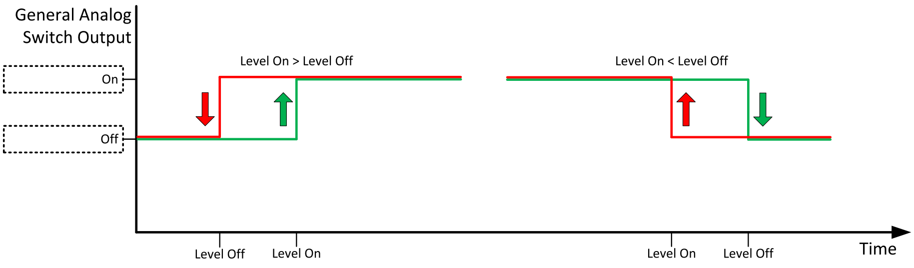


Image 8.144 General analog input 2 switch

back to Logical binary outputs alphabetically

AIN Switch03

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1402		
Description			
This is an output from the General Analog Input 3 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 3 On (page 421)** and **Analog Switch 3 Off (page 422)**. The value is measured from **AIN SWITCH 03 (PAGE 832)** analog input.			

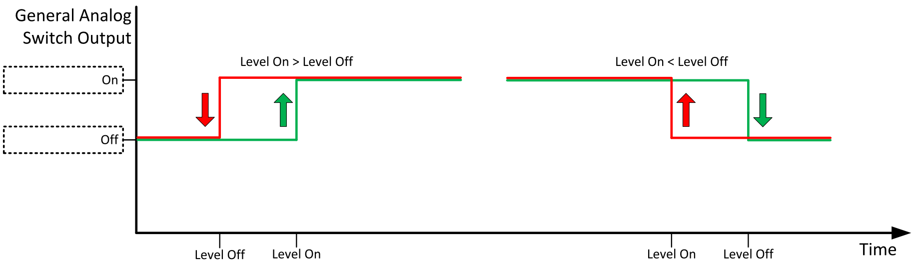


Image 8.145 General analog input 3 switch

back to Logical binary outputs alphabetically

AIN Switch04

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1403		
Description			
This is an output from the General Analog Input 4 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 4 On (page 424)** and **Analog Switch 4 Off (page 425)**. The value is measured from **AIN SWITCH 04 (PAGE 833)** analog input.			

Image 8.146 General analog input 4 switch

back to Logical binary outputs alphabetically

AIN Switch05

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1787		
Description			
This is an output from the General Analog Input 5 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 5 On (page 427)** and **Analog Switch 5 Off (page 428)**. The value is measured from **AIN SWITCH 05 (PAGE 833)** analog input.			

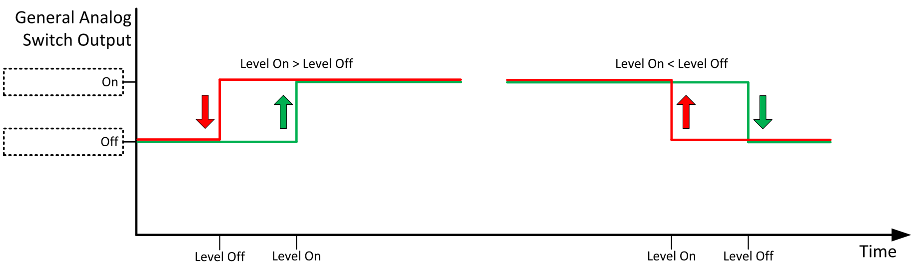


Image 8.147 General analog input 5 switch

back to Logical binary outputs alphabetically

AIN Switch06

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1788		
Description			
This is an output from the General Analog Input 6 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 6 On (page 430)** and **Analog Switch 6 Off (page 431)**. The value is measured from **AIN SWITCH 06 (PAGE 833)** analog input.			

Image 8.148 General analog input 6 switch

back to Logical binary outputs alphabetically

AIN Switch07

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1789		
Description			
This is an output from the General Analog Input 7 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 7 On (page 433)** and **Analog Switch 7 Off (page 434)**. The value is measured from **AIN SWITCH 07 (PAGE 834)** analog input.			

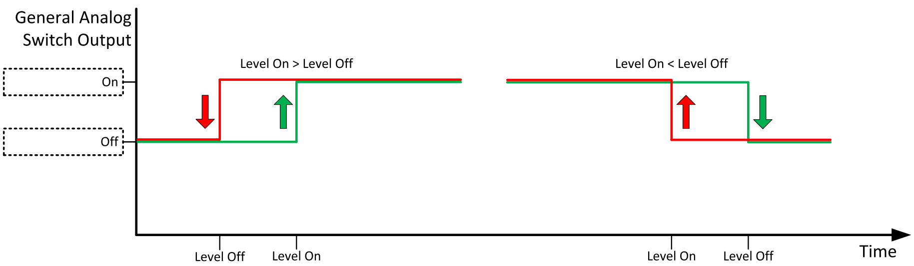


Image 8.149 General analog input 7 switch

back to Logical binary outputs alphabetically

AIN Switch08

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1790		

Description

This is an output from the General Analog Input 8 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 8 On (page 436)** and **Analog Switch 8 Off (page 437)**. The value is measured from **AIN SWITCH 08 (PAGE 834)** analog input.

Image 8.150 General analog input 8 switch

back to Logical binary outputs alphabetically

AIN Switch09

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1791		

Description

This is an output from the General Analog Input 9 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 9 On (page 439)** and **Analog Switch 9 Off (page 440)**. The value is measured from **AIN SWITCH 09 (PAGE 834)** analog input.

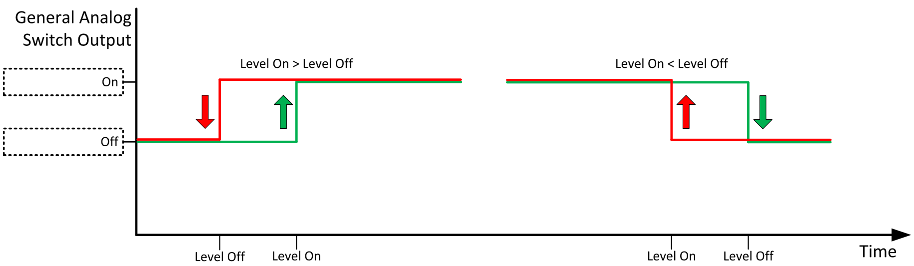


Image 8.151 General analog input 9 switch

back to Logical binary outputs alphabetically

AIN Switch10

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1792		
Description			
This is an output from the General Analog Input 10 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 10 On (page 442)** and **Analog Switch 10 Off (page 443)**. The value is measured from **AIN SWITCH 10 (PAGE 835)** analog input.			

Image 8.152 General analog input 10 switch

back to Logical binary outputs alphabetically

AIN Switch11

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1793		
Description			
This is an output from the General Analog Input 11 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 11 On (page 445)** and **Analog Switch 11 Off (page 446)**. The value is measured from **AIN SWITCH 11 (PAGE 835)** analog input.			

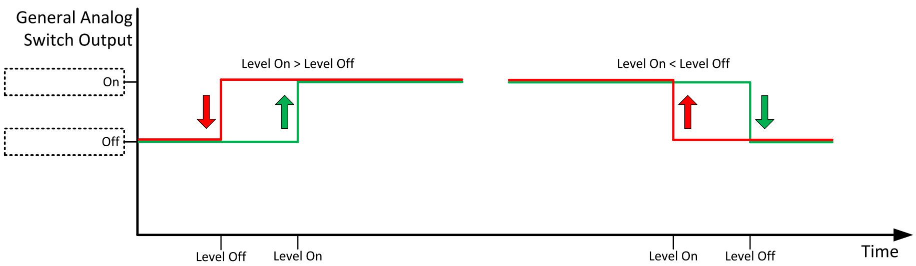


Image 8.153 General analog input 11 switch

back to Logical binary outputs alphabetically

AIN Switch12

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1794		
Description			

This is an output from the General Analog Input 12 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 12 On (page 448)** and **Analog Switch 12 Off (page 449)**. The value is measured from **AIN Switch 12 (page 835)** analog input.

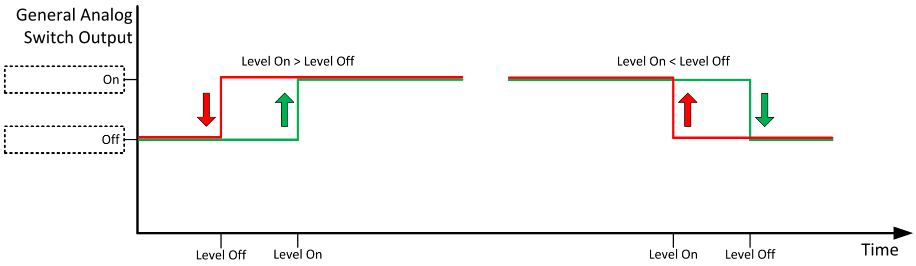


Image 8.154 General analog input 12 switch

back to Logical binary outputs alphabetically

AIN Switch13

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1795		
Description			

This is an output from the General Analog Input 13 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 13 On (page 451)** and **Analog Switch 13 Off (page 452)**. The value is measured from **AIN Switch 13 (page 836)** analog input.

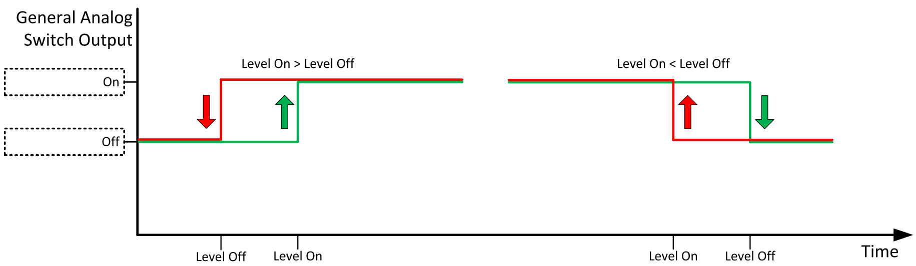


Image 8.155 General analog input 13 switch

back to Logical binary outputs alphabetically

AIN Switch14

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1796		
Description			

This is an output from the General Analog Input 14 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 14 On (page 454)** and **Analog Switch 14 Off (page 455)**. The value is measured from **AIN SWITCH 14 (PAGE 836)** analog input.

Image 8.156 General analog input 14 switch

back to Logical binary outputs alphabetically

AIN Switch15

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1797		
Description			

This is an output from the General Analog Input 15 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 15 On (page 457)** and **Analog Switch 15 Off (page 458)**. The value is measured from **AIN SWITCH 15 (PAGE 836)** analog input.

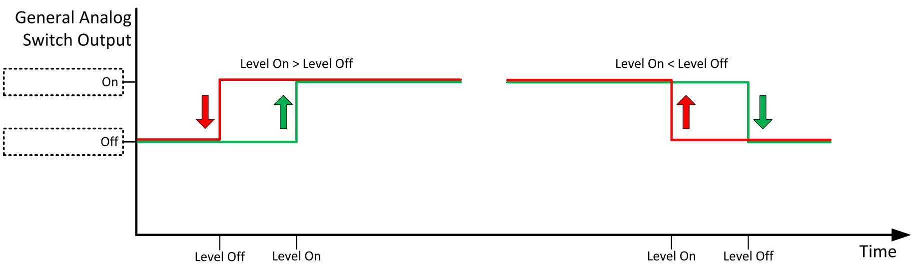


Image 8.157 General analog input 15 switch

back to Logical binary outputs alphabetically

AIN Switch16

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1798		
Description			
This is an output from the General Analog Input 16 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 16 On (page 460)** and **Analog Switch 16 Off (page 461)**. The value is measured from **AIN SWITCH 16 (PAGE 837)** analog input.			

Image 8.158 General analog input 16 switch

back to Logical binary outputs alphabetically

AIN Switch17

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1799		
Description			
This is an output from the General Analog Input 17 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 17 On (page 463)** and **Analog Switch 17 Off (page 464)**. The value is measured from **AIN SWITCH 17 (PAGE 837)** analog input.			

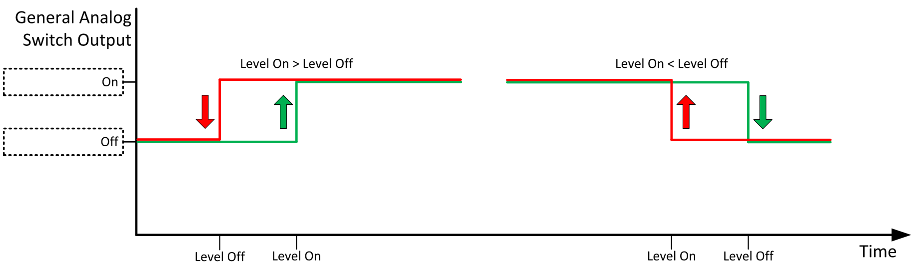


Image 8.159 General analog input 17 switch

back to Logical binary outputs alphabetically

AIN Switch18

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1800		

Description

This is an output from the General Analog Input 18 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 18 On (page 466)** and **Analog Switch 18 Off (page 467)**. The value is measured from **AIN SWITCH 18 (PAGE 837)** analog input.

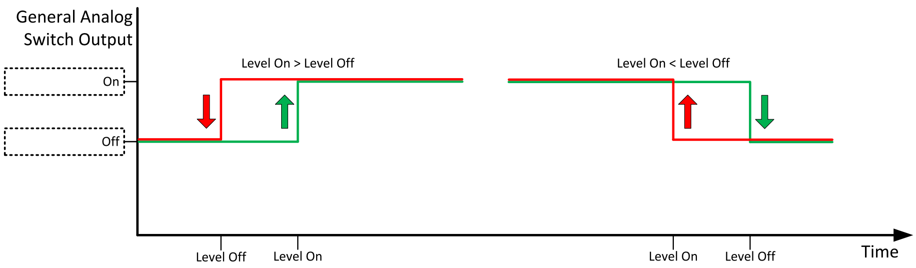


Image 8.160 General analog input 18 switch

back to Logical binary outputs alphabetically

AIN Switch19

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1801		

Description

This is an output from the General Analog Input 19 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 19 On (page 469)** and **Analog Switch 19 Off (page 470)**. The value is measured from **AIN SWITCH 19 (PAGE 838)** analog input.

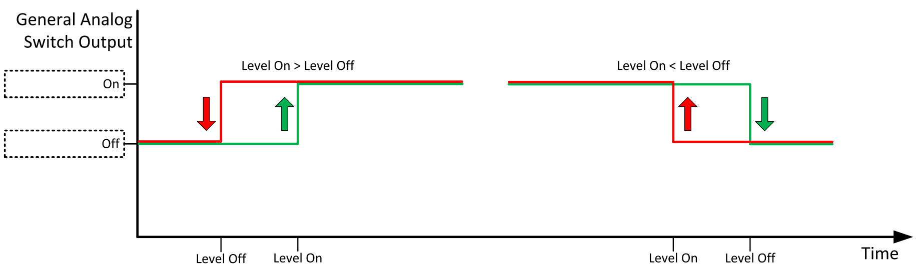


Image 8.161 General analog input 19 switch

back to Logical binary outputs alphabetically

AIN Switch20

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1802		
Description			
This is an output from the General Analog Input 20 switch function. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 20 On (page 472)** and **Analog Switch 20 Off (page 473)**. The value is measured from **AIN SWITCH 20 (PAGE 838)** analog input.			

Image 8.162 General analog input 20 switch

back to Logical binary outputs alphabetically

ATT DEF Level Lamp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2154		
Description			
This output is active when ATT DEF Level Lamp is active.			

back to Logical binary outputs alphabetically

ATT Filter Lamp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2152		
Description			
This output is active when ATT Filter Lamp is active.			

back to Logical binary outputs alphabetically

ATT HEST Lamp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1373		
Description			
This output is closed if ECU send signal HEST Lamp. If ECU stop send HEST LAMP signal binary input will be opened without no matter if alarms in alarmlist are confirmed or not.			

back to Logical binary outputs alphabetically

ATT Inhibited Lamp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2155		
Description			
This output is active when ATT Inhibited Lamp is active.			

back to Logical binary outputs alphabetically

ATT Interlock Status

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object			
Description			
This output is active when ATT Interlock Status is active.			

back to Logical binary outputs alphabetically

ATT PCD Lamp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2446		
Description			
This LBO is active when the engine Particulate Control Diagnostic System detects removal of DPF, loss of DPF function or failure of PCD itself. ***Note:*** *LBO is required in Yanmar engine types*			

back to Logical binary outputs alphabetically

ATT Regen ACK Lamp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2231		
Description			
This LBO is active when the engine requires to confirm the start of aftertreatment regeneration. ***Note:*** *LBO is required in Yanmar engine types*			

back to Logical binary outputs alphabetically

ATT SCR Error Lamp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	2153		
Description			
This output is active when ATT SCR Error Lamp is active.			

back to Logical binary outputs alphabetically

AVR Down

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	55		
Description			
This output together with the complementary output **AVR UP (PAGE 765)** is designed for voltage and power factor control at Gen-sets, where the AVR does not support analog control.			

back to Logical binary outputs alphabetically

AVR Up

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	54		
Description			
This output together with the complementary output **AVR DOWN (PAGE 765)** is designed for voltage and power factor control at Gen-sets, where the AVR does not support analog control.			

back to Logical binary outputs alphabetically

LBO: B

BIN 1 Status

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1374		
Description			
This output is active, when Binary Input 1 is active and deactivates when Binary Input 1 is inactive. When Binary Input 1 is used for BIN protection function then this output is deactivated when BIN protection alarm is in Alarmlist.			

Note: *When LBI 1 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

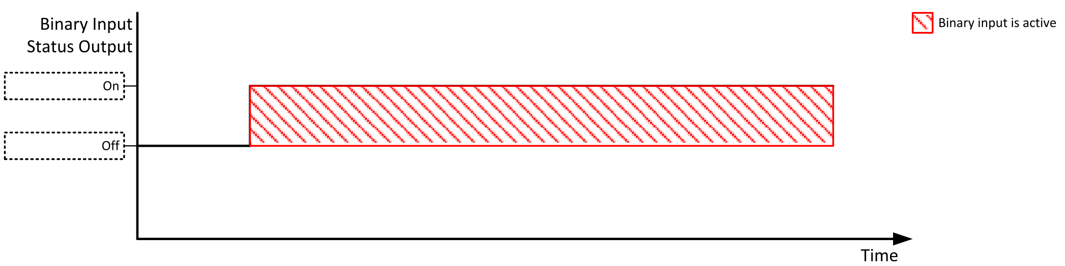


Image 8.163 Binary Input 1 Status

back to Logical binary outputs alphabetically

BIN 2 Status

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1375		

Description

This output is active when Binary Input 2 is active and open when Binary Input 2 is inactive. When Binary Input 2 is used for BIN protection function then this output is active when BIN protection alarm is in Alarmlist.

> ***Note:*** *When LBI 2 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

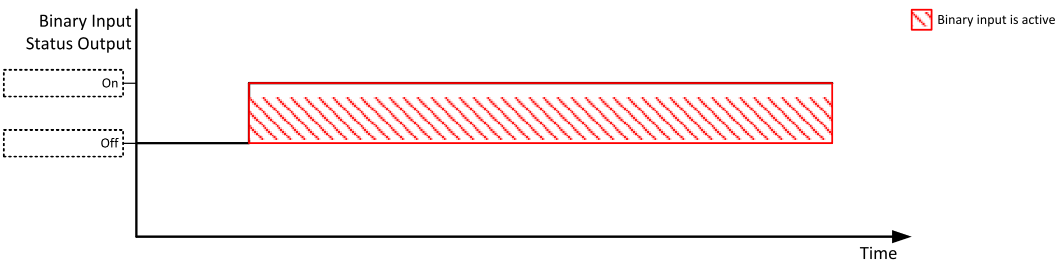


Image 8.164 Binary Input 2 Status

back to Logical binary outputs alphabetically

BIN 3 Status

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1376		

Description

This output is active when Binary Input 3 is active and open when Binary Input 3 is inactive. When Binary Input 3 is used for BIN protection function then this output is active when BIN protection alarm is in Alarmlist.

> ***Note:*** *When LBI 3 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

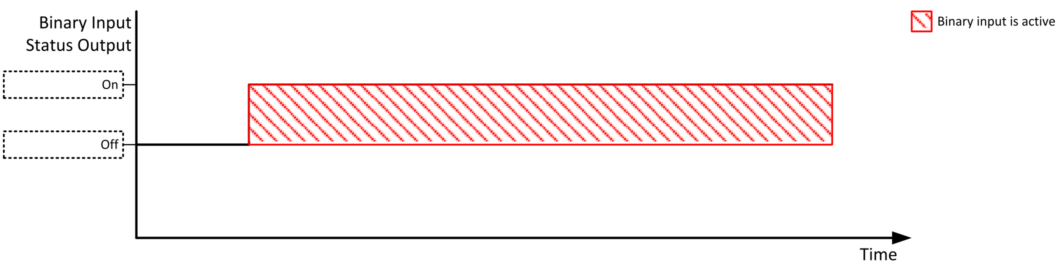


Image 8.165 Binary Input 3 Status

back to Logical binary outputs alphabetically

BIN 4 Status

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1377		

Description

This output is active when Binary Input 4 is active and open when Binary Input 4 is inactive. When Binary Input 4 is used for BIN protection function then this output is active when BIN protection alarm is in Alarmlist.

> ***Note:*** *When LBI 4 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

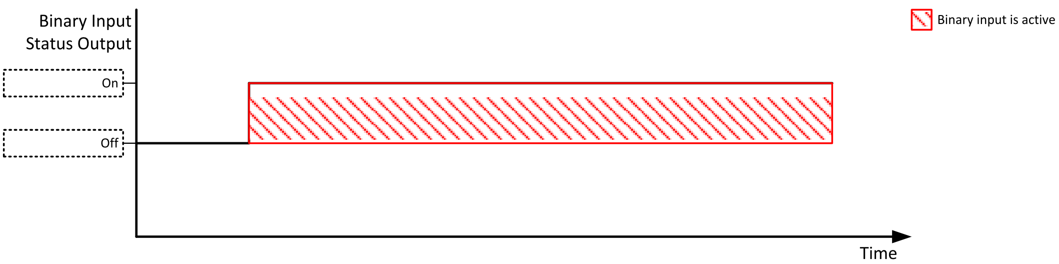


Image 8.166 Binary Input 4 Status

back to Logical binary outputs alphabetically

BIN 5 Status

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1378		

Description

This output is active when Binary Input 5 is active and open when Binary Input 5 is inactive. When Binary Input 5 is used for BIN protection function then this output is active when BIN protection alarm is in Alarmlist.

> ***Note:*** *When LBI 5 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

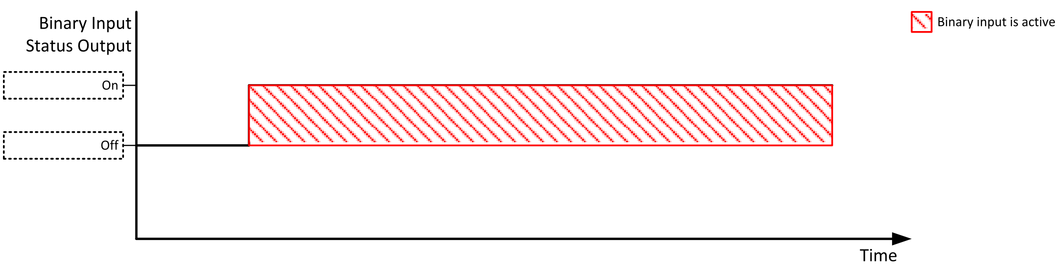


Image 8.167 Binary Input 5 Status

back to Logical binary outputs alphabetically

BIN 6 Status

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1379		

Description

This output is active when Binary Input 6 is active and open when Binary Input 6 is inactive. When Binary Input 6 is used for BIN protection function then this output is active when BIN protection alarm is in Alarmlist.

Note: *When LBI 6 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

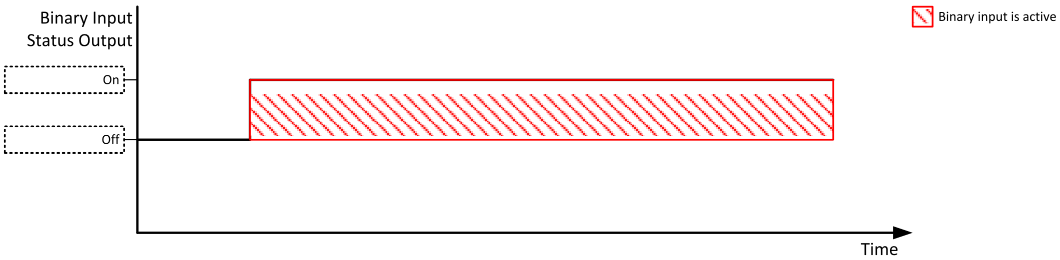


Image 8.168 Binary Input 6 Status

back to Logical binary outputs alphabetically

BIN 7 Status

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1380		

Description

This output is active when Binary Input 7 is active and open when Binary Input 7 is inactive. When Binary Input 7 is used for BIN protection function then this output is active when BIN protection alarm is in Alarmlist.

Note: *When LBI 7 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

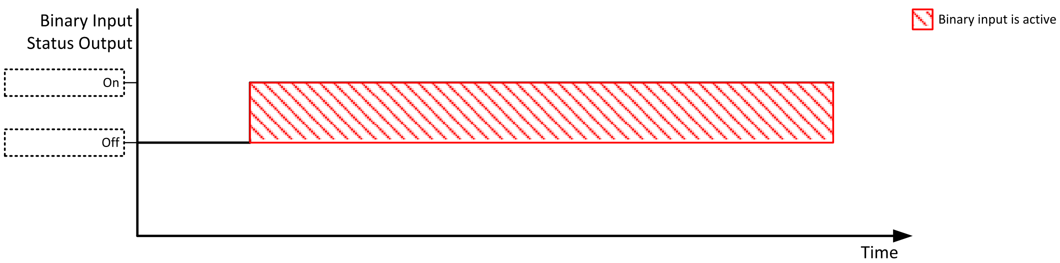


Image 8.169 Binary Input 7 Status

back to Logical binary outputs alphabetically

BIN 8 Status

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	1381		
Description			
This output is active when Binary Input 8 is active and open when Binary Input 8 is inactive. When Binary Input 8 is used for BIN protection function then this output is active when BIN protection alarm is in Alarmlist. ***Note:*** *When LBI 8 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*			

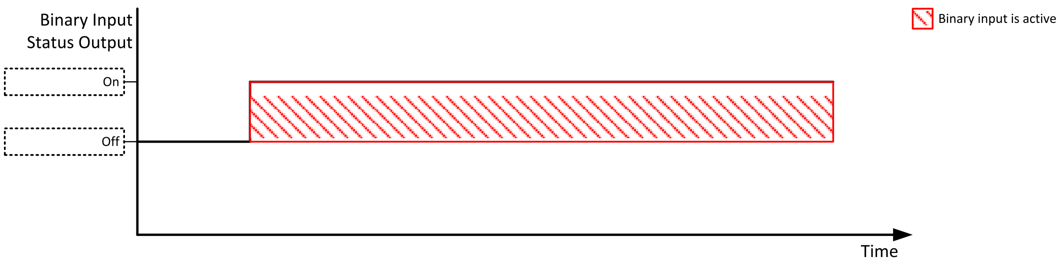


Image 8.170 Binary Input 8 Status

back to Logical binary outputs alphabetically

Bus Healthy

Related FW	1.6.0	Related applications	MINT
Comm object	79		
Description			
This output is active when the bus voltage and frequency are within limits. The limits for under/overvoltage and under/overfrequency are the same as for generator voltage / frequency and can be found in the Generator Settings setpoint group. It works only with **Application Mode Select (page 248)**= MINT, the output is always inactive with **Application Mode Select (page 248)** = SPTM.			

back to Logical binary outputs alphabetically

LBO: C

Cooling Pump

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	40		
Description			
This output is dedicated for coolant pump control. It is activated in the moment the Gen-set is started and remains active until the Gen-set is stopped and **After Cooling Time (page 309)** elapses or the cranking pause or the Emergency Stop occurs or the controller is switched to OFF mode.			

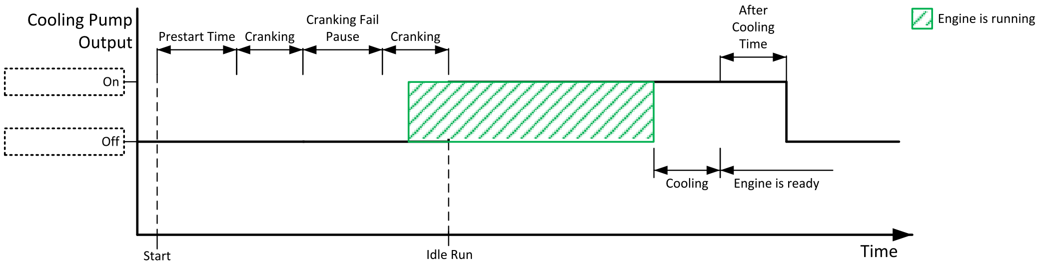


Image 8.171 Cooling Pump

back to Logical binary outputs alphabetically

Cooling

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	74		
Description			
The output is active when Gen-set is in Cooling state.			

back to Logical binary outputs alphabetically

LBO: D

Display Fail

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	74		
Description			
This output indicates controller display failure.			

back to Logical binary outputs alphabetically

LBO: E

ECU Communic Error

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	114		
Description			
This output is active when an ECU is configured, but the communication with the ECU is not established or has dropped out. ***Note:** When **ECU Power Relay (page 772)** is not configured, output is evaluated all the time. If **ECU Power Relay (page 772)** is configured, output is evaluated only when engine is not stop (**ECU Power Relay (page 772)** is active).*			

back to Logical binary outputs alphabetically

ECU Communic OK

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	347		
Description			
This output is active when an ECU is configured, connected and the communication with the ECU is established. ***Note:** When **ECU Power Relay (page 772)** is not configured, output is evaluated all the time. If **ECU Power Relay (page 772)** is configured, output is evaluated only when engine is not stop (**ECU Power Relay (page 772)** is active).*			

back to Logical binary outputs alphabetically

ECU Power Relay

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	116		

Description

This output is to be used for control of "keyswitch" input of an ECU. If the particular ECU does not have keyswitch or a similar input, it can be used for control of DC power for the ECU.

The output is activated together with **PRESTART (PAGE 797)** and remains active for the entire duration that the engine is running. It is deactivated at the moment that the engine comes to a stop (i.e. together with the **FUEL SOLENOID (PAGE 775)**).

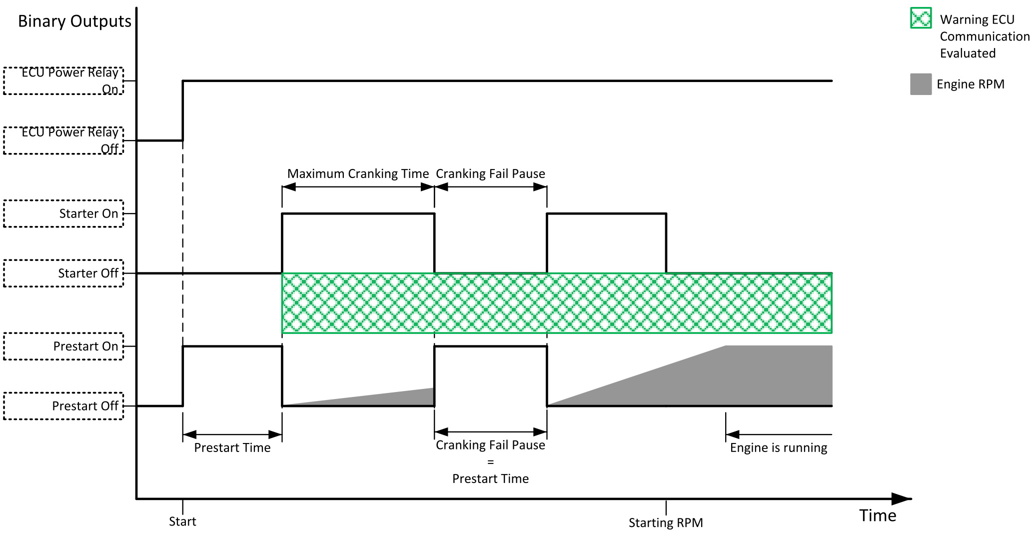


Image 8.172 ECU Power Relay

back to Logical binary outputs alphabetically

ECU Red Lamp

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	350		

Description

This output is active when the ECU sends an active “red lamp” flag, i.e. it has detected a critical malfunction and the engine should not be operated until a service check is performed. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all.

back to Logical binary outputs alphabetically

ECU Run Stop

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	958		

Description

Signal for starting and stopping of ECU.

back to Logical binary outputs alphabetically

ECU Wait To Start

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	959		
Description			
This output is active when ECU Wait To Start Lamp is active.			

back to Logical binary outputs alphabetically

ECU Yellow Lamp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	349		
Description			
This output is active when the ECU sends an active “yellow lamp” flag, i.e. it has detected a non-critical malfunction. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all.			

back to Logical binary outputs alphabetically

Engines Swapped

Related FW	1.6.0	**Related applications**	MINT
Comm object	208		
Description			
When the master controller (controller with the lowest Controller Address) swaps priority of two Gen-sets, it generates 100ms pulse with the output. The output works with the **#Priority Auto Swap (page 376)** option RunHourEql.			

back to Logical binary outputs alphabetically

Exercise Timer 1

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1250		
Description			
This is an output from the Exercise timer 1. This output makes it easy to make periodic tests of the Gen-set and its activation depends on the setpoints in the **Subgroup: Timer 1 (page 476)** subgroup. This output is active when Timer 1 is active. ***Note:** In the event that both Timers are active at the same time, **Subgroup: Timer 1 (page 476)** has a higher priority than **Subgroup: Timer 2 (page 483)**.*			

back to Logical binary outputs alphabetically

Exercise Timer 2

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1251		
Description			
This is an output from the Exercise timer 2. This output makes it easy to make periodic tests of the gen-set and its activation depends on the setpoints in the **Subgroup: Timer 2 (page 483)** subgroup. This output is active when Timer 2 is active. ***Note:*** *In the event that both Timers are active at the same time,* ***Subgroup: Timer 1 (page 476)*** *has a higher priority than* ***Subgroup: Timer 2 (page 483)****.*			

back to Logical binary outputs alphabetically

LBO: F

FltRes Button Echo

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	592		
Description			
This output provides 1s pulse when: › Fault Reset button is pressed on the controller front facia 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 **FAULT RESET BUTTON (PAGE 719)** is activated.			

back to Logical binary outputs alphabetically

Forward Synchronisation

Related FW	1.6.0	**Related applications**	MINT, SPtM, SPI
Comm object	68		
Description			
the output is active during forward synchronization and is opened when GCB is closed or forward synchronisation is interrupted. ***Note:*** *The output can be used for control of an external synchronizing module.*			

back to Logical binary outputs alphabetically

Frequency Select

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1815		
Description			
The Frequency select output is active when Nominal Frequency (Frequency Settings) is equal to 50 Hz and is deactivated when Nominal Frequency (Frequency Settings) is equal to 60 Hz.			

back to Logical binary outputs alphabetically

Fuel Pump

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1253		
Description			

Output is activated when the value of Fuel Level lies under the value of setpoint **Fuel Pump On (page 327)** and is deactivated when value of **Fuel Pump Off (page 328)** is reached.

This output also can be activated by binary input **FUEL PUMP ON/OFF (PAGE 722)**. In this case the binary output is active until the binary input **FUEL PUMP ON/OFF (PAGE 722)** is active or until the value of Fuel Level reaches 100 % or the time set by setpoint **Transfer Wrn Delay (page 329)** elapsed.

Note: *Setpoints and are invisible until configuration of this LBO.*

back to Logical binary outputs alphabetically

Fuel Solenoid

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	22		
Description			

This output controls the fuel solenoid valve. The Fuel Solenoid output has two different behaviors depending on engine type – gas or diesel. This setting is done by **Fuel Solenoid (page 298)** setpoint in Engine Settings group.

Diesel:

The output is activated before binary output **STARTER (PAGE 803)**.The lead time is adjusted by setpoint **Fuel Solenoid Lead (page 302)**.

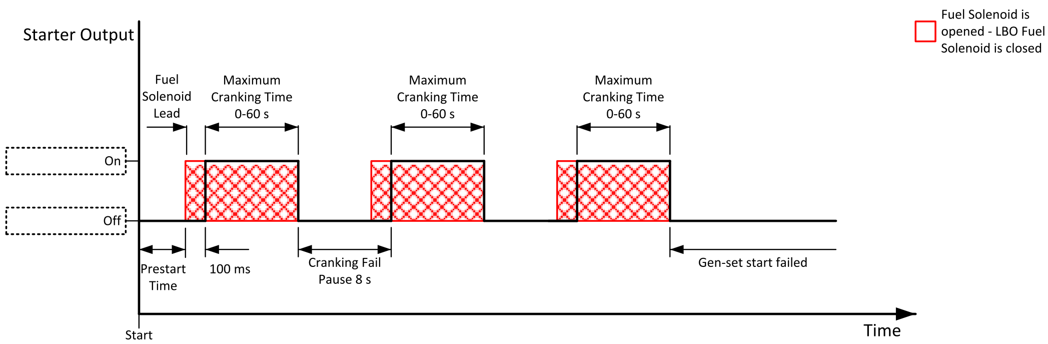


Image 8.173 Fuel Solenoid 1

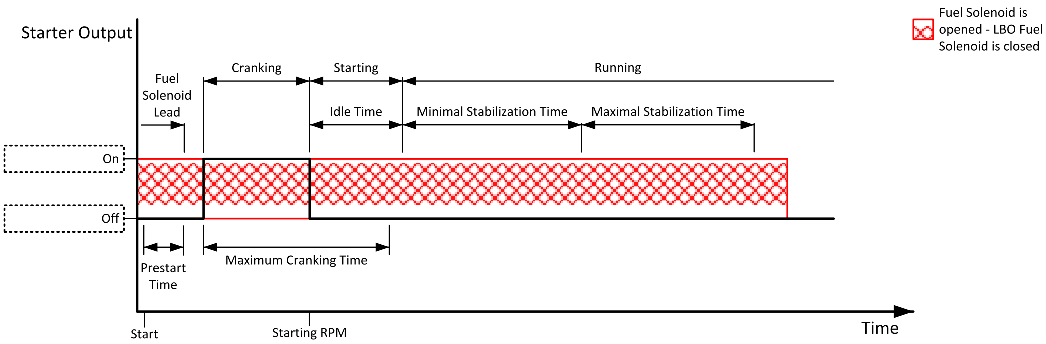


Image 8.174 Fuel Solenoid 2

The output is deactivated when:

- Emergency Stop comes
- Cooled Gen-set is stopped
- In pause between repeated starts

Gas:

The output closes together with binary output **IGNITION (PAGE 786)** when engine RPM exceed 30 RPM (fix value).

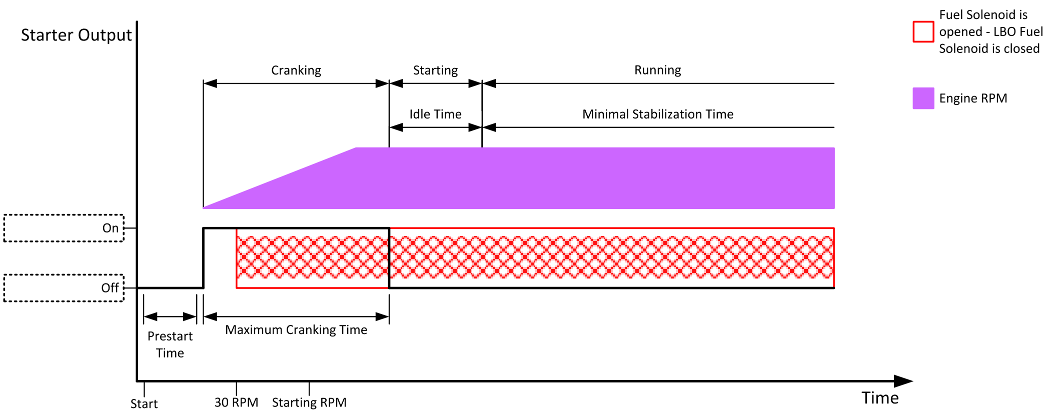


Image 8.175 Fuel Solenoid 3

The output is deactivated when:

- Emergency Stop comes
- Cooled Gen-set is stopped
- In pause between repeated starts

back to Logical binary outputs alphabetically

LBO: G

GCB Button Echo

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	35		
Description			
This output provides 1s pulse when: › GCB button is pressed on the controller front facia or › GCB button is pressed on any of external local/remote terminals or › GCB command is received via communication line or › the input GCB BUTTON is activated.			

back to Logical binary outputs alphabetically

GCB Close/Open

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	41		
Description			
The output controls the generator circuit breaker. Its state represents the breaker position requested by the controller. The breaker must react within 5 seconds to a close or open command, otherwise an alarm is issued. ***Note:*** *InteliGen 500 controllers can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*			

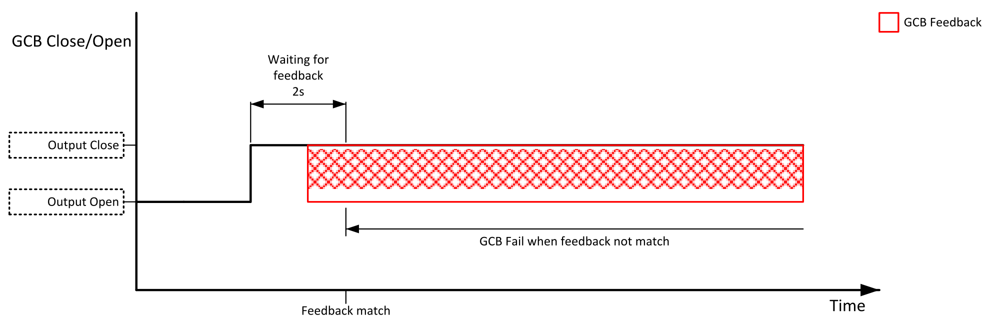


Image 8.176 GCB Open command

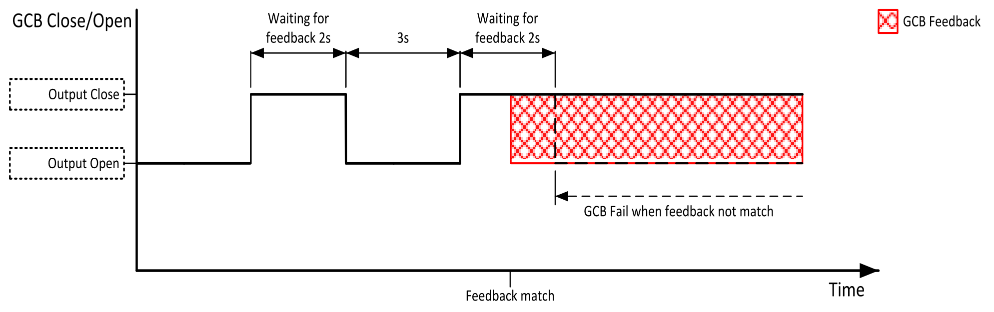


Image 8.177 GCB Open command

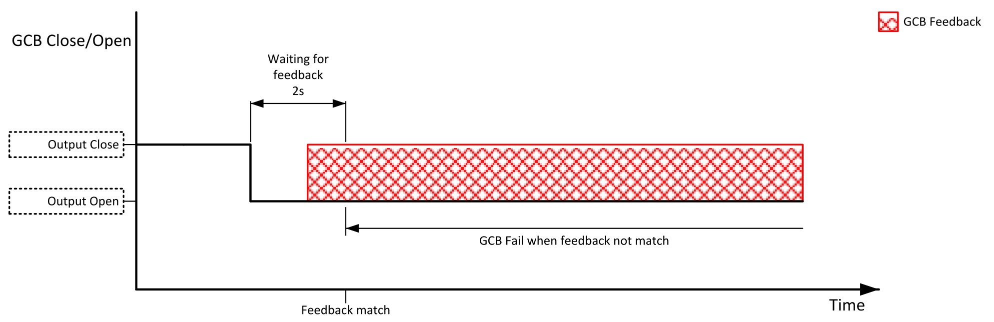


Image 8.178 GCB Open command

back to Logical binary outputs alphabetically

GCB OFF Coil

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	43		
Description			
The output is intended for control of open coil of generator circuit breaker. The output gives a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 5 seconds.			

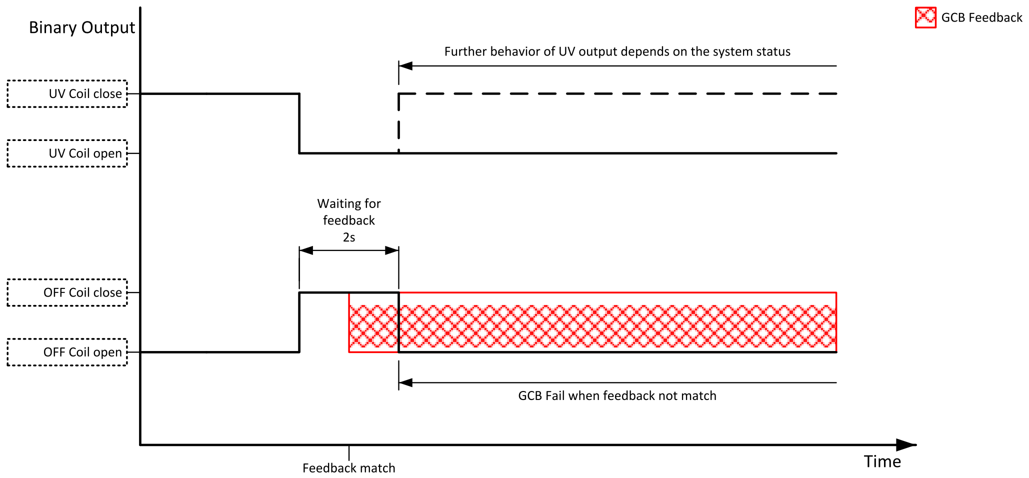


Image 8.179 GCB OFF Coil command

back to Logical binary outputs alphabetically

GCB ON Coil

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	42		
Description			
The output is intended for control of close coil of generator circuit breaker. The output gives at least 5 second pulse in the moment the breaker has to be closed.			

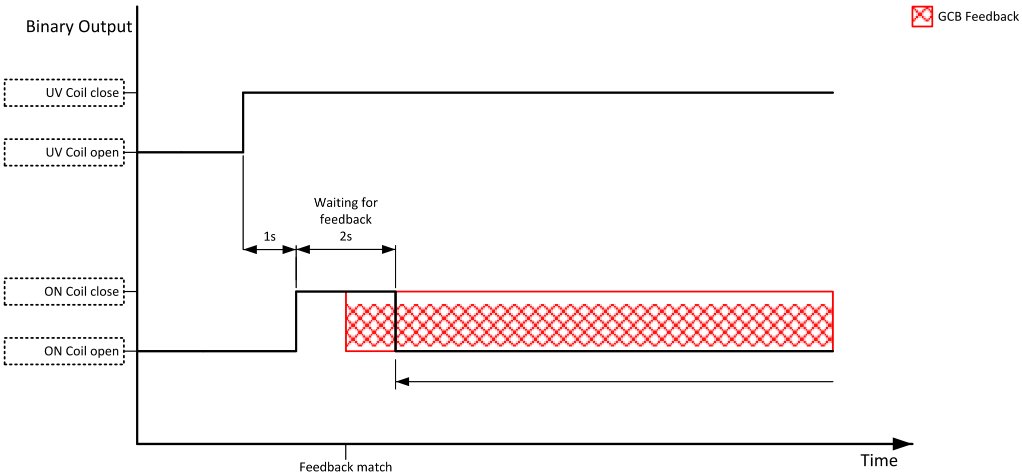


Image 8.180 GCB ON Coil close command

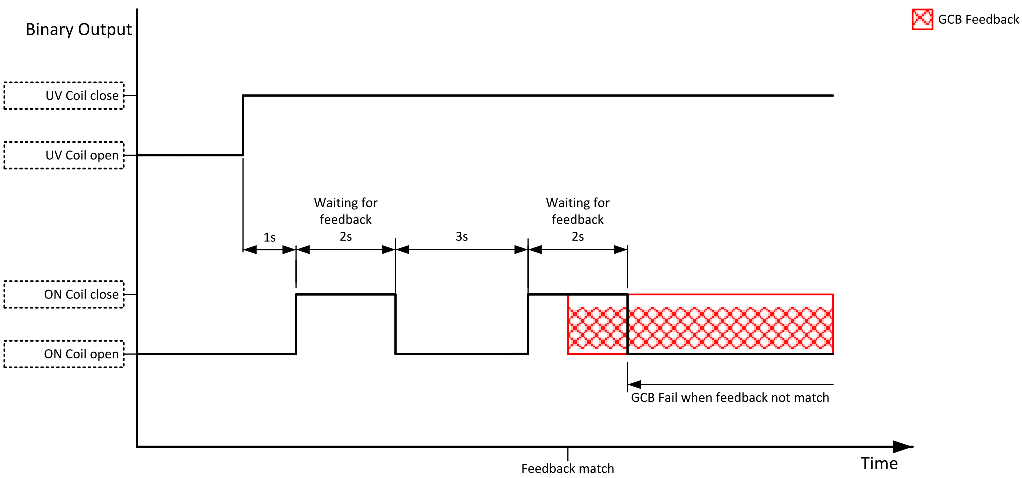


Image 8.181 Repeated GCB ON coil close command

back to Logical binary outputs alphabetically

GCB UV Coil

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	44		
Description			
The output is intended for control of undervoltage coil of generator circuit breaker. The output is active the whole time when the generator is running. The output is deactivated for at least 5 seconds in the moment			

the breaker has to be switched off.

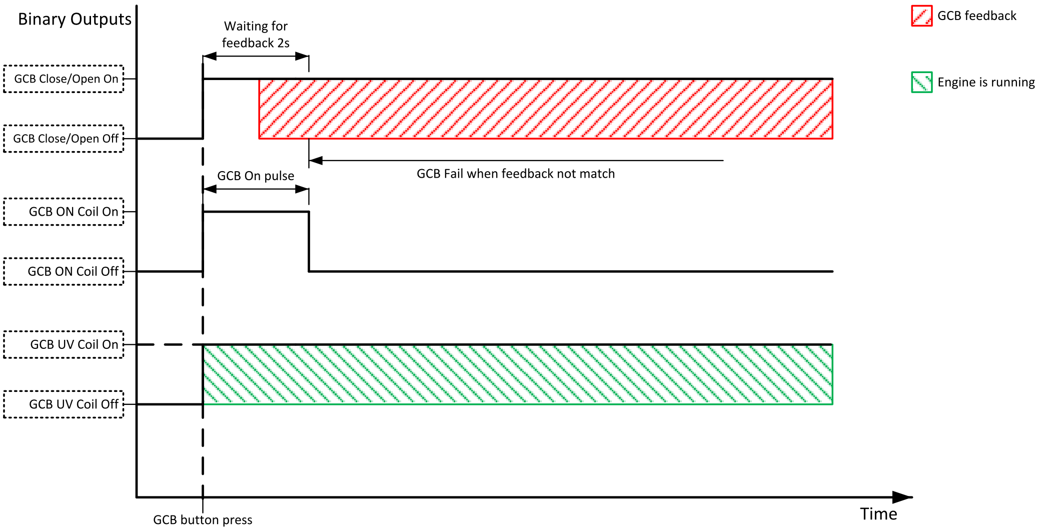


Image 8.182 GCB UV Coil close command

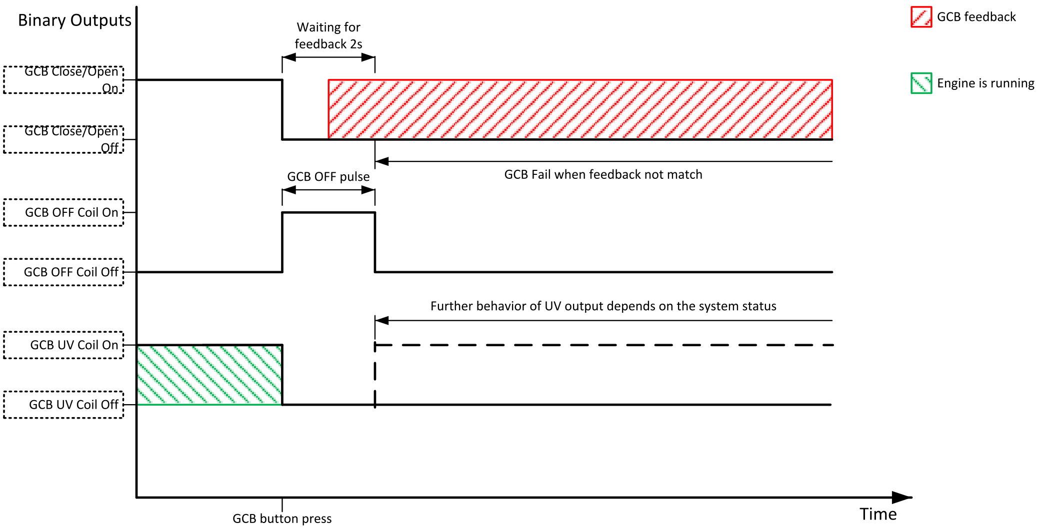


Image 8.183 GCB UV Coil open command

back to Logical binary outputs alphabetically

Generator Healthy

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	77		

Description

This output is active when the generator voltage, frequency and voltage unbalance is within limits. It is deactivated:

- immediately when the voltage/frequency/voltage unbalance gets out of limits (when GCB is not closed)
  or
- with an appropriate delay after the voltage/frequency/voltage unbalance has got out of limits (when GCB is closed)

back to Logical binary outputs alphabetically

Glow Plugs

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1252		

Description

This output is dedicated for diesel engine only. This output will be active for exact time pre-set by setpoint **Glow Plugs Time (page 301)** before every starting attempt. The output is deactivated at the same time as the **STARTER (PAGE 803)** output is activated (100 ms after **PRESTART (PAGE 797)** output is deactivated).

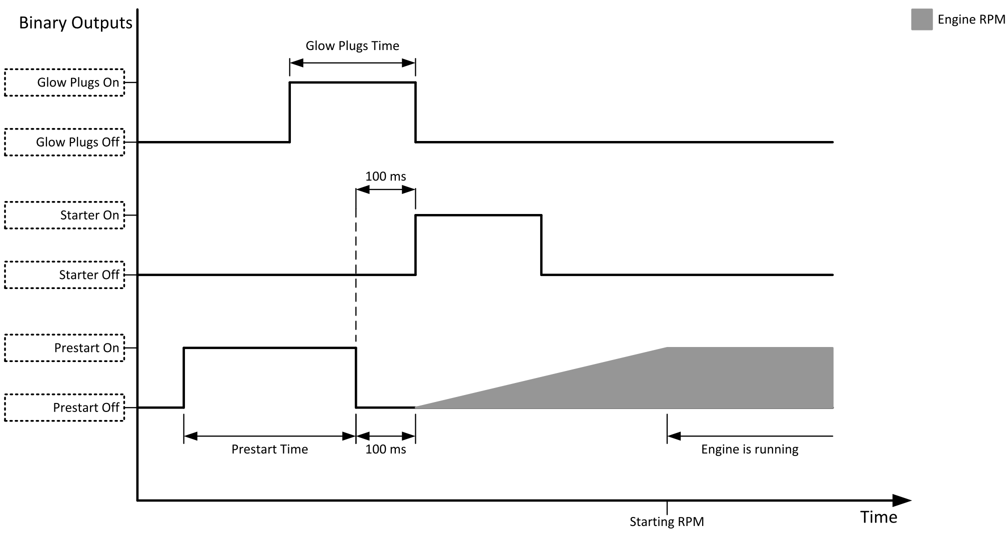


Image 8.184 Glow Plugs

When the **Glow Plugs Time (page 301)** is longer than **Cranking Fail Pause (page 299)** then the **Glow Plugs Time (page 301)** in **Cranking Fail Pause (page 299)** as long as **Cranking Fail Pause (page 299)**.

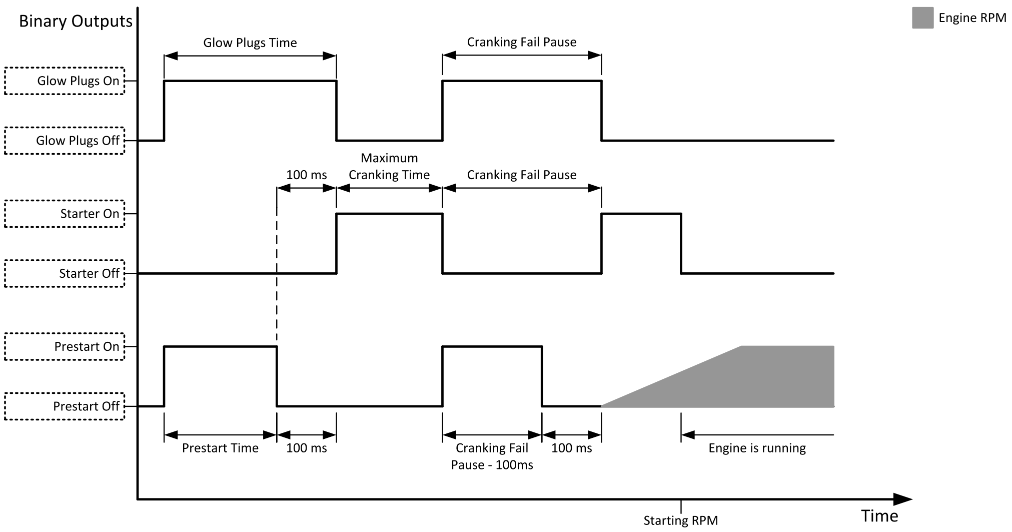


Image 8.185 Glow Plugs in Cranking Fail Pause 1

When the **Glow Plugs Time (page 301)** is shorter than **Cranking Fail Pause (page 299)** then the **Glow Plugs Time (page 301)** in **Cranking Fail Pause (page 299)** as long as the normal **Glow Plugs Time (page 301)**.

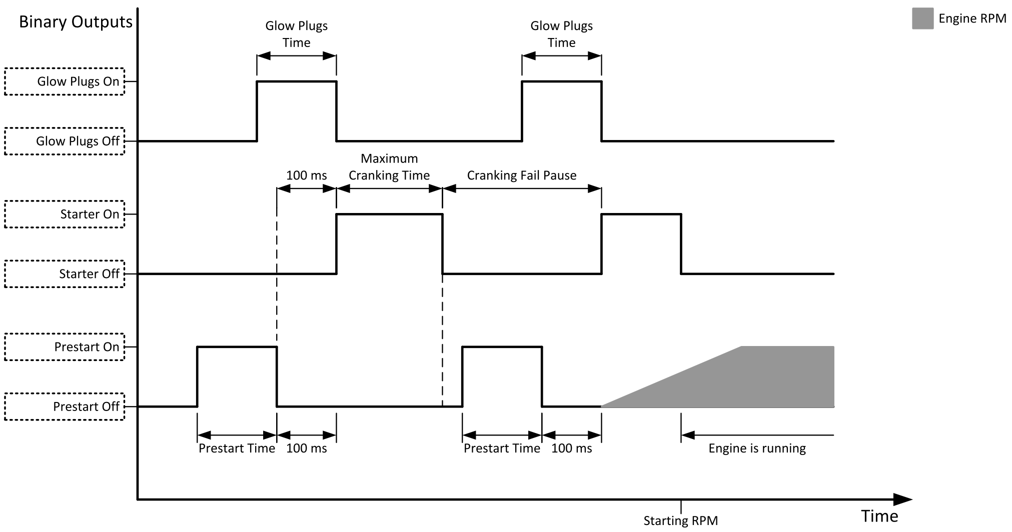


Image 8.186 Glow Plugs in Cranking Fail Pause 2

back to Logical binary outputs alphabetically

LBO: H

Heartbeat

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	81		
Description			
This output toggles on/off in a period of 500 ms whenever the controller is switched on and functional.			

back to Logical binary outputs alphabetically

HEST Lamp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1373		
Description			
This output is active if ECU sends signal HEST Lamp. If ECU stops sending HEST LAMP signal binary input will be opened. Confirmation of alarms in alarmlist has no effect on this binary output.			

back to Logical binary outputs alphabetically

Horn

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1		
Description			
The output designed to be used for acoustic indication of a newly appeared alarm. The output is activated each time a new alarm has appeared and remains active until one of the following events occurs: › Fault reset is pressed › Horn reset is pressed › **Horn Timeout (page 275)** has elapsed			

back to Logical binary outputs alphabetically

HornRes Button Echo

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	31		
Description			
This output provides 1s pulse when: › Horn Reset button is pressed on the controller front facia 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 HORN RESET BUTTON is activated.			

back to Logical binary outputs alphabetically

LBO: I

Idle/Nominal

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	39		
Description			

This output is used for switching between idle speed and nominal speed of the engine during the startup phase, if this feature (input) is available on the particular engine. In the case of some EFI engines, the idle/nominal switching is performed over the communication bus.

The output Idle/Nominal is activated after the timer **Idle Time (page 302)** elapses. The **Idle Time (page 302)** starts to countdown when **Starting RPM (page 300)** reached. The underspeed protection is not evaluated during fixed 5 seconds period after reaching **Starting RPM (page 300)**. A Start Fail protection occurs if the RPM drop below 2RPM during idle.

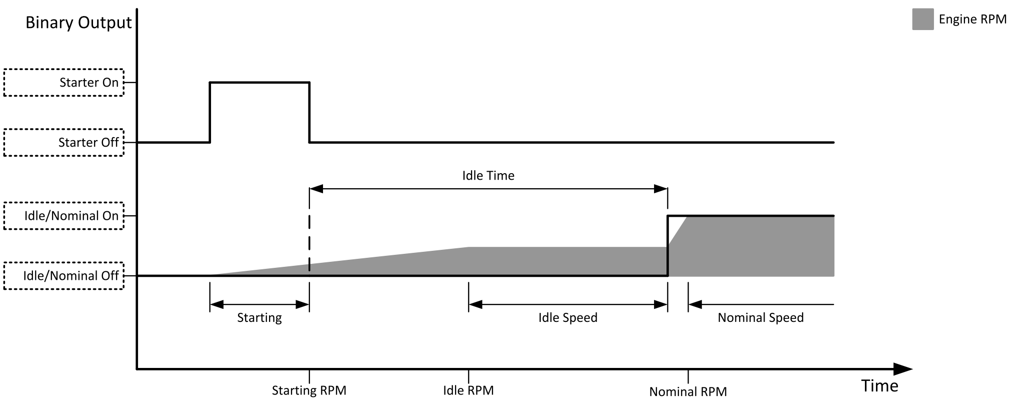


Image 8.187 Idle/Nominal

Note: *Connect binary output Idle/Nominal to speed governor to switch the speed:*
opened = Idle
closed = Nominal
(for normally open contact type)

back to Logical binary outputs alphabetically

Idle/Nominal Pulse

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	39		
Description			

200ms pulse is generated when transition from the Starting to the Running state is done. It means that the pulse is generated when the LBO: **IDLE/NOMINAL (PAGE 785)** is activated.

back to Logical binary outputs alphabetically

Ignition

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	37		
Description			

This output is dedicated to controlling the ignition at a gas engine. the output is active together with binary output **FUEL SOLENOID (PAGE 775)** in the moment when the timer **Sd Ventilation Time (page 306)** elapsed and the Gen-set reaches at least 30 RPM during cranking. The timer **Sd Ventilation Time (page 306)** become active when the Gen-set has been stopped for any Sd protection or the controller has been turned on only before first cranking attempt. The output is deactivated 500 ms after all **Additional running engine indications (page 184)** will be inactive. the output is deactivated when the Gen-set has to be stopped or in pause during repeated starts.

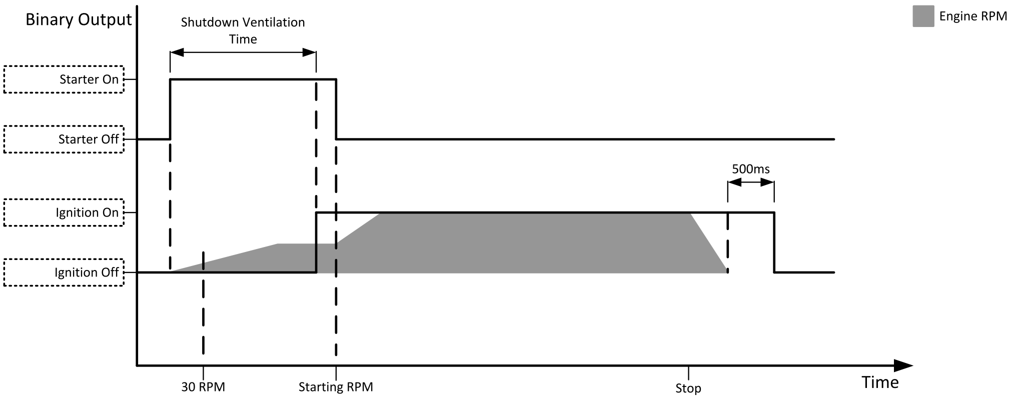


Image 8.188 Ignition 1

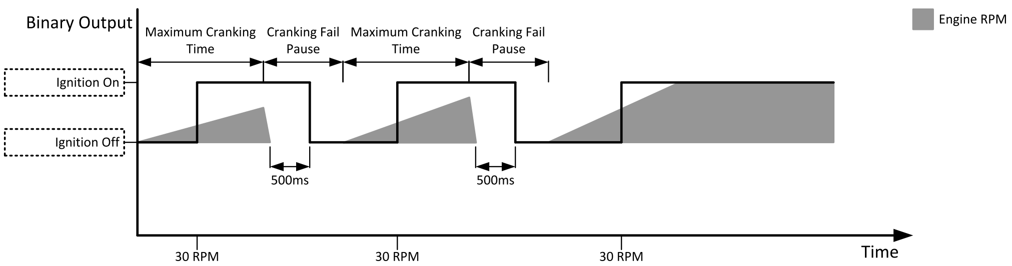


Image 8.189 Ignition 2

back to Logical binary outputs alphabetically

Ignition On

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1257		
Description			
This output is on since start button is pressed till the unit is completely stopped (or the engine doesn't start or Sd or E-Stop is active) ***Note:*** *This function is the same as* ***ECU Power Relay (page 772)****. Ignition ON stays there from historical reasons.*			

back to Logical binary outputs alphabetically

In Synchronism

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	80		
Description			
This output is closed **during synchronization** when all synchro conditions have been fulfilled. the output is deactivated 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.			

back to Logical binary outputs alphabetically

LBO: K

kWh Pulse

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	206		
Description			
This output generates a 100ms pulse whenever the internal kWh counter is incremented.			

back to Logical binary outputs alphabetically

LBO: L

Load Shedding Stage 1

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	51		
Description			
Particular instances of the load shedding functionality The load shedding outputs are activated (load is being shedd) in the order 1, 2, 3. The load shedding outputs are deactivated (load is being reconnected) in the order 3, 2, 1. The load disconnected by the LBO Nr.1 is the less essential load of these three possible loads instances.			

back to Logical binary outputs alphabetically

Load Shedding Stage 2

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	52		
Description			
Particular instances of the load shedding functionality The load shedding outputs are activated (load is being shedd) in the order 1, 2, 3. The load shedding outputs are deactivated (load is being reconnected) in the order 3, 2, 1. The load disconnected by the LBO Nr.1 is the less essential load of these three possible loads instances.			

back to Logical binary outputs alphabetically

Load Shedding Stage 3

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	53		
Description			
Particular instances of the load shedding functionality The load shedding outputs are activated (load is being shedd) in the order 1, 2, 3. The load shedding outputs are deactivated (load is being reconnected) in the order 3, 2, 1. The load disconnected by the LBO Nr.1 is the less essential load of these three possible loads instances.			

back to Logical binary outputs alphabetically

LBO: M

Mains Healthy

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	78		
Description			
This output is active while Mains failure is not detected and Mains voltage and frequency is within limits. It works only with Application Mode Select = SPTM, the output is always inactive with Application Mode Select = MINT.			

back to Logical binary outputs alphabetically

Manual Ready

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1258		
Description			
This output is active when controller is in MAN mode and the engine is stopped and it is possible to start it i.e. no red alarm is activated or **SD OVERRIDE (PAGE 734)** is active (Output **READY (PAGE 800)** is active).			

back to Logical binary outputs alphabetically

MCB Button Echo

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	34		
Description			
This output provides 1s pulse when: › MCB button is pressed on the controller front facia or › MCB button is pressed on any of external local/remote terminals or › MCB command is received via communication line or › the input MCB BUTTON is activated.			

back to Logical binary outputs alphabetically

MCB Close/Open

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	45		
Description			

The output controls the mains circuit breaker. Its state represents the breaker position requested by the controller. The breaker must react within 5 seconds to a close or open command, otherwise an alarm is issued.

> ***Note:** InteliGen 500 controllers can work even without breaker feedbacks, in this case do not configure the feedback to binary inputs.*

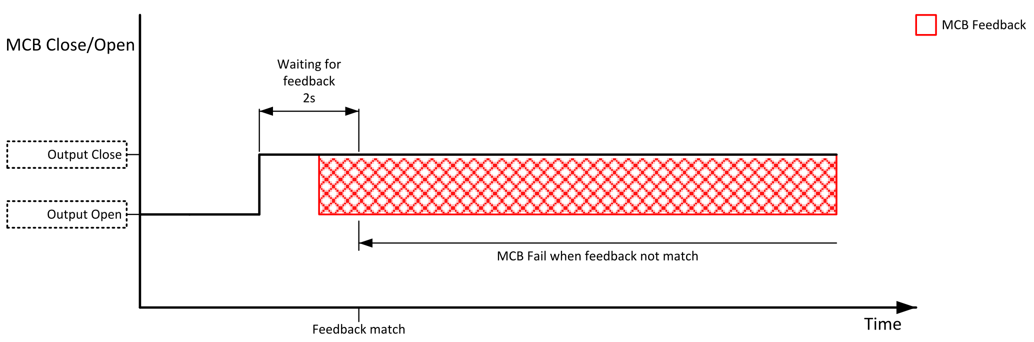


Image 8.190 MCB Close command

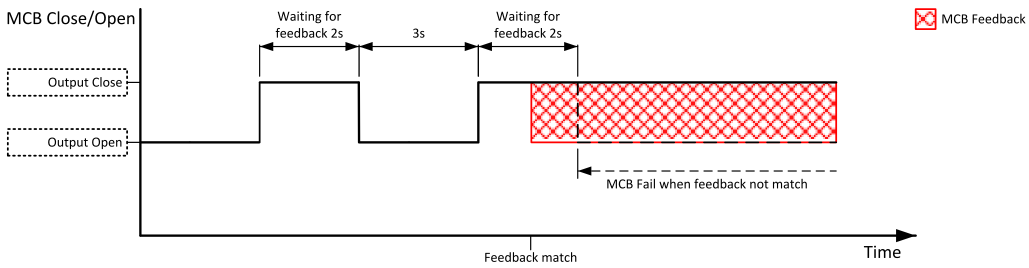


Image 8.191 Repeated MCB Close command

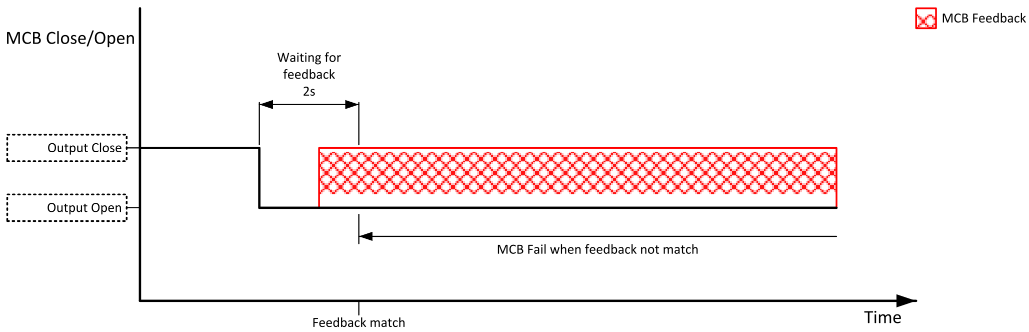


Image 8.192 MCB Open command

back to Logical binary outputs alphabetically

MCB OFF Coil

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	47		

Description

The output is intended for control of open coil of mains circuit breaker. The output gives a pulse in the moment the breaker has to be opened. The pulse lasts until the feedback deactivates, but at least for 5 seconds.

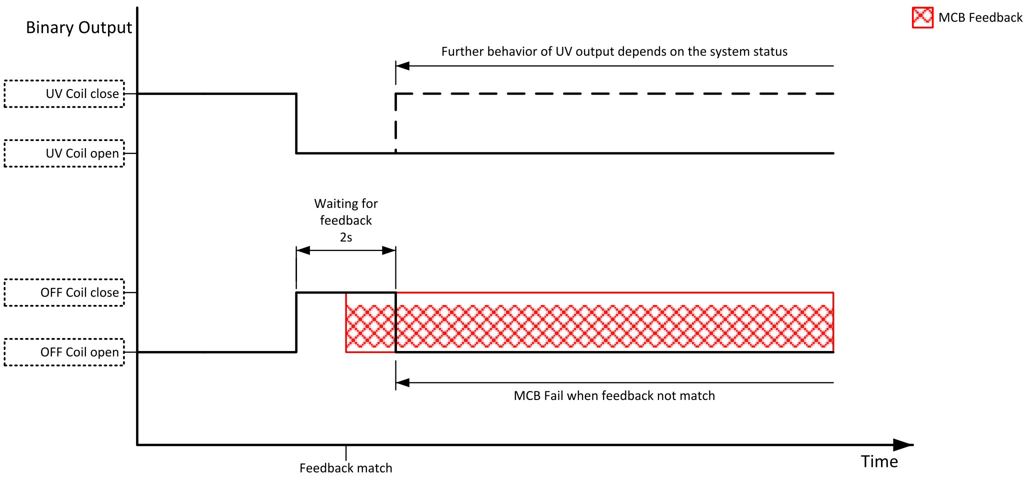


Image 8.193 MCB OFF Coil command

back to Logical binary outputs alphabetically

MCB ON Coil

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	46		
Description			
The output is intended for control of close coil of mains circuit breaker. The output gives at least 5 second pulse in the moment the breaker has to be closed.			

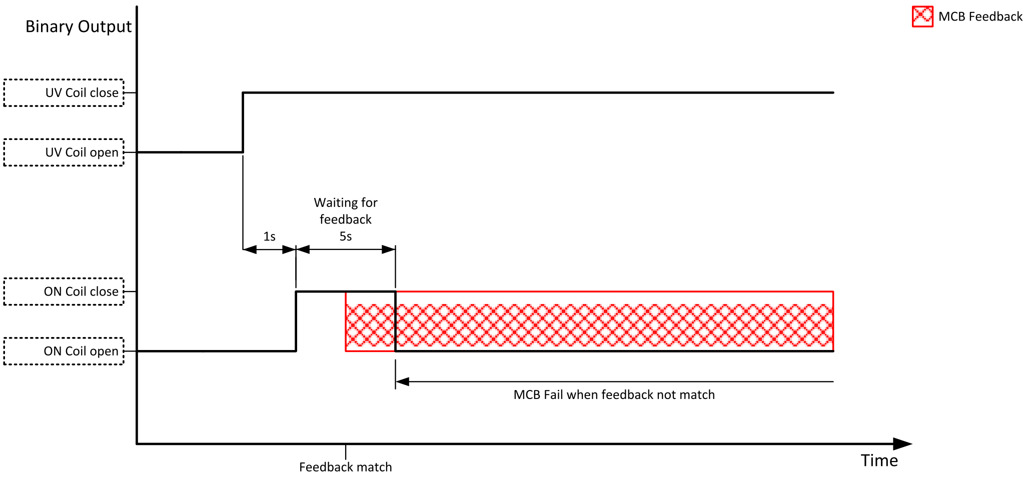


Image 8.194 MCB ON Coil close command

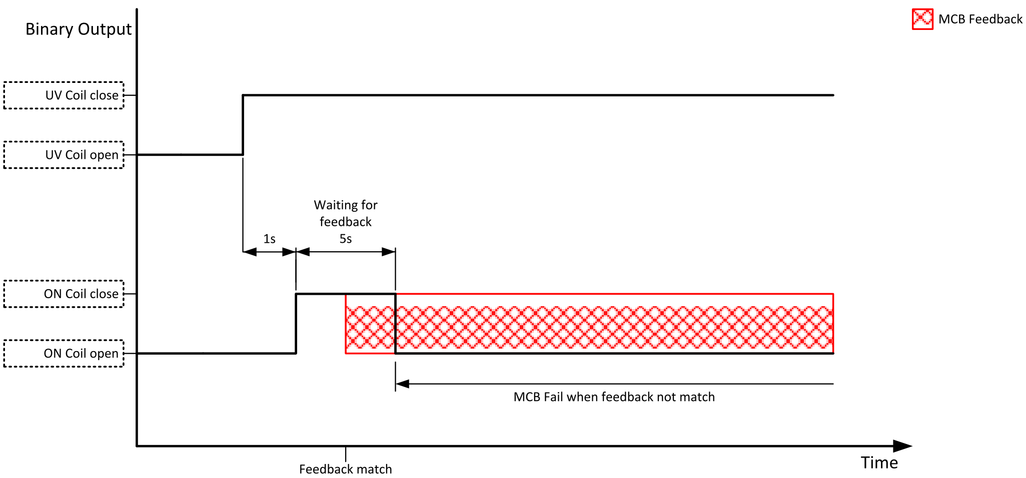


Image 8.195 MCB ON Coil close command

back to Logical binary outputs alphabetically

MCB UV Coil

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	48		

Description

The output is intended for control of undervoltage coil of mains circuit breaker. The output is active the whole time when the controller is switched on. The output is deactivated for at least 5 seconds in the moment the breaker has to be switched off.

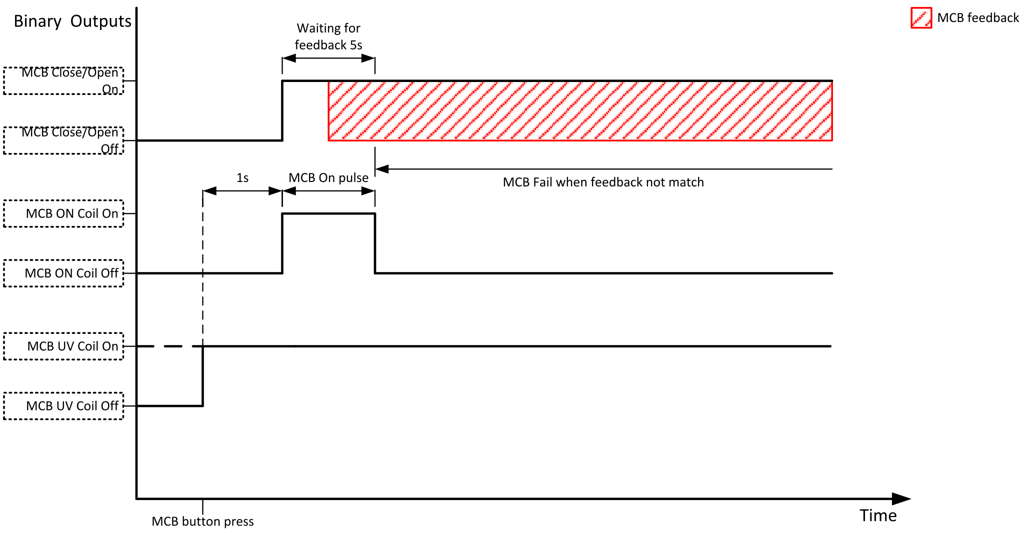


Image 8.196 MCB UV Coil close command

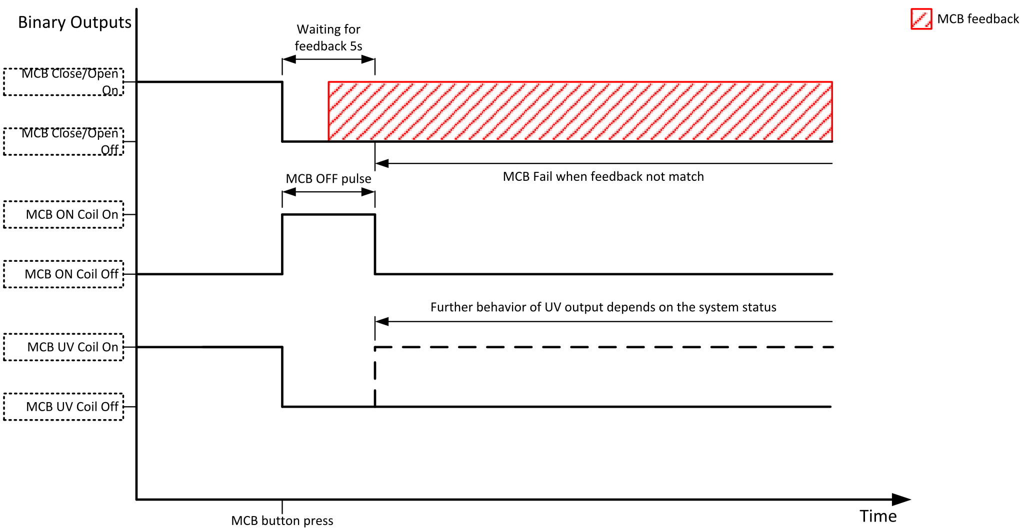


Image 8.197 MCB UV Coil open command

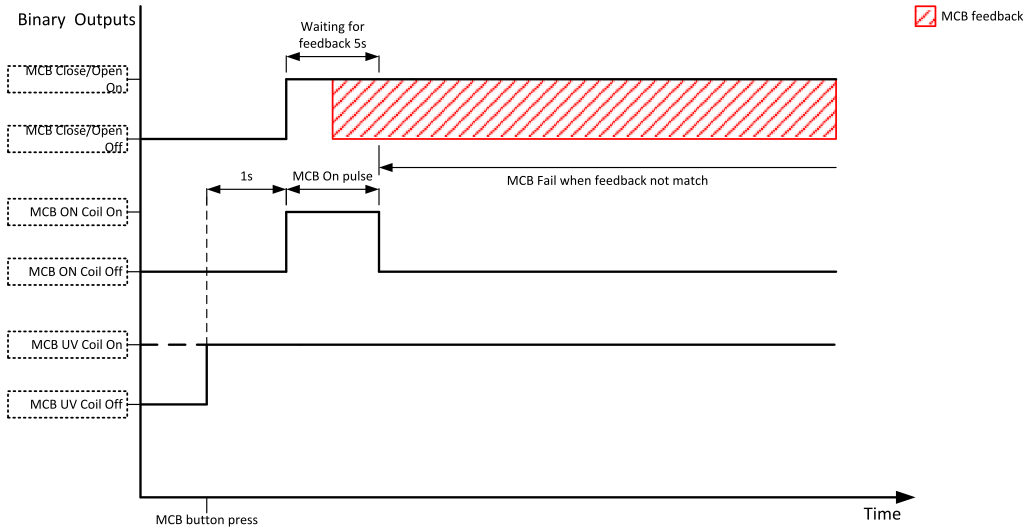


Image 8.198 MCB UV Coil close command

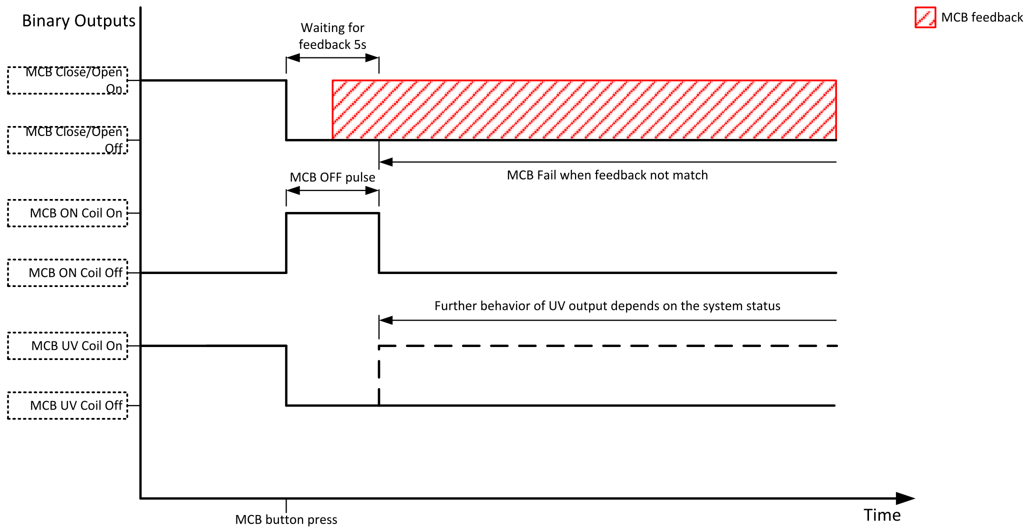


Image 8.199 MCB UV Coil close command

back to Logical binary outputs alphabetically

Mode AUTO

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	19		
Description			
This output is active whenever the controller is in AUTO mode.			

back to Logical binary outputs alphabetically

Mode MAN

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	18		
Description			
This output is active whenever the controller is in MAN mode.			

back to Logical binary outputs alphabetically

Mode OFF

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	17		
Description			
This output is active whenever the controller is in OFF mode.			

back to Logical binary outputs alphabetically

Mode TEST

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	20		
Description			
This output is active whenever the controller is in TEST mode.			

back to Logical binary outputs alphabetically

LBO: N

NCB Close/Open

Related FW	1.6.0	Related applications	MINT
Comm object	50		
Description			
Neutral circuit breaker Close/Open output controls the generator neutral circuit breaker. It is intended for contactors – provides a continual active signal if NCB should be closed.			

back to Logical binary outputs alphabetically

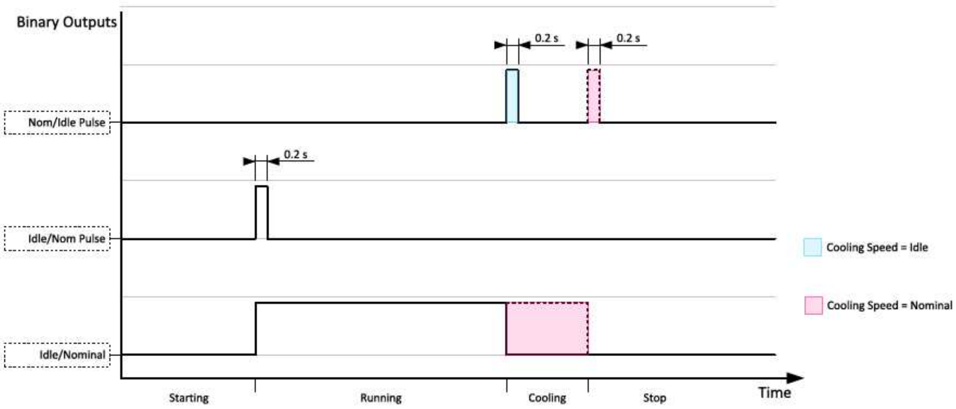
Nominal/Idle Pulse

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1903		
Description			

This function generates a pulse when transition to the Cooling or Stop state is done.

- **Cooling Speed (page 307)** = Idle
  - 200 ms pulse is generated when transition from the Running to the Cooling state is done.
- **Cooling Speed (page 307)**= Nominal
  - 200 ms pulse is generated when transition from the Cooling to the Stop state is done.

It means that the pulse is generated when the LBO:**IDLE/NOMINAL (PAGE 785)** is deactivated.



back to Logical binary outputs alphabetically

Not In AUTO

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1248		
Description			
This output is active when controller isn't in AUTO mode.			

back to Logical binary outputs alphabetically

Not Used

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	286		
Description			
Output has no function.			

back to Logical binary outputs alphabetically

LBO: P

Peak Shaving Active

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	2118		
Description			
Active anytime, when the peak shaving start condition is fulfilled.			

back to Logical binary outputs alphabetically

Power Switch

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	290		
Description			

This is an output from the Power switch function. The behavior of the switch depends on the adjustment of the setpoints **Power Switch On (page 309)** and **Power Switch Off (page 310)**. When the dummy load function is used the switching ON of Power switch is block when the engine isn't running and is allowed 30 s after start of the engine.

Image 8.200 Power Switch

Note: *Setpoints* ***Power Switch On (page 309)*** *and* ***Power Switch Off (page 310)*** *are invisible until configuration of this LBO.*

back to Logical binary outputs alphabetically

Prestart

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	36		
Description			

This output can be used for control of any device, which has to be activated just before start. the output is active for time period of **Prestart Time (page 300)**. The output is deactivated 100 ms before the **STARTER (PAGE 803)** output is activated.

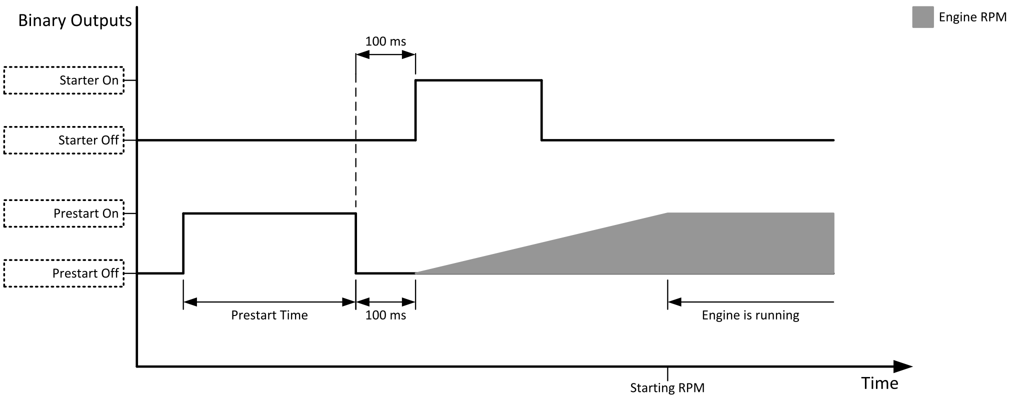


Image 8.201 Engine start

When the **Prestart Time (page 300)** is longer than **Cranking Fail Pause (page 299)** then the **Prestart Time (page 300)** in **Cranking Fail Pause (page 299)** is long as **Cranking Fail Pause (page 299)** minus 100 ms.

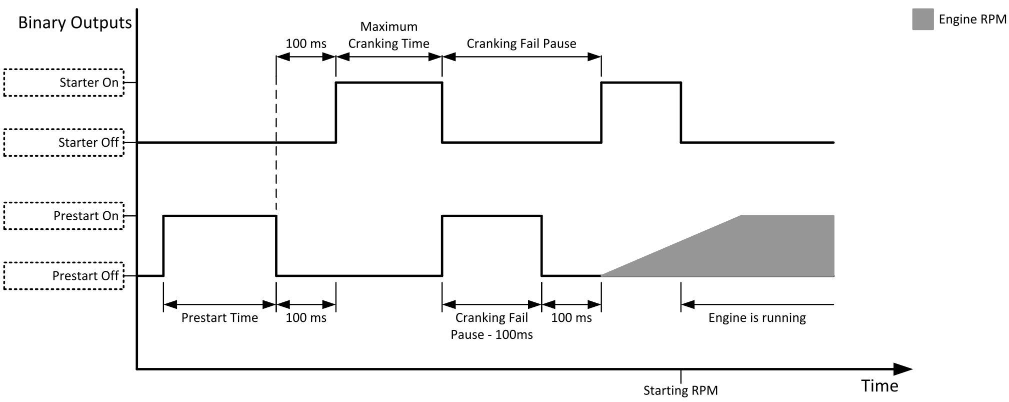


Image 8.202 Prestart in Cranking Fail Pause 1

When the **Prestart Time (page 300)** is shorter than **Cranking Fail Pause (page 299)** then the **Prestart Time (page 300)** in **Cranking Fail Pause (page 299)** is long as normal **Prestart Time (page 300)**.

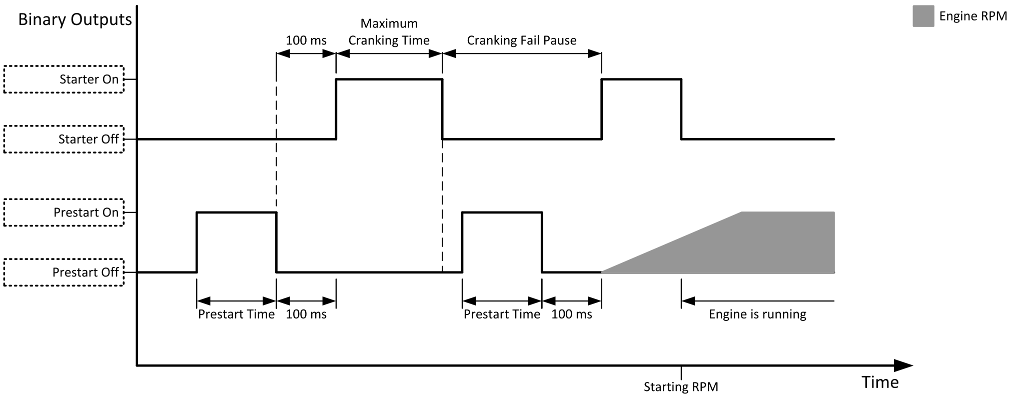


Image 8.203 Prestart in Cranking Fail Pause 2

back to Logical binary outputs alphabetically

LBO: R

Ready To AMF

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	324		
Description			

the output is active if the Gen-set is ready to start automatically and take the load if the mains fails, i.e.:

- the controller is in AMF operating mode
- the controller is in AUTO controller mode and
- no red alarm is present in the alarmlist
- when the red alarm is confirmed during Stop Valve and other requirements are fulfilled then the LBO is still inactive until the state ready

back to Logical binary outputs alphabetically

Ready To Excite

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	221		
Description			

This LBO is activated after the engine reaches RPM window given by setpoint **SUS RPM Window (page 338)**.

back to Logical binary outputs alphabetically

Ready To Load

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	58		
Description			
the output is active whenever the GCB is closed or can be closed i.e. the stabilization phase is finished, the Gen-set is running and the **Minimal Stabilization Time (page 304)** timer has elapsed and the Gen-set voltage and frequency are within limits. If GCB is open then Gen-set voltage and frequency must be in limits. If GCB is close then Gen-set voltage and frequency can be out of limits, but protection delay can’t be count down. If Gen-set voltage and frequency will return into limits until delay is count down then output is still active.			

back to Logical binary outputs alphabetically

Ready

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	62		
Description			
The binary output is active when the engine is stopped and it is possible to start it i.e. no red alarm is activated or **Sd Override (page 734)** is active. The binary output is switch on when the Ready state occurs. The binary output is switch off when the Prestart or the Not Ready or the Stop state occurs i.e. always except Ready state.			

back to Logical binary outputs alphabetically

RegenerationNeeded

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1372		
Description			
This output is active when DPF lamp from ECU is active.			

back to Logical binary outputs alphabetically

Reverse Synchronisation

Related FW	1.6.0	**Related applications**	MINT, SPtM, SPI
Comm object	69		
Description			
The output is active during reverse synchronization and is deactivated when MCB is closed or reverse synchronisation is interrupted. ***Note:*** *The output can be used for external synchronizing module control.*			

back to Logical binary outputs alphabetically

Running

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	67		
Description			
The output is designed to be used as an indication that the Gen-set is running. The output is activated if **Fuel Solenoid (page 775)** is active and **Starter (page 803)** and **Prestart (page 797)** are deactivated. The out remains active until engine stop and cooling period elapses.			

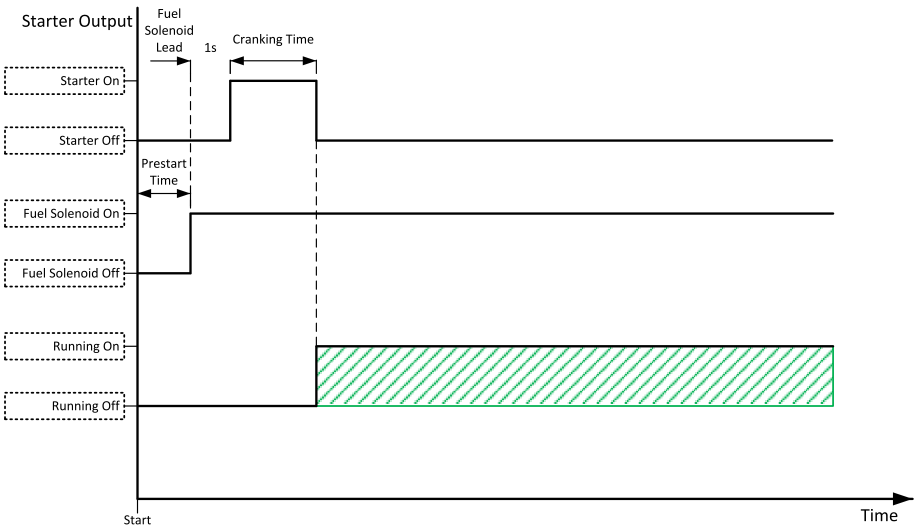


Image 8.204 Running

back to Logical binary outputs alphabetically

LBO: S

Sd Override

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	962		
Description			
The output is active if **Sd Override (page 734)** input is active and open if **Sd Override (page 734)** input is inactive. This output is usually used to send information about **Sd Override (page 734)** input into ECU.			

back to Logical binary outputs alphabetically

Speed Down

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	57		
Description			
This output together with the complementary output **Speed Up (page 802)** are designed for speed and power control at Gen-sets where the speed governor does not support analogue control.			

back to Logical binary outputs alphabetically

Speed Up

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	56		
Description			
This output together with the complementary output **SPEED DOWN** (PAGE 801) are designed for speed and power control at Gen-sets where the speed governor does not support analogue control.			

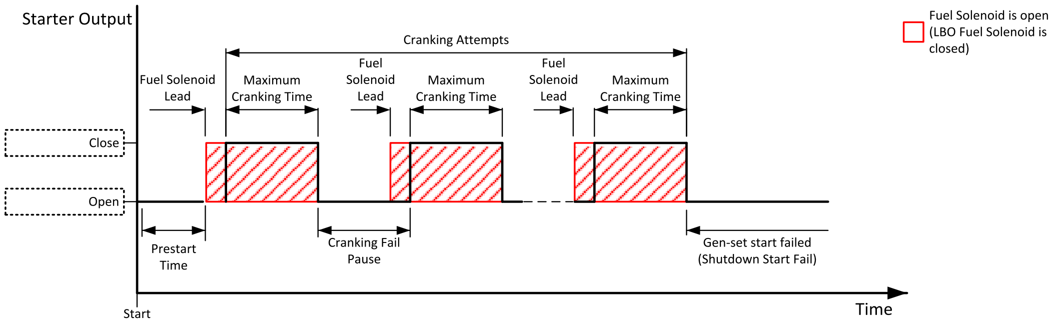
back to Logical binary outputs alphabetically

Start Button Echo

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	33		
Description			
This output provides 1s pulse when: › Start button is pressed on the controller front facia or › Start button is pressed on any of external local/remote terminals or › Start command is received via communication line or › the input START BUTTON is activated.			

back to Logical binary outputs alphabetically

Starter

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	24		
Description			
This output is dedicated for starter motor control. The number of cranking attempts is adjusted by setpoint **Cranking Attempts (page 298)** in Engine Settings group. Cranking fail pause is adjusted by setpoint **Cranking Fail Pause (page 299)**.  Image 8.205 Starter. The starter output opens when: the "firing" speed is reached (gas engines only); maximum time of cranking is exceeded; request to stop comes up; D+ value is higher than **D+ Threshold (page 333)**; Oil pressure value is higher than **Starting Oil Pressure (page 301)**; Generator voltage >25 % of **Gen Nominal Voltage Ph-N (page 267)** or **Gen Nominal Voltage Ph-Ph (page 267)** (any phase)			

back to Logical binary outputs alphabetically

Still Log 0

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	26		
Description			
Logical binary output which is still in logical 0.			

back to Logical binary outputs alphabetically

Still Log 1

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	27		
Description			
Logical binary output which is still in logical 1.			

back to Logical binary outputs alphabetically

Stop Button Echo

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	32		
Description			

This output provides 1s pulse when:

- Stop button is pressed on the controller front facia or
- Stop button is pressed on any of external local/remote terminals or
- Stop command is received via communication line or
- the input STOP BUTTON is activated.

back to Logical binary outputs alphabetically

Stop Pulse

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	25		
Description			

Output is active for 1 second after **STOP SOLENOID (PAGE 804)** output activation. This signal is sent to ECU in case of engine stop request.

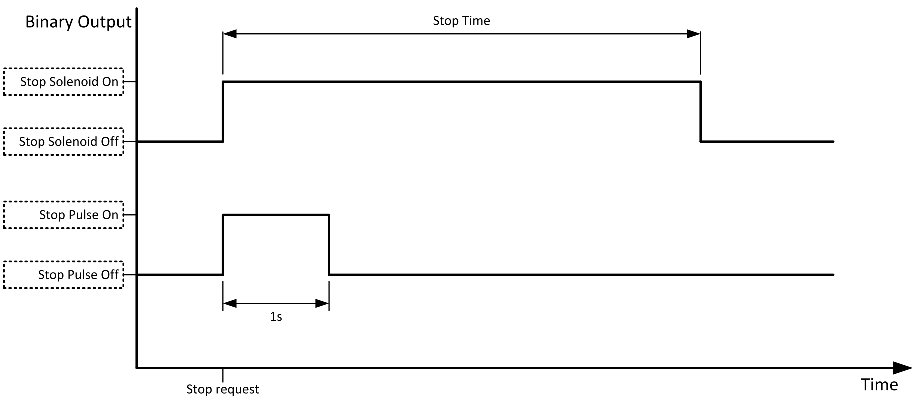


Image 8.206 Stop Pulse

back to Logical binary outputs alphabetically

Stop Solenoid

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	23		
Description			

This output is dedicated to control the stop solenoid (valve). The output is activated when an engine stop command is received and is deactivated 12 s after last running engine indication went off, i.e. engine is stopped.

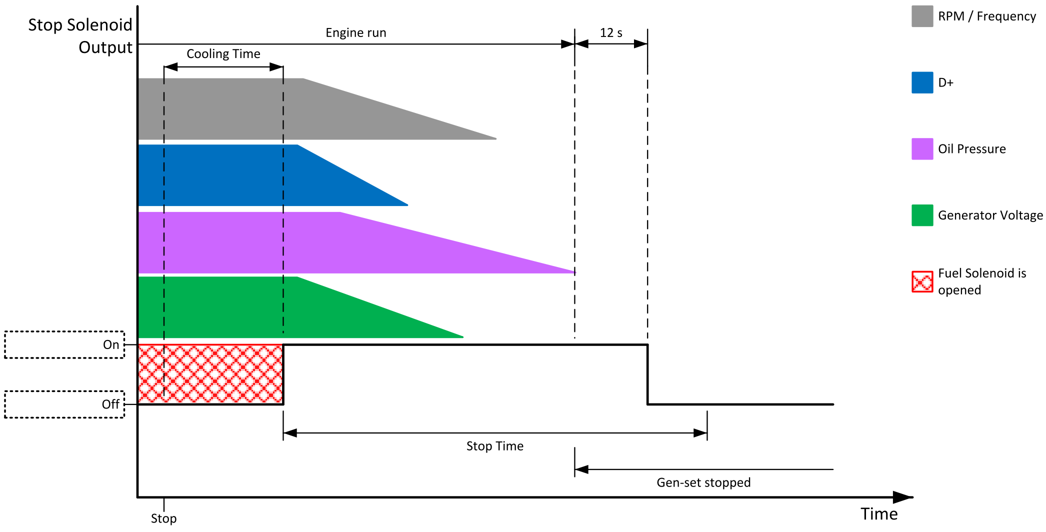


Image 8.207 Stop Solenoid 1

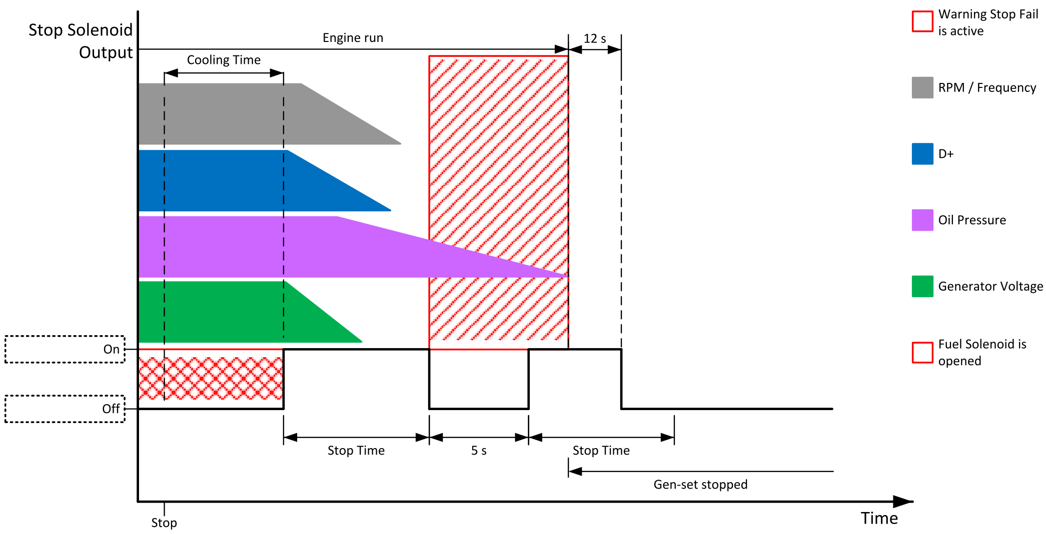


Image 8.208 Stop Solenoid 2

***Note:** If **Additional running engine indications (page 184)** went off during 5 s pause than Stop Solenoid is not activated again otherwise stop solenoid is activated again.*

back to Logical binary outputs alphabetically

Supplying Load

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	1249		
Description			
The binary output depends on measured generator active power. Power is compared with generator nominal active power with use of hysteresis and with delay of switch 1 s. When the measured active power is equal to or bigger than 5 % of **Nominal Power (page 261)** for 1 s then the binary output is active. When the measured active power is equal to or lower than 3 % of **Nominal Power (page 261)** for 1 s then the binary output is inactive.			

back to Logical binary outputs alphabetically

SUS Excitation

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	223		
Description			
Behavior of this LBO depends on setpoint **Excitation Control (page 337)**. › **Excitation Control (page 337)** = Internal » This LBO gets active as soon as LBO **Ready To Excite (page 799)** is activated. › **Excitation Control (page 337)** = External » This LBO gets active as soon as LBI **SUS Excitation Block (page 735)** is deactivated and LBO **Ready To Excite (page 799)** is activated			

back to Logical binary outputs alphabetically

Synchronizing

Related FW	1.6.0	**Related applications**	MINT, SPtM, SPI
Comm object	325		
Description			
The output is active during synchronization. output is active when GCB is closed or synchronization is interrupted.			

back to Logical binary outputs alphabetically

System Ready

Related FW	1.6.0	Related applications	MINT
Comm object	325		
Description			
The output is active, if a group of Gen-sets is able to cover the **Start Reserve (page 640)**. The output is inactive, if the group of Gen-sets does not have enough capacity to cover the **Start Reserve (page 640)**. The output is active, if the **Actual Reserve (page 639)** is higher than the **Start Reserve (page 640)** or system is able to increase the **Actual Reserve (page 639)** by starting another Gen-set, which is available with power management. It means that the output can be active even with the **Actual Reserve (page 639)** lower than the **Start Reserve (page 640)**.			

back to Logical binary outputs alphabetically

System Reserve OK

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	32		
Description			
This LBO is active when System Reserve is higher than the actual reserve for start of next Gen-sets.			

back to Logical binary outputs alphabetically

LBO: T

Temperature Switch

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	563		
Description			
This is an output from the Temperature switch function. The behavior of the switch depends on the adjustment of the setpoints **Temperature Switch On (page 321)** and **Temperature Switch Off (page 322)**.			

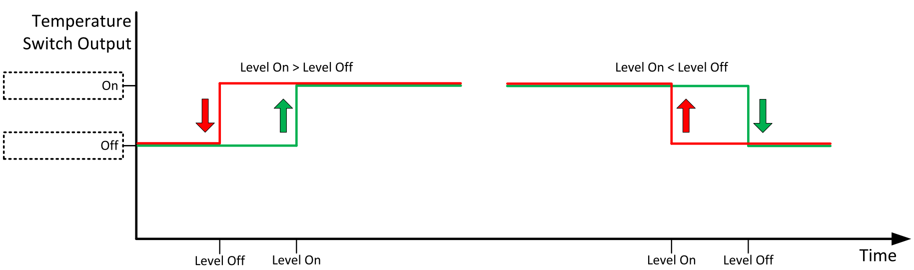


Image 8.209 Temperature Switch

Note: *Setpoints **Temperature Switch On (page 321)** and **Temperature Switch Off (page 322)** are invisible until configuration of this LBO.*

back to Logical binary outputs alphabetically

LBO: U

Unloading

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	73		
Description			
The output is active when generator is unloaded – controller is in the Soft unld state.			

back to Logical binary outputs alphabetically

8.1.6 Logical analog inputs

What Logical analog inputs are:

Logical analog inputs are inputs for analog values.

Alphabetical groups of Logical analog inputs

For a full list of Logical analog inputs go to the chapter **Logical analog inputs alphabetically (page 810)**.

Logical analog inputs alphabetically

back to Controller objects

LAI: A

AIN Prot01

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9999		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 1 Wrn (page 414)** and **Analog Protection 1 Sd (page 414)**. Delay is adjusted by setpoint **Analog Protection 1 Delay (page 415)**.			

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot02

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9998		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 2 Wrn (page 416)** and **Analog Protection 2 Sd (page 417)**. Delay is adjusted by setpoint **Analog Protection 2 Delay (page 417)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot03

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9997		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 3 Wrn (page 419)** and **Analog Protection 3 Sd (page 420)**. Delay is adjusted by setpoint **Analog Protection 3 Delay (page 420)**.			

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot04

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9996		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 4 Wrn (page 422)** and **Analog Protection 4 Sd (page 422)**. Delay is adjusted by setpoint **Analog Protection 4 Delay (page 423)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot05

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9995		

Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs see **Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 5 Wrn (page 425)** and **Analog Protection 5 Sd (page 426)**. Delay is adjusted by setpoint **Analog Protection 5 Delay (page 426)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot06

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9994		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 6 Wrn (page 428)** and **Analog Protection 6 Sd (page 429)**. Delay is adjusted by setpoint **Analog Protection 6 Delay (page 429)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot07

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9993		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 7 Wrn (page 431)** and **Analog Protection 7 Sd (page 432)**. Delay is adjusted by setpoint **Analog Protection 7 Delay (page 432)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot08

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9992		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 8 Wrn (page 434)** and **Analog Protection 8 Sd (page 435)**. Delay is adjusted by setpoint **Analog Protection 8 Delay (page 435)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot09

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9991		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 9 Wrn (page 437)** and **Analog Protection 9 Sd (page 438)**. Delay is adjusted by setpoint **Analog Protection 9 Delay (page 438)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot10

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9990		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 10 Wrn (page 440)** and **Analog Protection 10 Sd (page 441)**. Delay is adjusted by setpoint **Analog Protection 10 Delay (page 441)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot11

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	9989		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 11 Wrn (page 443)** and **Analog Protection 11 Sd (page 444)**. Delay is adjusted by setpoint **Analog Protection 11 Delay (page 444)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot12

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9988		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 12 Wrn (page 446)** and **Analog Protection 12 Sd (page 447)**. Delay is adjusted by setpoint **Analog Protection 12 Delay (page 447)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot13

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9987		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 13 Wrn (page 449)** and **Analog Protection 13 Sd (page 450)**. Delay is adjusted by setpoint **Analog Protection 13 Delay (page 450)**.			

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot14

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	9986		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 14 Wrn (page 452)** and **Analog Protection 14 Sd (page 453)**. Delay is adjusted by setpoint **Analog Protection 14 Delay (page 453)**.			

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot15

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9985		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 15 Wrn (page 455)** and **Analog Protection 15 Sd (page 456)**. Delay is adjusted by setpoint **Analog Protection 15 Delay (page 456)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot16

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9984		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 16 Wrn (page 458)** and **Analog Protection 16 Sd (page 459)**. Delay is adjusted by setpoint **Analog Protection 16 Delay (page 459)**.			

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot17

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9983		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 17 Wrn (page 461)** and **Analog Protection 17 Sd (page 462)**. Delay is adjusted by setpoint **Analog Protection 17 Delay (page 462)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot18

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9982		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 18 Wrn (page 464)** and **Analog Protection 18 Sd (page 465)**. Delay is adjusted by setpoint **Analog Protection 18 Delay (page 465)**.			

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot19

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9981		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 19 Wrn (page 467)** and **Analog Protection 19 Sd (page 468)**. Delay is adjusted by setpoint **Analog Protection 19 Delay (page 468)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Prot20

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9980		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Analog Protection 20 Wrn (page 470)** and **Analog Protection 20 Sd (page 471)**. Delay is adjusted by setpoint **Analog Protection 20 Delay (page 471)**.			

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
AL Indic	Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn+BOR	Analog value is used for warning and breaker open protection
BOR	Analog value is used for breaker open protection
Wrn+MPR	Analog value is used for warning and mains protection
MPR	Analog value is used for mains protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

back to Logical analog inputs alphabetically

AIN Switch 01

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	209		

Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH01 (PAGE 753)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 1 On (page 415)** and **Analog Switch 1 Off (page 416)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 02

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	210		

Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH02 (PAGE 754)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 2 On (page 418)** and **Analog Switch 2 Off (page 419)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 03

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	211		

Description

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH03 (PAGE 754)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 3 On (page 421)** and **Analog Switch 3 Off (page 422)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 04

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	212		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH04 (PAGE 755)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 4 On (page 424)** and **Analog Switch 4 Off (page 425)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 05

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	278		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH05 (PAGE 755)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 5 On (page 427)** and **Analog Switch 5 Off (page 428)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 06

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	279		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH06 (PAGE 756)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 6 On (page 430)** and **Analog Switch 6 Off (page 431)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 07

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	280		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH07 (PAGE 756)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 7 On (page 433)** and **Analog Switch 7 Off (page 434)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 08

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	281		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH08 (PAGE 757)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 8 On (page 436)** and **Analog Switch 8 Off (page 437)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 09

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	282		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH09 (PAGE 757)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 9 On (page 439)** and **Analog Switch 9 Off (page 440)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 10

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	283		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH10 (PAGE 758)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 10 On (page 442)** and **Analog Switch 10 Off (page 443)**. ***Note:*** *This function is not suitable for tristate or binary analog sensors.* **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

AIN Switch 11

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	284		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH11 (PAGE 758)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 11 On (page 445)** and **Analog Switch 11 Off (page 446)**. ***Note:*** *This function is not suitable for tristate or binary analog sensors.* **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

AIN Switch 12

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	285		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH12 (PAGE 759)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 12 On (page 448)** and **Analog Switch 12 Off (page 449)**. ***Note:*** *This function is not suitable for tristate or binary analog sensors.* **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

AIN Switch 13

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	286		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN Switch13 (page 759)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 13 On (page 451)** and **Analog Switch 13 Off (page 452)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 14

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	287		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN Switch14 (page 760)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 14 On (page 454)** and **Analog Switch 14 Off (page 455)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 15

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	288		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN Switch15 (page 760)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 15 On (page 457)** and **Analog Switch 15 Off (page 458)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 16

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	289		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH16 (PAGE 761)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 16 On (page 460)** and **Analog Switch 16 Off (page 461)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 17

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	290		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH17 (PAGE 761)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 17 On (page 463)** and **Analog Switch 17 Off (page 464)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 18

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	291		
Description			

Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN SWITCH18 (PAGE 762)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 18 On (page 466)** and **Analog Switch 18 Off (page 467)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 19

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	292		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN Switch19 (page 762)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 19 On (page 469)** and **Analog Switch 19 Off (page 470)**. *__Note:__ This function is not suitable for tristate or binary analog sensors.* **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

AIN Switch 20

Related FW	1.6.0	Related applications	MINT, SPtM
Comm object	293		
Description			
Logical analog input designed for general value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. This analog input controls logical binary output **AIN Switch20 (page 763)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 20 On (page 472)** and **Analog Switch 20 Off (page 473)**. *__Note:__ This function is not suitable for tristate or binary analog sensors.* **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

LAI: C

Coolant Temp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	67		
Description			
Logical analog input designed for coolant temperature value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Coolant Temperature Wrn (page 316)** and **Coolant Temperature Sd (page 317)**. Delay is adjusted by setpoint **Coolant Temperature Delay (page 317)**.			

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

Note: *This analog function can by also configured on binary input as binary function. In this case chose* ***Coolant Temp (page 715)*** *binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.*

IMPORTANT: Value from analog input has higher priority than value from ECU.

back to Logical analog inputs alphabetically

LAI: D

Display Brightness

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	67		
Description			
Use this function to adjust display brightness. It is necessary to set Brightness control to External to use the function **Display brightness settings (page 100)**.			

back to Logical analog inputs alphabetically

LAI: F

Fuel Level

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	78		
Description			
Logical analog input designed for fuel level value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Fuel Level Wrn (page 323)** and **Fuel Level Sd (page 323)**. Delay is adjusted by setpoint **Fuel Level Delay (page 324)**.			

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

IMPORTANT: For right behavior of this function, curve for analog input has to be in percentage and setpoint Fuel Tank Volume (page 325) has to be adjusted correctly.

Note: *This analog function can by also configured on binary input as binary function. In this case chose* ***FUEL LEVEL (PAGE 721)*** *binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.*

IMPORTANT: Value from analog input has higher priority than value from ECU.

back to Logical analog inputs alphabetically

LAI: M

Mains Import Measurement

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	67		
Description			
Logical analog input designed for **Mains import measurement (page 206)**. Value from this input is used in load transfer from mains to generator. Load transfer is considered to be finished when this value is lower then **Mains Unload MCB Open Window (page 399)**			

back to Logical analog inputs alphabetically

LAI: N

Not Used

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	230		
Description			
Input has no function.			

back to Logical analog inputs alphabetically

LAI: O

Oil Pressure

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	9		
Description			

Logical analog input designed for oil pressure value received from analog sensor. Limits for this protection are adjusted by setpoints **Oil Pressure Wrn (page 314)** and **Oil Pressure Sd (page 315)**. Delay is adjusted by setpoint **Oil Pressure Delay (page 315)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn + Sd	Analog value is used for warning and Sd protection.
Sd	Analog value is used for Sd protection.

***Note:** This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

***Note:** This parameter has to be adjusted via InteliConfig.*

***Note:** This analog function can by also configured on binary input as binary function. In this case choose **Oil Pressure (page 729)** binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.*

IMPORTANT: Value from analog input has higher priority than value from ECU.

back to Logical analog inputs alphabetically

Oil Temp

Related FW	1.6.0	**Related applications**	MINT, SPtM
Comm object	77		

Description

Logical analog input designed for oil temperature value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 51**. Limits for this protection are adjusted by setpoints **Oil Temp Wrn (page 318)** and **Oil Temp Sd (page 319)**. Delay is adjusted by setpoint **Oil Temp Delay (page 319)**.

Protection types

Monitoring	Analog value is only measured and displayed on the LCD screen but not used for protection.
HistRecOnl	Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits.
Wrn	Analog value is used for warning protection only.
Wrn+Stp	Analog value is used for warning and slow stop protection
Stp	Analog value is used for slow stop protection
Wrn + BOC	Analog value is used for warning and BOC (Breaker Open and Cooling) protection.
BOC	Analog value is used for BOC (Breaker Open and Cooling) protection.
Wrn + Sd	Analog value is used for warning and shutdown protection.
Sd	Analog value is used for shutdown protection.

Note: *This parameter has to be adjusted via InteliConfig.*

Alarm

Under limit	Alarm is activated when value of analog input is under adjusted limits
Over limit	Alarm is activated when value of analog input is over adjusted limits
Under limit + fls	Alarm is activated when value of analog input is under adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.
Over limit + fls	Alarm is activated when value of analog input is over adjusted limits. If sensor fail is detected then the alarm with higher level is activate as well.

Example: Protection type is Wrn + Sd. When sensor fail is detected then Sd alarm will be activated + Sensor fail alarm will be activated.

Note: *This parameter has to be adjusted via InteliConfig.*

IMPORTANT: Value from analog input has higher priority than value from ECU.

back to Logical analog inputs alphabetically

8.1.7 PLC

List of PLC groups

For a full list of PLC blocks go to the chapter **List of PLC blocks (page 844)**.

List of PLC blocks

Group: Basic logical functions

Group: Comparison of analog inputs

Group: Time functions

Group: Other functions

Group: Basic Logical functions

OR/AND

PLC group	Basic logical functions
Related FW	1.6.0
Related applications	MINT, SPtM
Comm object	1

Inputs

Input	Type	Negation	Range	Function
Input 1 .. 8	Binary	Yes	0/1	Inputs 1 .. 8

Outputs

Output	Type	Negation	Range	Function
Output	Binary	Yes	0/1	Result of the logical operation

Description

The block performs logical operation OR / AND of 2 – 8 binary operands. The inputs as well as the output can be inverted.

Function OR

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	1

Function AND

Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1

There have to be at least 2 inputs every time. There may be up to 8 inputs configured.

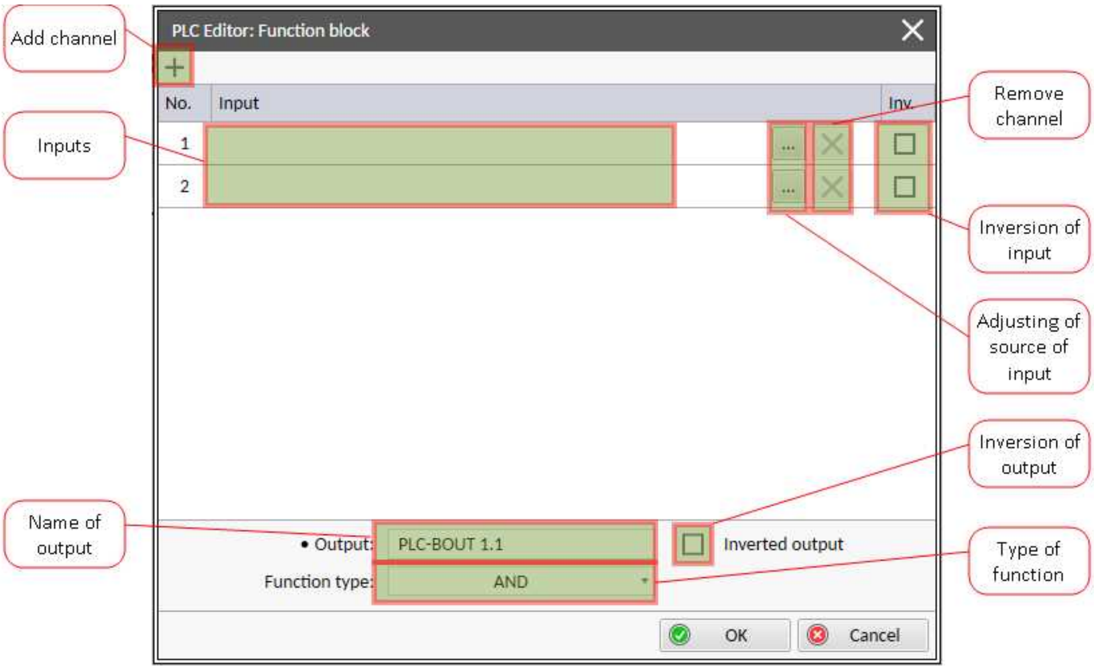


Image 8.210 Configuration of OR/AND block

back to List of PLC blocks

XOR/RS

PLC group	Basic logical functions
Related FW	1.6.0
Related applications	MINT, SPtM
Comm object	2

Inputs

Input	Type	Negation	Range	Function
Input 1..2	Binary	Yes	0/1	Inputs 1..2

Outputs

Output	Type	Negation	Range	Function
Output	Binary	Yes	0/1	Result of the logical operation

Description

The block provides logical function of two values – XOR or RS flip-flop. Both inputs and output can be inverted.

Function XOR

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	0

Function RS

R	S	Q_{n+1}
0	0	Q_n
0	1	1
1	0	0
1	1	0

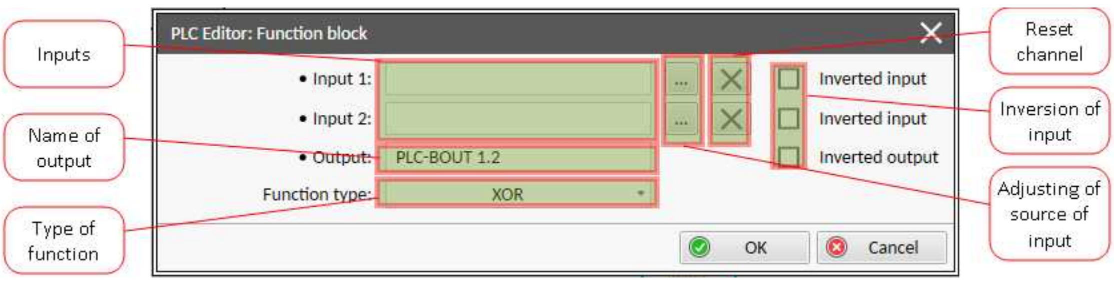


Image 8.211 Configuration of XOR/RS block

back to List of PLC blocks

Group: Comparison of analog inputs

Comparator With Hysteresis

PLC group	Comparison of analog inputs
Related FW	1.6.0
Related applications	MINT, SPtM
Comm object	3

Inputs

Input	Type	Negation	Range	Function
Input	Analog	No	Any	Compared value
Input ON	Analog	No	Same as Input	Comparative level for switching on
Input OFF	Analog	No	Same as Input	Comparative level for switching off

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Comparator output

Description

The block compares the input value with the comparative levels. The behavior depends on whether the ON level is higher than OFF level or vice versa.

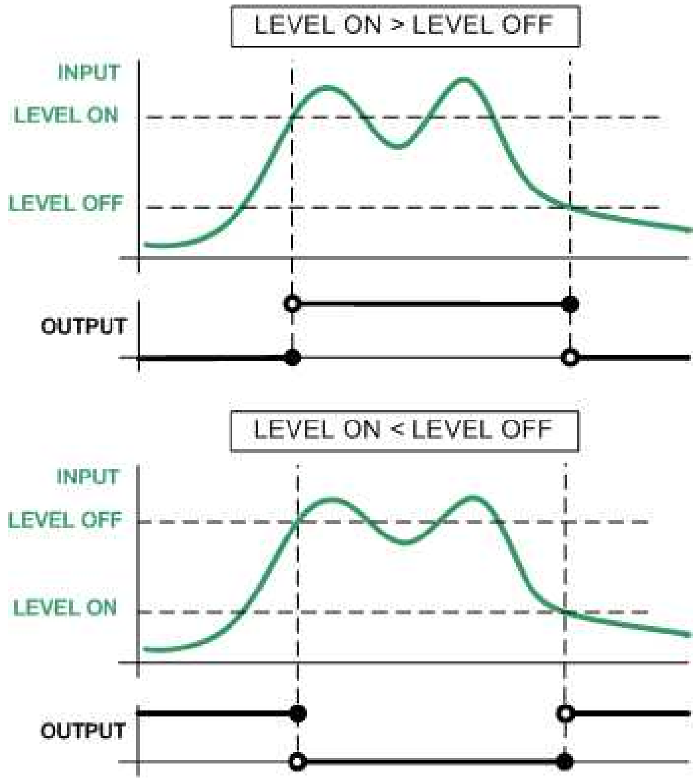


Image 8.212 Different On and Off levels

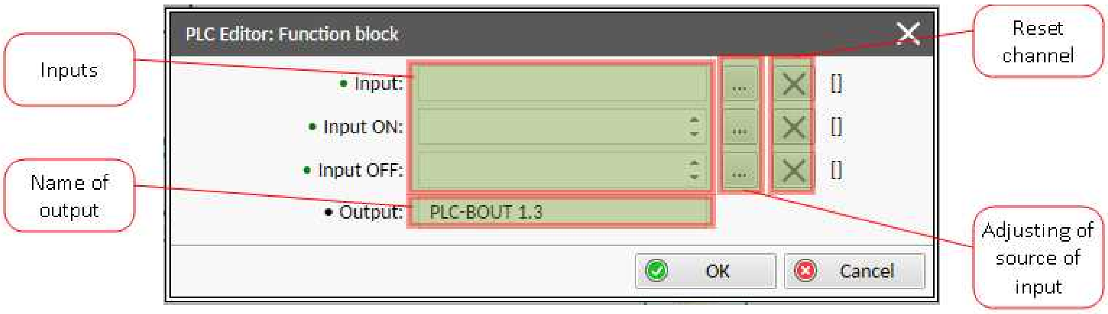


Image 8.213 Configuration of Comp Hyst block

***Note:** Level On and Level Off can be constants or values from controller.*

IMPORTANT: In case that the values on inputs have different decimal numbers, then the values are converted and the name of block is red. It is strongly recommended to use values with the same decimal numbers.

back to List of PLC blocks

Comparator With Delay

PLC group	Comparison of analog inputs
Related FW	1.6.0
Related applications	MINT, SPtM
Comm object	4

Inputs

Input	Type	Negation	Range	Function
Input 1	Analog	No	Any	Compared value
Input 2	Analog	No	Same as Input 1	Comparative level
Delay	Analog	No	0.0..3000,0 [s]	Comparative delay

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Comparator output

Description

The block works as an analog switch. It compares the input value with the comparative level. The output will switch on if the input is equal or higher than the comparative level for time longer than the delay.

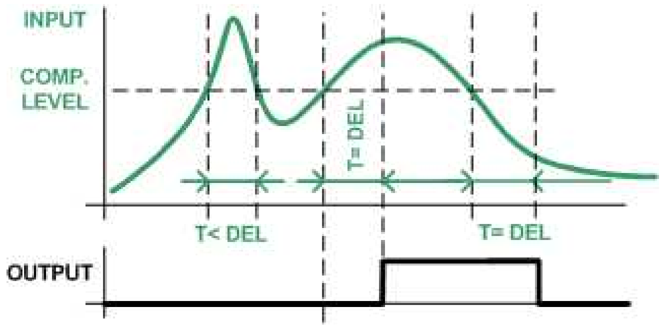


Image 8.214 Principle of delay

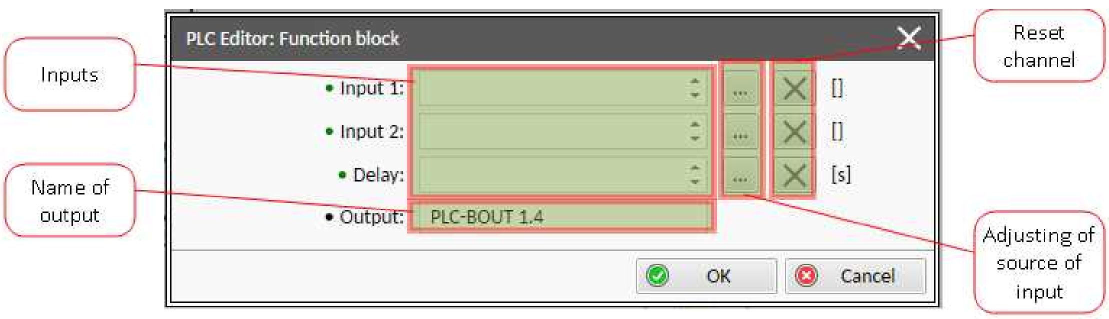


Image 8.215 Configuration of Comp Time block

Note: *Input 2 and Delay can be constants or values from controller.*

back to List of PLC blocks

Group: Time functions

Timer

PLC group	Time functions
Related FW	1.6.0
Related applications	MINT, SPtM
Comm object	38

Inputs

Input	Type	Negation	Range	Function
Run	Binary	No	0/1	The timer runs only if this input is active or not connected
Reload	Binary	No	0/1	This input reloads the timer to the initial value
Reload value	Analog	No	0.0..3276.7 [s]	Initial value of the timer

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Timer output

Description

The block works as a countdown timer which is decreased by 1 every PLC cycle. The timer initial value is adjustable by the "Reload value" input. The timer is automatically reloaded with the initial value when it reaches zero or it can be reloaded at any other time using the "reload" input. The timer remains at reload value until the reload input is deactivated. The timer output is inverted always when the timer is reloaded.

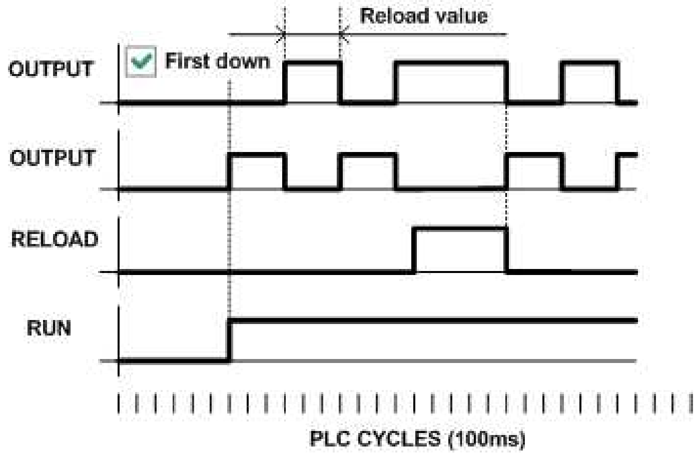


Image 8.216 Principle of timer

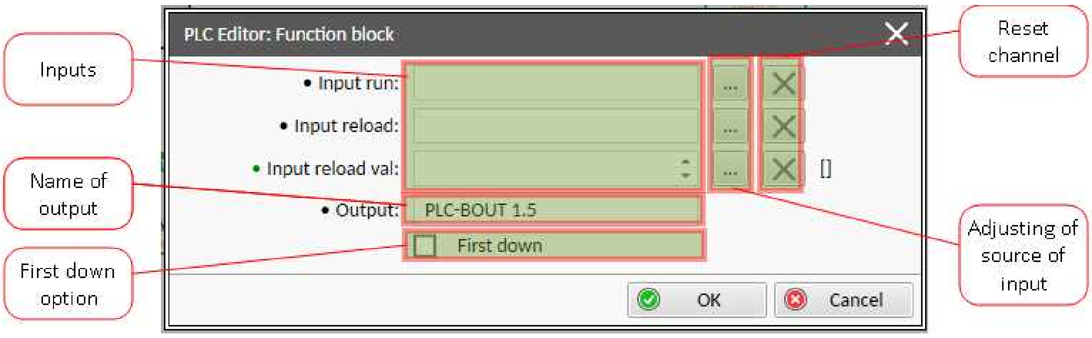


Image 8.217 Configuration of Timer block

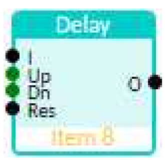
Note: *Input reload value can be constant or value from controller.*

Note: *If you want the output to start at logical 0, tick First down option. Otherwise the output will start at logical 1.*

IMPORTANT: If the inputs are not connected and First down option is not ticked, then the output is active.

back to List of PLC blocks

Delay

PLC group	Time functions	
Related FW	1.6.0	
Related applications	MINT, SPtM	
Comm object	33	

Inputs

Input	Type	Negation	Range	Function
Input	Binary	No	0/1	Input signal to be delayed
Input time up	Analog	No	-3200.0 .. 3200.0 [s, m, h]	Delay of the rising edge resp. pulse length generated by rising edge of the input
Input time down	Analog	No	-3200.0 .. 3200.0 [s, m, h]	Delay of the falling edge resp. pulse length generated by falling edge of the input
Input reset	Binary	No	0/1	Resets the output to logical 0. The output remains in logical 0 until new rising edge appears on Input (when Input reset is deactivated already)

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Output signal

Description

This block can work in two modes of operation:

- Delay mode – the rising edge at the output is generated with delay of "input time up" when a rising edge at the input is detected. The falling edge at the output is generated with delay of "input time down" when a falling edge at the input is detected. If the delayed falling edge at the output came earlier than the delayed rising edge, then no pulse would be generated at the output.
- Pulse mode – a pulse of "input time up" length is generated at the output when a rising edge is detected, a pulse of "input time down" length is generated at the output when a falling edge is detected.

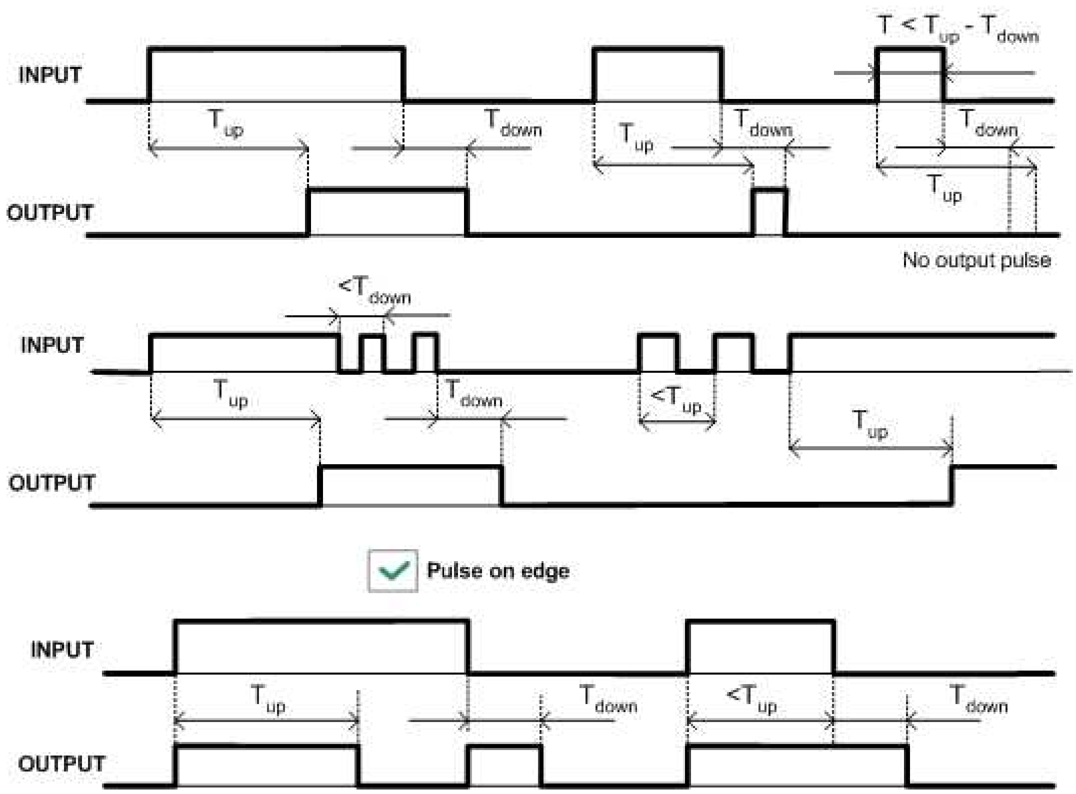


Image 8.218 Delay modes principles

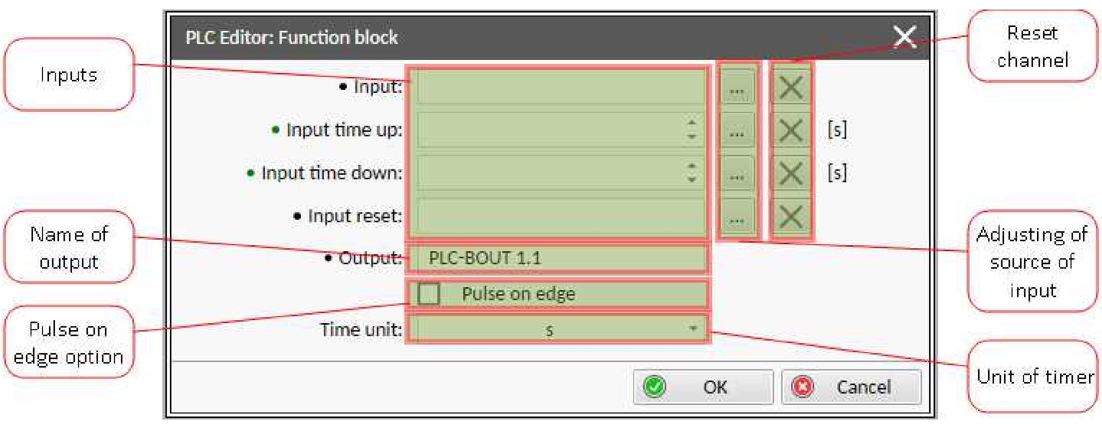


Image 8.219 Configuration of Delay block

Note: *If Input time up or Input time down value is <0, this input is internally set to zero.*

Note: *Input time up and Input time down values can be constants or values from controller.*

Note: *Use Pulse on edge option to choose between delay and pulse mode.*

back to List of PLC blocks

Group: Other functions

Force History Record

PLC group	Other functions	
Related FW	1.6.0	
Related applications	MINT, SPtM	
Comm object	9	

Inputs

Input	Type	Negation	Range	Function
Input	Binary	No	0/1	A record with configured text is recorded into the controller history when the input is activated.

Outputs

No outputs.

Description

This block writes a record with defined text into the history when the input is activated.

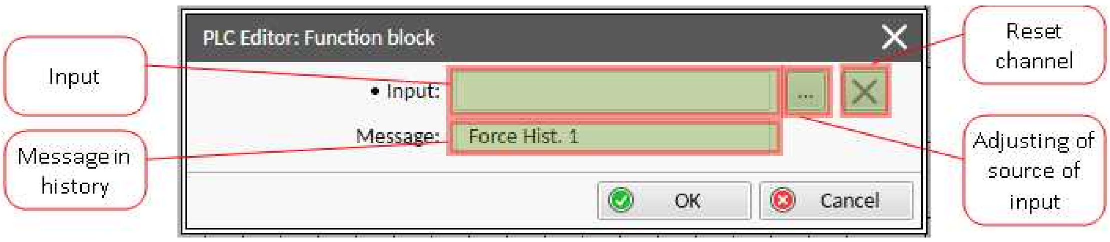


Image 8.220 Configuration of Force Hist block

Note: *Maximal number of characters for history message is 15.*

back to List of PLC blocks

Force Protection

PLC group	Other functions	
Related FW	1.6.0	
Related applications	MINT, SPtM	
Comm object	10	

Inputs

Input	Type	Negation	Range	Function
Lvl 1	Binary	No	0/1	The input activates yellow level of the configured protection if it is configured
Lvl 2	Binary	No	0/1	The input activates red level of the configured protection if a red level protection is configured
Fls	Binary	No	0/1	The input activates sensor fail if a fls protection is configured

Outputs

No outputs.

Description

This block issues alarms of configured type and text when appropriate binary input is activated.

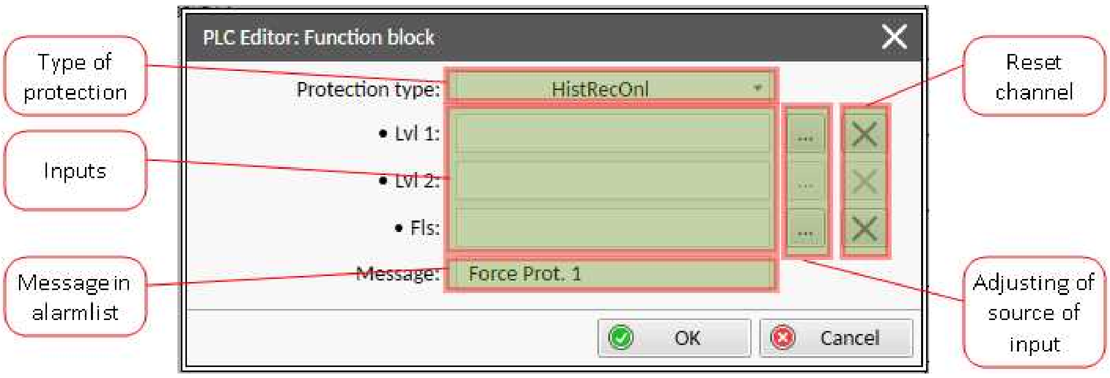


Image 8.221 Configuration of Force Prot block

Available protections are:

- Monitoring
- HistRecOnl
- AL Indic
- Wrn
- Wrn+BOC
- BOC
- Wrn+Sd
- Sd

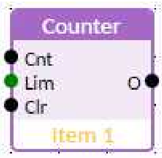
Note: *Maximal number of characters for alarmlist message is 15.*

Note: *Prefix of protection (e.g. Wrn, Sd, BOC) is added automatically into alarmlist message.*

back to List of PLC blocks

Counter

PLC group	Other functions
Related FW	1.6.0
Related applications	MINT, SPtM
Comm object	13



Inputs

Input	Type	Negation	Range	Function
Input Count Up	Binary	No	0/1	Input at which the edges are counted
Input Preset Limit	Analog	No	0 .. 32767 [-]	Counter value limit for activation of the output
Input Clear	Binary	No	0/1	Reset input

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Output is activated when the counter value exceeds the limit

Description

The block works as a counter of edges (selectable rising, falling or both) with reset input and adjustable counting limit. The maximal counter value is 32767. The counter value is lost when the controller is switched off. The output is activated when the counter value is equal or higher than Input Preset Limit and stays active until the block reset is done using Input Clear. Activating of the Input Clear resets the counter value to 0 and deactivates the output. Holding the Input Clear active blocks the counting.

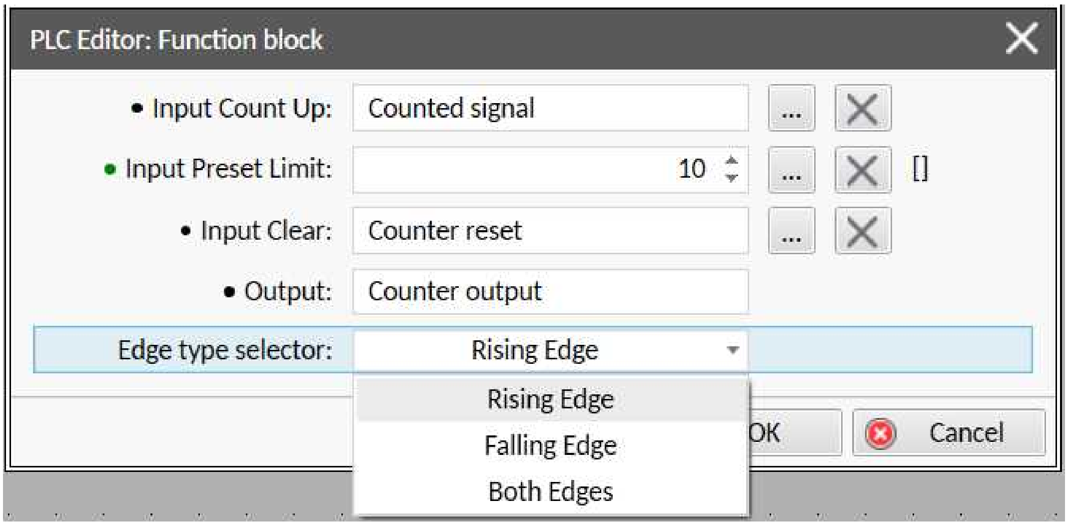


Image 8.222 Configuration of the Counter block

back to List of PLC blocks

Decomposer

PLC group	Other functions
Related FW	1.6.0
Related applications	MINT, SPtM
Comm object	

Inputs

Input	Type	Negation	Range	Function
Input	Analog	No	-2147483647..2147483647	Value to be "decomposed" to bits

Outputs

Output	Type	Negation	Range	Function
Output 1	Binary	Yes	0/1	Bit 0,4,8,12,16,20,24,28 – according to selected group of bits.
Output 2	Binary	Yes	0/1	Bit 1,5,9,13,17,21,25,29 – according to selected group of bits.
Output 3	Binary	Yes	0/1	Bit 2,6,10,14,18,22,26,30 – according to selected group of bits.
Output 4	Binary	Yes	0/1	Bit 3,7,11,15,19,23,27,31 – according to selected group of bits.

Description

The block converts the input analog value to binary form and provides selected bits as binary outputs.

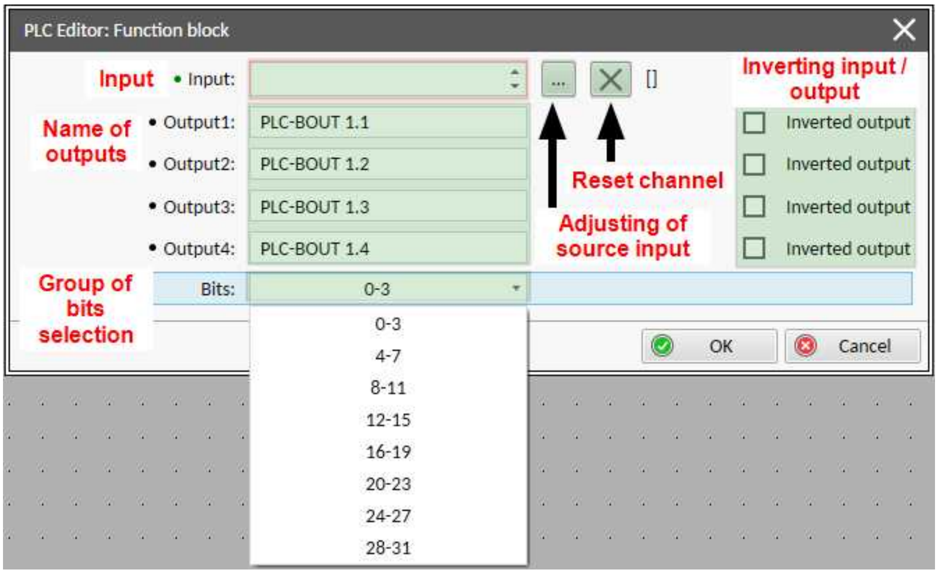


Image 8.223 Configuration of Comp Time block

***Note:** Input 2 and Delay can be constants or values from the controller.*

back to List of PLC blocks

8.2 Alarms

What alarms are:

The controller evaluates two levels of alarms. For more information **see Alarm management on page 162**.

8.2.1 Alarm levels in the controller

8.2.2 Alarms level 1

What alarms level 1 are:

The level 1 alarm indicates that a value or parameter is out of normal limits, but has still not reached critical level.

List of alarms level 1

back to Alarms

Al/Hist.msg. 1

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 1 will trigger.

back to List of alarms level 1

Al/Hist.msg. 2

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 2 will trigger.

back to List of alarms level 1

Al/Hist.msg. 3

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 3 will trigger.

back to List of alarms level 1

Al/Hist.msg. 4

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 4
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 4 will trigger.

back to List of alarms level 1

Al/Hist.msg. 5

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 5
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 5 will trigger.

back to List of alarms level 1

Al/Hist.msg. 6

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 6
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 6 will trigger.

back to List of alarms level 1

Al/Hist.msg. 7

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 7
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 7 will trigger.

back to List of alarms level 1

Al/Hist.msg. 8

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 8
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 8 will trigger.

back to List of alarms level 1

Al/Hist.msg. 9

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 9
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 9 will trigger.

back to List of alarms level 1

Al/Hist.msg. 10

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 10
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 10 will trigger.

back to List of alarms level 1

Al/Hist.msg. 11

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 11
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 11 will trigger.

back to List of alarms level 1

Al/Hist.msg. 12

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 12
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 12 will trigger.

back to List of alarms level 1

Al/Hist.msg. 13

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 13
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 13 will trigger.

back to List of alarms level 1

Al/Hist.msg. 14

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 14
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 14 will trigger.

back to List of alarms level 1

Al/Hist.msg. 15

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 15 will trigger.

back to List of alarms level 1

Al/Hist.msg. 16

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 16
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 16 will trigger.

back to List of alarms level 1

Alarm Email 1 Fail

Alarm Type	WRN
Alarmlist message	Alarm Email 1 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 1 (page 538)** and email wasn't send.

back to List of alarms level 1

Alarm Email 2 Fail

Alarm Type	WRN
Alarmlist message	Alarm Email 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 2 (page 539)** and email wasn't send.

back to List of alarms level 1

Alarm Email 3 Fail

Alarm Type	WRN
Alarmlist message	Alarm Email 3 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 3 (page 539)** and email wasn't send.

back to List of alarms level 1

Alarm Email 4 Fail

Alarm Type	WRN
Alarmlist message	Alarm Email 4 Fail
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 4 (page 540)** and email wasn't send.

back to List of alarms level 1

Alarm SMS 1 Fail

Alarm Type	WRN
Alarmlist message	Alarm SMS 1 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 1 (page 545)** and SMS wasn't sent.

back to List of alarms level 1

Alarm SMS 2 Fail

Alarm Type	WRN
Alarmlist message	Alarm SMS 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 2 (page 546)** and SMS wasn't sent.

back to List of alarms level 1

Alarm SMS 3 Fail

Alarm Type	WRN
Alarmlist message	Alarm SMS 3 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 3 (page 546)** and SMS wasn't sent.

back to List of alarms level 1

Alarm SMS 4 Fail

Alarm Type	WRN
Alarmlist message	Alarm SMS 4 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 4 (page 547)** and SMS wasn't sent.

back to List of alarms level 1

ALI Bus Ph L1 Inverted

Alarm Type	ALI
Alarmlist message	ALI Bus Ph L1 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if bus phase L1 is inverted.

back to List of alarms level 1

ALI Bus Ph L2 Inverted

Alarm Type	ALI
Alarmlist message	ALI Bus Ph L2 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if bus phase L2 is inverted.

back to List of alarms level 1

ALI Bus Ph L3 Inverted

Alarm Type	ALI
Alarmlist message	ALI Bus Ph L3 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if bus phase L3 is inverted.

back to List of alarms level 1

ALI Bus Ph Rotation Opposite

Alarm Type	ALI
Alarmlist message	ALI Bus Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if bus phases are wired in wrong order.

back to List of alarms level 1

ALI Gen Ph L1 Inverted

Alarm Type	ALI
Alarmlist message	ALI Gen Ph L1 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if generator phase L1 is inverted.

back to List of alarms level 1

ALI Gen Ph L2 Inverted

Alarm Type	ALI
Alarmlist message	ALI Gen Ph L2 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if generator phase L2 is inverted.

back to List of alarms level 1

ALI Gen Ph L3 Inverted

Alarm Type	ALI
Alarmlist message	ALI Gen Ph L3 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if generator phase L3 is inverted.

back to List of alarms level 1

ALI Gen Ph Rotation Opposite

Alarm Type	ALI
Alarmlist message	ALI Gen Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if generator phases are wired in wrong order.

back to List of alarms level 1

ALI Mains Ph L1 Inverted

Alarm Type	ALI
Alarmlist message	ALI Mains Ph L1 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if mains phase L1 is inverted.

back to List of alarms level 1

ALI Mains Ph L2 Inverted

Alarm Type	ALI
Alarmlist message	ALI Mains Ph L2 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if mains phase L2 is inverted.

back to List of alarms level 1

ALI Mains Ph L3 Inverted

Alarm Type	ALI
Alarmlist message	ALI Mains Ph L3 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if mains phase L3 is inverted.

back to List of alarms level 1

ALI Mains Ph Rotation Opposite

Alarm Type	ALI
Alarmlist message	ALI Mains Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if mains phases are wired in wrong order.

back to List of alarms level 1

ATT DEF Level Lamp

Alarm Type	AHI
Alarmlist message	ATT DEF Level Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate DEF Level lamp.

back to List of alarms level 1

ATT Filter Lamp

Alarm Type	AHI
Alarmlist message	ATT Filter Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate the ATT Filter lamp.

back to List of alarms level 1

ATT HEST Lamp

Alarm Type	AHI
Alarmlist message	ATT HEST Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate HEST Lamp.

back to List of alarms level 1

Hst ATT Inhib Regen Active

Alarm Type	AHI
Alarmlist message	Hst ATT Inhib Regen Active
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This message is written in the history when LBI **ATT INHIBIT REGEN (PAGE 689)** is active. LBO **ALARM (PAGE 753)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

ATT Inhibited Lamp

Alarm Type	AHI
Alarmlist message	ATT Inhibited Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate Inhibited Lamp.

back to List of alarms level 1

Hst ATT Interlock Active

Alarm Type	AHI
Alarmlist message	Hst ATT interlock Active
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This message is written in the history when LBI **ATT INTERLOCK (PAGE 689)** is active. LBO **ALARM (PAGE 753)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

ATT SCR Error Lamp

Alarm Type	AHI
Alarmlist message	ATT SCR Error Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate SCR error lamp.

back to List of alarms level 1

Wrn Battery Charger Fail

Alarm Type	WRN
Alarmlist message	Battery Charge Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when logical binary input **BATTERY CHARGER (PAGE 690)** is active.

back to List of alarms level 1

Dead Bus GCB blocked

Alarm Type	ALI
Alarmlist message	Dead Bus GCB blocked
Alarm evaluated	
Related applications	MINT, SPtM
Description	This alarm is issued if GCB breaker can not be closed because controller does not have the master status. This can happen while droop mode is active. -> related setpoints **Dead Bus GCB Close Master (page 410)**, **Load/Var Sharing Regulation Type (page 409)**.

back to List of alarms level 1

ECU Red Lamp

Alarm Type	AHI
Alarmlist message	ECU Red Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when an red ECU alarm is logged in Alarm List. ***Note:*** *This lamp can be ignored during prestart phase. Use InteliConfig to enable this function.*

back to List of alarms level 1

ECU Wait To Start

Alarm Type	AHI
Alarmlist message	ECU Wait To Start
Alarm evaluated	Only when ECU is connected
Related applications	MINT, SPtM
Description	This alarm is activated when ECU send information that ECU Wait To Start lamp is activated. LBO **Alarm (page 753)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

ECU Yellow Lamp

Alarm Type	AHI
Alarmlist message	ECU Yellow Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when ECU send information that ECU Yellow lamp is activated. LBO **Alarm (page 753)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

ECUDiagBlocked

Alarm Type	ALI
Alarmlist message	ECUDiagBlocked
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	LBO **ALARM (PAGE 753)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

EM(A) - a message lost

Alarm Type	WRN
Alarmlist message	EM(A) - a message lost
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 1

EM(A) - configuration mistake

Alarm Type	WRN
Alarmlist message	EM(A) - configuration mistake
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with configuration of binary input or output of module in slot.

back to List of alarms level 1

EM(A) - insufficient

Alarm Type	WRN
Alarmlist message	EM(A) - insufficient
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that module does not support all required features.

back to List of alarms level 1

EM(A) - missing or damaged

Alarm Type	WRN
Alarmlist message	EM(A) - missing or damaged
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication with module in slot (in first 5 second there was no communication and module is configured in slot).

back to List of alarms level 1

EM(B) - a message lost

Alarm Type	WRN
Alarmlist message	EM(B) - a message lost
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 1

EM(B) - configuration mistake

Alarm Type	WRN
Alarmlist message	EM(B) - configuration mistake
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with configuration of binary input or output of module in slot.

back to List of alarms level 1

EM(B) - insufficient

Alarm Type	WRN
Alarmlist message	EM(B) - insufficient
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that module does not support all required features.

back to List of alarms level 1

EM(B) - missing or damaged

Alarm Type	WRN
Alarmlist message	EM(B) - missing or damaged
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication with module in slot (if first 5 second there was no communication and module is configured in slot).

back to List of alarms level 1

Event Email 1 Fail

Alarm Type	WRN
Alarmlist message	Event Email 1 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 1 (page 538)** and email wasn't send.

back to List of alarms level 1

Event Email 2 Fail

Alarm Type	WRN
Alarmlist message	Event Email 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 2 (page 539)** and email wasn't send.

back to List of alarms level 1

Event Email 3 Fail

Alarm Type	WRN
Alarmlist message	Event Email 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 3 (page 539)** and email wasn't send.

back to List of alarms level 1

Event Email 4 Fail

Alarm Type	WRN
Alarmlist message	Event Email 4 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 4 (page 540)** and email wasn't send.

back to List of alarms level 1

Event SMS 1 Fail

Alarm Type	WRN
Alarmlist message	Event SMS 1 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 1 (page 545)** and SMS wasn't send.

back to List of alarms level 1

Event SMS 2 Fail

Alarm Type	WRN
Alarmlist message	Event SMS 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 2 (page 546)** and SMS wasn't send.

back to List of alarms level 1

Event SMS 3 Fail

Alarm Type	WRN
Alarmlist message	Event SMS 3 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 3 (page 546)** and SMS wasn't send.

back to List of alarms level 1

Event SMS 4 Fail

Alarm Type	WRN
Alarmlist message	Event SMS 4 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 4 (page 547)** and SMS wasn't send.

back to List of alarms level 1

Fence 1 Alarm

Alarm Type	HST
Alarmlist message	Fence 1 Alarm
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 498)** › **Fence 1 Protection (page 499)** › **Fence Radius 1 (page 496)**

back to List of alarms level 1

Fence 2 Alarm

Alarm Type	HST
Alarmlist message	Fence 2 Alarm
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 498)** › **Fence 2 Protection (page 500)** › **Fence 2 Protection (page 500)**

back to List of alarms level 1

Wrn Fence 1 Alarm

Alarm Type	WRN
Alarmlist message	Wrn Fence 1 Alarm
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 498)** › **Fence 1 Protection (page 499)** › **Fence Radius 1 (page 496)**

back to List of alarms level 1

Wrn Fence 2 Alarm

Alarm Type	WRN
Alarmlist message	Wrn Fence 2 Alarm
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 498)** › **Fence 2 Protection (page 500)** › **Fence Radius 2 (page 496)**

back to List of alarms level 1

Fuel Transfer Failed

Alarm Type	ALI
Alarmlist message	Fuel Transfer Failed
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

back to List of alarms level 1

Wrn ECU Communication Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 772)** - only when this LBO is active Without configured LBO **ECU Power Relay (page 772)** - all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU is configured, but the communication with the ECU is not established or has dropped out.

back to List of alarms level 1

Wrn Battery Voltage

Alarm Type	WRN
Alarmlist message	Wrn Battery Voltage
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate the battery voltage is out of limits given by **Battery Undervoltage (page 329)** and **Battery Overvoltage (page 329)** setpoints.

back to List of alarms level 1

Wrn Fuel Transfer Failed

Alarm Type	Warning
Alarmlist message	Wrn Fuel Transfer Failed
Alarm evaluated	When **FUEL PUMP (PAGE 775)** is active
Related applications	MINT, SPtM
Description	This alarm will occur when there is no increase of fuel level when **FUEL PUMP (PAGE 775)** is active.

back to List of alarms level 1

Wrn Generator L1 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L1 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L1L2 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L1L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L1L2 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L1L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L2 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L2 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L2L3 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L2L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L2L3 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L2L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L3 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L3 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L3 < Voltage
Alarm evaluated	Generator excited only

Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L3L1 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L3L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator L3L1 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L3L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 1

Wrn Generator Overfrequency

Alarm Type	WRN
Alarmlist message	Generator > Frequency
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator overfrequency in the phase L1. The following setpoints are related to it: › **Generator Overfrequency Wrn (page 351)** › **Generator <> Frequency Delay (page 352)**

back to List of alarms level 1

Wrn Generator Uderfrequency

Alarm Type	WRN
Alarmlist message	Generator < Frequency
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator underfrequency in the phase L1. The following setpoints are related to it: › **Generator Underfrequency Wrn (page 352)** › **Generator <> Frequency Delay (page 352)**

back to List of alarms level 1

Mains Overfrequency

Alarm Type	MP
Alarmlist message	Mains Overfrequency
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active when Mains frequency is above the setpoint **Mains Overfrequency (page 362)** for the period longer than **Mains < > Frequency Delay (page 363)**.

back to List of alarms level 1

Mains Underfrequency

Alarm Type	MP
Alarmlist message	Mains Underfrequency
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active when Mains frequency is bellow the setpoint **Mains Underfrequency (page 362)** for the period longer than **Mains < > Frequency Delay (page 363)**.

back to List of alarms level 1

Mains Voltage Unbalance ph-n

Alarm Type	MP
Alarmlist message	Mains Voltage Unbalance ph-n
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued depending on evaluation of the unbalance of the phase voltages, i.e. the difference between highest and lowest phase voltage at any given time. The following setpoints are related to it: › **Mains Voltage Unbalance (page 361)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Mains Voltage Unbalance Delay (page 362)** adjusts the alarm delay.

back to List of alarms level 1

Mains Voltage Unbalance ph-ph

Alarm Type	MP
Alarmlist message	Mains Voltage Unbalance ph-ph
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued depending on evaluation of the unbalance of the phase to phase voltages, i.e. the difference between highest and lowest phase to phase voltage at any given time. The following setpoints are related to it: › **Mains Voltage Unbalance (page 361)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Mains Voltage Unbalance Delay (page 362)** adjusts the alarm delay.

back to List of alarms level 1

Wrn Oil Pressure

Alarm Type	Warning
Alarmlist message	Wrn Oil Pressure
Alarm evaluated	Gen-set is running
Related applications	MINT, SPtM
Description	This alarm indicates that the oil pressure is lower than the pressure set in **Oil Pressure Wrn (page 314)** setpoint.

back to List of alarms level 1

Manual Restore

Alarm Type	ALI
Alarmlist message	Manual Restore
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Alarm is activated when controller is in AUTO mode, **Return From Island (page 365)** setpoint is set to manual, load is on Gen-set and mains has returned.

back to List of alarms level 1

Module(slotA) - comm. outage

Alarm Type	WRN
Alarmlist message	Module(slotA) - comm. outage
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 1

Module(slotA) - false module

Alarm Type	WRN
Alarmlist message	Module(slotA) - fake module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that false module is inserted in slot.

back to List of alarms level 1

Module(slotA) - unattended

Alarm Type	WRN
Alarmlist message	Module(slotA) - unattended
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

back to List of alarms level 1

Module(slotA) - unexpected

Alarm Type	WRN
Alarmlist message	Module(slotA) - unexpected
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

back to List of alarms level 1

Module(slotA) - unknown module

Alarm Type	WRN
Alarmlist message	Module(slotA) - unknown module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that unknown module is inserted in slot.

back to List of alarms level 1

Module(slotB) - comm. outage

Alarm Type	WRN
Alarmlist message	Module(slotB) - comm. outage
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 1

Module(slotB) - false module

Alarm Type	WRN
Alarmlist message	Module(slotB) - fake module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that false module is inserted in slot.

back to List of alarms level 1

Module(slotB) - unattended

Alarm Type	WRN
Alarmlist message	Module(slotB) - unattended
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

back to List of alarms level 1

Module(slotB) - unexpected

Alarm Type	WRN
Alarmlist message	Module(slotB) - unexpected
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

back to List of alarms level 1

Module(slotB) - unknown module

Alarm Type	WRN
Alarmlist message	Module(slotB) - unknown module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that unknown module is inserted in slot.

back to List of alarms level 1

Module: Slot 1

Alarm Type	WRN
Alarmlist message	Module: Slot 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 1.

back to List of alarms level 1

Module: Slot 2

Alarm Type	WRN
Alarmlist message	Module: Slot 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 2.

back to List of alarms level 1

Module: Slot 3

Alarm Type	WRN
Alarmlist message	Module: Slot 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 3.

back to List of alarms level 1

Module: Slot 4

Alarm Type	WRN
Alarmlist message	Module: Slot 4
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 4.

back to List of alarms level 1

Module: Slot 5

Alarm Type	WRN
Alarmlist message	Module: Slot 5
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 5.

back to List of alarms level 1

Wrn Overload

Alarm Type	WRN
Alarmlist message	Overload
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is issued when the Gen-set power is over the limit for time period longer than the delay. The following setpoints are related to it: › **Overload Wrn (page 344)** adjusts the overload limit. › **Overload BOC (page 343)** Overload Del adjusts the delay.

back to List of alarms level 1

PasswEnterBlock

Alarm Type	WRN
Alarmlist message	PasswEnterBlock
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate that user will not be able to type in password for set amount of time. ***Note:*** *This is cause by too many invalid attempts.*

back to List of alarms level 1

Rental Timer 1 Elapsed

Alarm Type	AHI
Alarmlist message	Rental Timer 1 Elapsed
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when **Rental Timer 1 (page 490)** elapses.

back to List of alarms level 1

Rental Timer 2 Elapsed

Alarm Type	AHI
Alarmlist message	Rental Timer 2 Elapsed
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when **Rental Timer 2 (page 492)** elapses.

back to List of alarms level 1

Rental Timer Block Start

Alarm Type	WRN
Alarmlist message	Rental Timer Block Start
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	Alarm is active when there is start command and **Rental Timer 1 (page 490)** or **Rental Timer 2 (page 492)** elapsed.

back to List of alarms level 1

ROCOF

Alarm Type	HST
Alarmlist message	ROCOF
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if ROCOF protection is triggered.

back to List of alarms level 1

SNMP TRAP 1 Fail

Alarm Type	WRN
Alarmlist message	SNMP TRAP 1 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if TRAP will not be able to reach server.

back to List of alarms level 1

SNMP TRAP 2 Fail

Alarm Type	WRN
Alarmlist message	SNMP TRAP 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if TRAP will not be able to reach server, or in case there is no reply for the server

back to List of alarms level 1

Soft Transfer Fail

Alarm Type	WRN
Alarmlist message	Soft Transfer Fail
Alarm evaluated	During transition of load
Related applications	MINT, SPtM
Description	This alarm is issued when the unloading was not successful (**Load Ramp (page 400)** + 10 % gets elapsed).

back to List of alarms level 1

Transferring Fuel

Alarm Type	ALI
Alarmlist message	Transferring Fuel
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	This alarm is issued if **FUEL PUMP (PAGE 775)** is active.

back to List of alarms level 1

VectorShift

Alarm Type	HST
Alarmlist message	VectorShift
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if the generator phase to phase shift will exceed preset values. The following setpoints are related to it: Vector Shift Protection, Vector Shift Limit.

back to List of alarms level 1

Wrn Charging Alternator Fail

Alarm Type	SD
Alarmlist message	Sd Charging Alternator Fail
Alarm evaluated	Engine running only
Related applications	MINT, SPtM
Description	This alarm is issued if the engine is running and the voltage on the D+ terminal is lower than **D+ Threshold (page 333)** of the controller supply voltage. This alarm works similar to the red "battery" alarm indicator on a vehicle dashboard. The setpoint has to be in Charge Fail or Enabled position to enable this alarm.

back to List of alarms level 2

Wrn Coolant Temperature Low

Alarm Type	WRN
Alarmlist message	Wrn Coolant Temperature Low
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that the coolant temperature is lower than the temperature set in **Coolant Temperature Low Wrn (page 322)** setpoint.

back to List of alarms level 1

Wrn Emergency Droop Active

Alarm Type	WRN
Alarmlist message	Wrn Emergency Droop Active
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will switch from isochronous regulation to droop regulation when number of controller detected by the controller on CAN2 is lower than the number in the setpoint #Number Of Controller On CAN.

back to List of alarms level 1

Wrn Fuel Theft

Alarm Type	WRN
Alarmlist message	Wrn Fuel Theft
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when the fuel level value measured at relevant AI (Fuel Level) drops faster than is the limit adjusted by setpoint **Maximal Fuel Drop (page 325).**

back to List of alarms level 1

Wrn Mains Voltage Detected

Alarm Type	WRN
Alarmlist message	Wrn Mains Voltage Detected
Alarm evaluated	Gen-set is running
Related applications	MINT, SPtM
Description	This alarm occurs when setpoint **Application Mode Select (page 248)** is adjusted to MRS and voltage is detected on mains.

back to List of alarms level 1

Wrn Maintenance 1

Alarm Type	WRN
Alarmlist message	Wrn Maintenance 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Indication that either **Maintenance Timer 1 RunHours (page 339)** or **Maintenance Timer 1 Interval (page 339)** count down is finished. Adjust the setpoint **Maintenance Timer 1 RunHours (page 339)** and/or **Maintenance Timer 1 Interval (page 339)** for the next maintenance check to clear the alarm.

back to List of alarms level 1

Wrn Maintenance 2

Alarm Type	WRN
Alarmlist message	Wrn Maintenance 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Indication that either **Maintenance Timer 2 RunHours (page 340)** or **Maintenance Timer 2 Interval (page 341)** count down is finished. Adjust the setpoint **Maintenance Timer 2 RunHours (page 340)** and/or **Maintenance Timer 2 Interval (page 341)** for the next maintenance check to clear the alarm.

back to List of alarms level 1

Wrn Maintenance 3

Alarm Type	WRN
Alarmlist message	Wrn Maintenance 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Indication that either **Maintenance Timer 3 RunHours (page 342)** or **Maintenance Timer 3 Interval (page 342)** count down is finished. Adjust the setpoint **Maintenance Timer 3 RunHours (page 342)** and/or **Maintenance Timer 3 Interval (page 342)** for the next maintenance check to clear the alarm.

back to List of alarms level 1

Wrn MCB Fail

Alarm Type	WRN
Alarmlist message	Wrn MCB Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm will occur when the **MCB Feedback (page 727)** input does not match the expected position given by the **MCB Close/Open (page 789)** output. It stays active until the mismatch between the output and feedback disappears. › If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately. › Self-opening of the breaker is not considered a fault and if all mains values are within limits, the command to reclose the breaker is issued after delay given by the setpoint **Mains Return Delay (page 359)** has elapsed. › The alarm will be also issued, if the breaker does not respond to the close command within 2 seconds. After this period has elapsed the output MCB Close/Open is deactivated again and the next attempt to close the breaker will occur first after the alarm is reset. › The alarm will be also issued if the breaker does not respond to the open command within 2 seconds. The output MCB Close/Open will stay deactivated. Closing of GCB is blocked until this alarm becomes inactive.

back to List of alarms level 1

Wrn Override All Sd

Alarm Type	WRN
Alarmlist message	Override All Sd
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when binary input **Sd Override (page 734)** is activated.

back to List of alarms level 1

Wrn Rental Timer 1

Alarm Type	WRN
Alarmlist message	Wrn Rental Timer 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs xx hours before **Rental Timer 1 (page 490)** elapsed. Hours are adjusted by setpoint **Rental Timer 1 Wrn (page 492)**.

back to List of alarms level 1

Wrn Rental Timer 2

Alarm Type	WRN
Alarmlist message	Wrn Rental Timer 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs xx hours before **Rental Timer 2 (page 492)** elapsed. Hours are adjusted by setpoint **Rental Timer 2 Wrn (page 494)**.

back to List of alarms level 1

Wrn Reverse Synchro Fail

Alarm Type	WRN
Alarmlist message	Wrn Reverse Synchro Fail
Alarm evaluated	During synchronization
Related applications	MINT, SPtM
Description	This alarm is issued when Gen-set is synchronizing to the mains/bus via MCB and **Synchronization Timeout (page 406)** gets elapsed.

back to List of alarms level 1

Wrn Speed Regulation Limit

Alarm Type	WRN
Alarmlist message	Wrn Speed Regulation Limit
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate the speed governor output stays close to one of the limit values for more than 2 seconds.

back to List of alarms level 1

Wrn Stop Fail

Alarm Type	WRN
Alarmlist message	Wrn Stop Fail
Alarm evaluated	While the engine shall be stopped

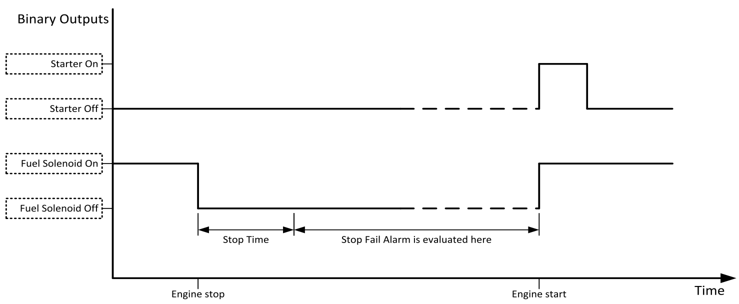
<table>
<tr><td>Related applications</td><td>MINT, SPtM</td></tr>
<tr><td>Description</td><td>This alarm occurs if the Gen-set shall be stopped, but some symptom indicates that it is not stopped. The period when the Gen-set shall be stopped begins after the FUEL SOLENOID (PAGE 775) has been switched off and time delay Stop Time (page 307) has elapsed and lasts for the entire time the FUEL SOLENOID (PAGE 775) or STARTER (PAGE 803) are off.


Image 8.224 Stop Fail
Note: Gen-set cannot be started until this alarm is inactive and reset.</td></tr>
</table>

back to List of alarms level 1

Wrn Unsupported PMS Mode

Alarm Type	WRN
Alarmlist message	Wrn Unsupported PMS Mode
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active if setpoint **#Power Management Mode (page 374)** is adjusted to not available option.

back to List of alarms level 1

Wrn Voltage Regulation Limit

Alarm Type	WRN
Alarmlist message	Wrn Voltage Regulation Limit
Alarm evaluated	Gen-set is running
Related applications	MINT, SPtM
Description	This alarm is issued when AVR output (**Voltage control outputs (page 158)**) stays close to one of the limit values for more than 2 seconds.

back to List of alarms level 1

Wrong Config

Alarm Type	ALI
Alarmlist message	Wrong Config
Alarm evaluated	

Related applications	MINT, SPtM
Description	This alarm is issued to indicate that content of the configuration in controller unit does not match to configuration.

back to List of alarms level 1

Wrong Power Format

Alarm Type	ALI
Alarmlist message	Wrong Power Format
Alarm evaluated	
Related applications	MINT, SPtM
Description	This alarm is issued if maximum sum of nominal power is exceeded.

back to List of alarms level 1

Wrn Default Credentials

Alarm Type	WRN
Alarmlist message	Wrn Default Credentials
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is issued if the factory default password and/or access code are used. Factory default password and access code are "0".

back to List of alarms level 1

ECU Communication Fail

Alarm Type	WRN
Alarmlist message	ECU Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 772)** – only when this LBO is active Without configured LBO **ECU Power Relay (page 772)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU is configured, but the communication with the ECU is not established or has dropped out. LBO **Alarm (page 753)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Stp Bus Meas Error

Alarm Type	ProtSTP
Alarmlist message	Stp Bus Meas Error
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued in MINT application when the voltage on the controller's bus terminals is out of limits 20 seconds after GCB or MCB was closed

back to List of alarms level 1

Stp Synchronisation Fail

Alarm Type	ProtSTP
Alarmlist message	Stp Synchronisation Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if the synchronization timeout gets elapsed (forward synchronization).

back to List of alarms level 1

Wrn Display Fail

Alarm Type	WRN
Alarmlist message	Wrn Display Fail
Alarm evaluated	
Related applications	MINT, SPtM
Description	This alarm is issued if communication with display is interrupted or lost.

back to List of alarms level 1

8.2.3 Alarms level 2

What alarms level 2 are:

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

List of alarms level 2

back to Alarms

Aux Overcurrent

Alarm Type	BOC
Alarmlist message	Aux Overcurrent
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

back to List of alarms level 2

BOC Excitation Loss

Alarm Type	BOC
Alarmlist message	BOC Excitation Loss
Alarm evaluated	Gen-set is running
Related applications	MINT, SPtM
Description	The alarm is issued when the level of reactive power (-kVAr) gets under limit given by setpoint **Excitation Loss Level (page 353)** for time longer then the value of setpoint **Excitation Loss Delay (page 353)**.

back to List of alarms level 2

BOC Gen Voltage Unbalance Ph-N

Alarm Type	BOC
Alarmlist message	BOC Gen Voltage Unbalance ph-n
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the unbalance of the phase voltages, i.e. the difference between highest and lowest phase voltage at any given time. The following setpoints are related to it: › **Voltage Unbalance BOC (page 350)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Voltage Unbalance BOC Delay (page 350)** adjusts the alarm delay.

back to List of alarms level 2

BOC Gen Voltage Unbalance Ph-Ph

Alarm Type	BOC
Alarmlist message	BOC Gen Voltage Unbalance ph-ph
Alarm evaluated	Generator excited only

Related applications	MINT, SPtM
Description	This alarm evaluates the unbalance of the phase to phase voltages, i.e. the difference between highest and lowest phase to phase voltage at any given time. The following setpoints are related to it: › **Voltage Unbalance BOC (page 350)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Voltage Unbalance BOC Delay (page 350)** adjusts the alarm delay.

back to List of alarms level 2

BOC NCB fail

Alarm Type	BOC
Alarmlist message	BOC NCB fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when the **NCB Feedback (page 728)** input does not match the expected position given by the **NCB Close/Open (page 795)** output. It stays active until the mismatch between the output and feedback persists. › If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately. › The alarm will be also issued if the breaker does not respond to an open or close command within 5 seconds.

back to List of alarms level 2

BOC Overcurrent IDMT

Alarm Type	BOC
Alarmlist message	Sd + Name of binary input
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm is issued if IDMT protection is activated due to over-crossing the IDMT curve set by setpoints **IDMT Overcurrent Delay (page 345)**. The behaviour of the overcurrent alarm is adjusted by the following setpoints: › **IDMT Overcurrent Delay (page 345)** defines the reaction time of the protection when the current is twice the amount of nominal value. › **Nominal Current (page 262)** set the nominal current level, where the alarm starts to be evaluated. The reaction time is infinite at this point.

back to List of alarms level 2

BOC Rental Timer 1 Exceeded

Alarm Type	BOC
Alarmlist message	BOC Rental Timer 1 Exceeded
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	This alarm is issued if Rental Timer 1 BOC will timer elapse.

back to List of alarms level 2

BOC Rental Timer 2 Exceeded

Alarm Type	BOC
Alarmlist message	BOC Rental Timer 2 Exceeded
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if Rental Timer 2 BOC will timer elapse.

back to List of alarms level 2

BOC Reverse Power

Alarm Type	BOC
Alarmlist message	BOC Reverse Power
Alarm evaluated	Gen-set is running
Related applications	MINT, SPtM
Description	The alarm is issued when the level of active power (-kW) gets under limit given by setpoint **Reverse Power Level (page 352)** for time longer than the value of setpoint **Reverse Power Delay (page 353)**.

back to List of alarms level 2

BOC Maintenance 1

Alarm Type	BOC
Alarmlist message	BOC
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Indication that either **Maintenance Timer 1 RunHours (page 339)** or **Maintenance Timer 1 Interval (page 339)** count down is finished. Adjust the setpoint **Maintenance Timer 1 RunHours (page 339)** and/or **Maintenance Timer 1 Interval (page 339)** for the next maintenance check to clear the alarm.

back to List of alarms level 2

BOC Maintenance 2

Alarm Type	BOC
Alarmlist message	BOC
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Indication that either **Maintenance Timer 2 RunHours (page 340)** or **Maintenance Timer 2 Interval (page 341)** count down is finished. Adjust the setpoint **Maintenance Timer 2 RunHours (page 340)** and/or **Maintenance Timer 2 Interval (page 341)** for the next maintenance check to clear the alarm.

back to List of alarms level 2

BOC Maintenance 3

Alarm Type	BOC
Alarmlist message	BOC
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Indication that either **Maintenance Timer 3 RunHours (page 342)** or **Maintenance Timer 3 Interval (page 342)** count down is finished. Adjust the setpoint **Maintenance Timer 3 RunHours (page 342)** and/or **Maintenance Timer 3 Interval (page 342)** for the next maintenance check to clear the alarm.

back to List of alarms level 2

Current Unbalance

Alarm Type	BOC
Alarmlist message	Current Unbalance
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate if **Current Unbalance BOC (page 347)** timer elapses.

back to List of alarms level 2

EM(A) - a message lost

Alarm Type	SD
Alarmlist message	EM(A) - a message lost
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 2

EM(A) - configuration mistake

Alarm Type	SD
Alarmlist message	EM(A) - configuration mistake
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with configuration of binary input or output of module in slot.

back to List of alarms level 2

EM(A) - insufficient

Alarm Type	SD
Alarmlist message	EM(A) - insufficient
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that module does not support all required features.

back to List of alarms level 2

EM(A) - missing or damaged

Alarm Type	SD
Alarmlist message	EM(A) - missing or damaged
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication with module in slot (in first 5 second there was no communication and module is configured in slot).

back to List of alarms level 2

EM(B) - a message lost

Alarm Type	SD
Alarmlist message	EM(B) - a message lost
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 2

EM(B) - configuration mistake

Alarm Type	SD
Alarmlist message	EM(B) - configuration mistake
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with configuration of binary input or output of module in slot.

back to List of alarms level 2

EM(B) - insufficient

Alarm Type	SD
Alarmlist message	EM(B) - insufficient
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that module does not support all required features.

back to List of alarms level 2

EM(B) - missing or damaged

Alarm Type	SD
Alarmlist message	EM(B) - missing or damaged
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication with module in slot (if first 5 second there was no communication and module is configured in slot).

back to List of alarms level 2

Sd Emergency Stop

Alarm Type	SD
Alarmlist message	Emergency Stop
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Alarm is activated when binary input **EMERGENCY STOP (PAGE 718)** is activated. The Gen-set shuts down in the moment the input is activated and starting is blocked until the input is deactivated and fault reset is pressed. ***Note:*** *Use red emergency button placed on the switchboard door and connect it to a binary input of the controller. Then configure the function Emergency Stop to this binary input. It is recommended to use NC contact of the button.* ***Note:*** *The MCB control is not affected by this alarm.*

back to List of alarms level 2

Sd Fence 1 Alarm

Alarm Type	Shutdown
Alarmlist message	Sd Fence 1 Alarm
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 498)** › **Fence 1 Protection (page 499)** › **Fence Radius 1 (page 496)**

back to List of alarms level 2

Sd Fence 2 Alarm

Alarm Type	Shutdown
Alarmlist message	Sd Fence 2 Alarm
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 498)** › **Fence 1 Protection (page 499)** › **Fence Radius 1 (page 496)**

back to List of alarms level 2

Generator Earth Overcurrent

Alarm Type	BOC
Alarmlist message	Generator Earth Overcurrent
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

back to List of alarms level 2

Sd Generator L1 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: › **Generator Overvoltage Sd (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

BOC Generator L1 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phases 1. The following setpoints are related to it: › **Generator Undervoltage BOC (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

Sd Generator L1L2 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L1L2 > Voltage
Alarm evaluated	Generator excited only

Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: › **Generator Overvoltage Sd (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

BOC Generator L1L2 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L1L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: › **Generator Undervoltage BOC (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

Sd Generator L2 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: › **Generator Overvoltage Sd (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

BOC Generator L2 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phases 2. The following setpoints are related to it: › **Generator Undervoltage BOC (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

Sd Generator L2L3 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L2L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: › **Generator Overvoltage Sd (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

BOC Generator L2L3 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L2L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: › **Generator Undervoltage BOC (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

Sd Generator L3 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: › **Generator Overvoltage Sd (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

BOC Generator L3 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phases 3. The following setpoints are related to it: › **Generator Undervoltage BOC (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

Sd Generator L3L1 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L3L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: › **Generator Overvoltage Sd (page 348)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

BOC Generator L3L1 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L3L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: › **Generator Undervoltage BOC (page 349)** › **Generator <> Voltage Delay (page 350)**

back to List of alarms level 2

BOC Generator Overfrequency

Alarm Type	BOC
Alarmlist message	Sd Generator > Frequency
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: › **Generator Overfrequency BOC (page 351)** › **Generator <> Frequency Delay (page 352)**

back to List of alarms level 2

Generator Underfrequency

Alarm Type	BOC
Alarmlist message	Sd Generator < Frequency
Alarm evaluated	Generator excited only

Related applications	MINT, SPtM
Description	This alarm evaluates the generator frequency in the phase L1. The following setpoints are related to it: › **Generator Underfrequency BOC (page 351)** › **Generator <> Frequency Delay (page 352)**

back to List of alarms level 2

Module(slotA) - comm. outage

Alarm Type	SD
Alarmlist message	Module(slotA) - comm. outage
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 2

Module(slotA) - false module

Alarm Type	SD
Alarmlist message	Module(slotA) - fake module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that false module is inserted in slot.

back to List of alarms level 2

Module(slotA) - unattended

Alarm Type	SD
Alarmlist message	Module(slotA) - unattended
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

back to List of alarms level 2

Module(slotA) - unexpected

Alarm Type	SD
Alarmlist message	Module(slotA) - unexpected
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

back to List of alarms level 2

Module(slotA) - unknown module

Alarm Type	SD
Alarmlist message	Module(slotA) - unknown module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that unknown module is inserted in slot.

back to List of alarms level 2

Module(slotB) - comm. outage

Alarm Type	SD
Alarmlist message	Module(slotB) - comm. outage
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 2

Module(slotB) - false module

Alarm Type	SD
Alarmlist message	Module(slotB) - fake module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that false module is inserted in slot.

back to List of alarms level 2

Module(slotB) - unattended

Alarm Type	SD
Alarmlist message	Module(slotB) - unattended
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

back to List of alarms level 2

Module(slotB) - unexpected

Alarm Type	SD
Alarmlist message	Module(slotB) - unexpected
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

back to List of alarms level 2

Module(slotB) - unknown module

Alarm Type	SD
Alarmlist message	Module(slotB) - unknown module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that unknown module is inserted in slot.

back to List of alarms level 2

Module: Slot 1

Alarm Type	SD
Alarmlist message	Module: Slot 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 1.

back to List of alarms level 2

Module: Slot 2

Alarm Type	SD
Alarmlist message	Module: Slot 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 2.

back to List of alarms level 2

Module: Slot 3

Alarm Type	SD
Alarmlist message	Module: Slot 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 3.

back to List of alarms level 2

Module: Slot 4

Alarm Type	SD
Alarmlist message	Module: Slot 4
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 4.

back to List of alarms level 2

Module: Slot 5

Alarm Type	SD
Alarmlist message	Module: Slot 5
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 5.

back to List of alarms level 2

Sd Overload

Alarm Type	BOC
Alarmlist message	Sd Overload
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is issued when the Gen-set power is over the limit for time period longer than the delay. The behavior of the overload alarm is adjusted by the following setpoints: › **Overload BOC (page 343)** adjusts the overload limit. › **Overload Delay (page 344)** adjusts the delay.

back to List of alarms level 2

Sd Aux Current

Alarm Type	SD
Alarmlist message	Sd Aux Current
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

back to List of alarms level 2

Sd Battery Flat

Alarm Type	SD
Alarmlist message	Sd Battery Flat
Alarm evaluated	During cranking
Related applications	MINT, SPtM
Description	This alarm will be issued if the controller was reset during cranking of the gen-set. If this situation occurs, the controller supposes the starting battery is so exhausted that its voltage drops so low when starter motor is energized that it causes controller reset.

back to List of alarms level 2

Sd Earth Fault Current

Alarm Type	SD
Alarmlist message	Sd Earth Fault Current
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that the value of earth fault current is higher than adjusted limit. The following setpoints are related to it: › **Earth Fault Sd (page 550)** adjusts the maximum allowed earth fault current. › **Earth Fault Delay (page 549)** adjusts the alarm delay.

back to List of alarms level 2

Sd GCB Fail

Alarm Type	SD
Alarmlist message	Sd GCB Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm will occur when the **GCB Feedback (page 723)** input does not match the expected position given by the **GCB Close/Open (page 777)** output. It stays active until the mismatch between the output and feedback persists. › If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately. › The alarm will be also issued if the breaker does not respond to an open or close command within 2 seconds.

back to List of alarms level 2

Sd Overspeed

Alarm Type	SD
Alarmlist message	Sd Overspeed
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs immediately when the engine speed has exceeded the limit. The behavior of the overspeed alarm is adjusted by the following setpoints: › **Overspeed Sd (page 312)** adjust the overspeed limit

back to List of alarms level 2

Sd RPM Measurement Fail

Alarm Type	SD
Alarmlist message	Sd RPM Measurement Fail
Alarm evaluated	During cranking

Related applications	MINT, SPtM
Description	The alarm is issued if the engine speed has not exceeded the **Starting RPM (page 300)** within the **Maximum Cranking Time (page 299)**, although some of additional running engine indication sources indicate that the engine has started.

back to List of alarms level 2

Sd Start Fail

Alarm Type	SD
Alarmlist message	Sd Start Fail
Alarm evaluated	When the gen-set is being started
Related applications	MINT, SPtM
Description	This alarm will be issued after all attempts to start the gen-set have run out but the Gen-set did not start. The following setpoints are related to this alarm: › **Cranking Attempts (page 298)** adjust the number of attempts

back to List of alarms level 2

Sd Underspeed

Alarm Type	SD
Alarmlist message	Sd Underspeed
Alarm evaluated	Engine running only
Related applications	MINT, SPtM
Description	This alarm will be issued when the Gen-set is running and then stops by itself. The underspeed alarm starts to be evaluated after successful Gen-set start and is being evaluated for the entire time that the fuel solenoid is on.

back to List of alarms level 2

Short Circuit

Alarm Type	BOC
Alarmlist message	Short Circuit
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This is a fast overcurrent protection. The following setpoints are related to this alarm: › **Short Circuit BOC (page 345)** adjusts the short current limit. › **Short Circuit BOC Delay (page 345)** adjusts the delay in fine steps.

back to List of alarms level 2

Sd ECU Communication Fail

Alarm Type	SD
Alarmlist message	ECU Communication Fail
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	This alarm is issued if ECU is configured but the communication with ECU is not established or has dropped out.

back to List of alarms level 2

8.2.4 Fail sensor and other types

What Fail sensor and other types of alarms are

If the measured resistance on an analog input exceeds the valid range, a sensor fail will be detected and a sensor fail message will appear in the Alarmlist.

List of fail sensor

back to Alarms

Fls Coolant Temp

Alarm Type	Fls
Alarmlist message	Fls Coolant Temperature
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of coolant temperature is out of range or is missing.

back to List of fail sensor

Fls Fuel Level

Alarm Type	Fls
Alarmlist message	Fls Fuel Level
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of fuel level is out of range or is missing.

back to List of fail sensor

Fls AIN Prot 1

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that the value of general analog protection is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 2

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 2 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 3

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 3 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 4

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 4
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 4 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 5

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 5
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 5 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 6

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 6
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 6 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 7

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 7
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 7 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 8

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 8
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 8 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 9

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 9
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 9 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 10

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 10
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 10 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 11

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 11
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 11 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 12

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 12
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 12 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 13

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 13
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 13 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 14

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 14
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 14 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 15

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 15
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 15 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 16

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 16
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 16 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 17

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 17
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 17 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 18

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 18
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 18 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 19

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 19
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 19 is out of range or is missing.

back to List of fail sensor

Fls AIN Protect 20

Alarm Type	Fls
Alarmlist message	Fls + name of analog input 20
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when measurement value of analog input 20 is out of range or is missing.

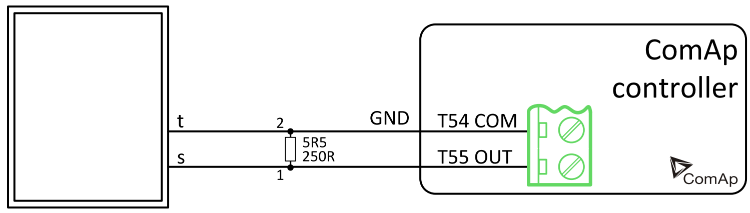
back to List of fail sensor

8.3 AVR interfaces

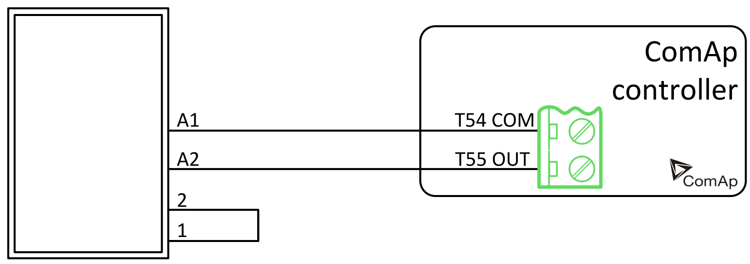
> **IMPORTANT: Read carefully AVR instructions before connecting to a controller! It is not sufficient to use suggested wiring settings, it is necessary as well to adjust AVR settings!**

8.3.1 AVR interfaces alphabetically

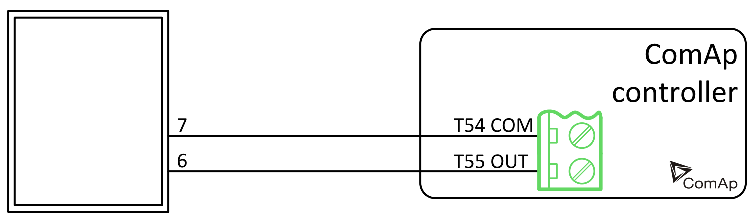
AVK Newage Cosimat N+

	**Voltage Control:** *Voltage Regulator Character* = NEGATIVE *Voltage Regulator Bias* = 0.50 V *Voltage Regulator Low Limit* = 0.00 V *Voltage Regulator High Limit* = 2.00 V

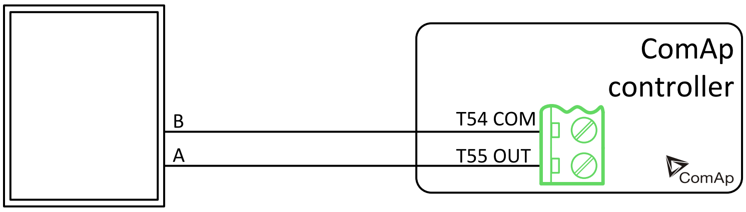
AVK Newage MA330, 327, 321, 341

	**Voltage Control:** *Voltage Regulator Character* = POSITIVE *Voltage Regulator Bias* = 0.00 V *Voltage Regulator Low Limit* = -2.00 V *Voltage Regulator High Limit* = 2.00 V

Basler: APR 63-5, AEC 63-7, KR-FX, KR-FFX

 AVRi output is connected instead of external resistor for voltage adjusting.	**Voltage Control:** *Voltage Regulator Character* = POSITIVE *Voltage Regulator Bias* = 1.00 V *Voltage Regulator Low Limit* = 0.00 V *Voltage Regulator High Limit* = 2.00 V

Basler: DECS 100



AVRi output is connected instead of external resistor for voltage adjusting.

Voltage Control:

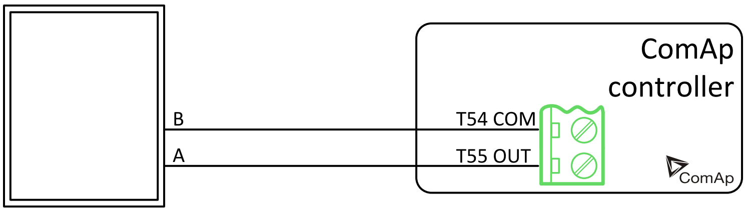
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

Basler: DECS 200



Voltage Control:

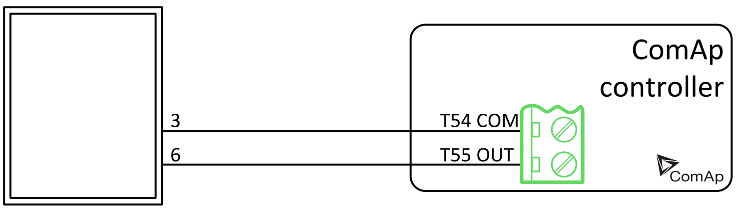
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

Catterpillar CDVR



Pin 44 on DVR – PF regulation is not connected directly from DVR

Voltage Control:

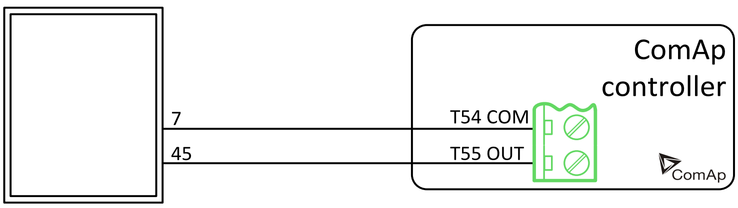
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -6.00 V

Voltage Regulator High Limit = 6.00 V

Catterpillar DVR



Pin 44 on DVR – PF regulation is not connected directly from DVR

Voltage Control:

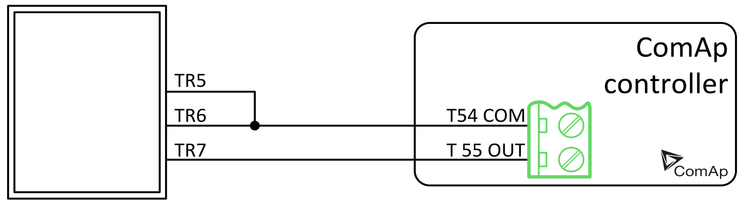
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 2.00 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 4.00 V

Catterpillar VR6, VR3F



For VR3F link 4-7 has to be removed.

Voltage Control:

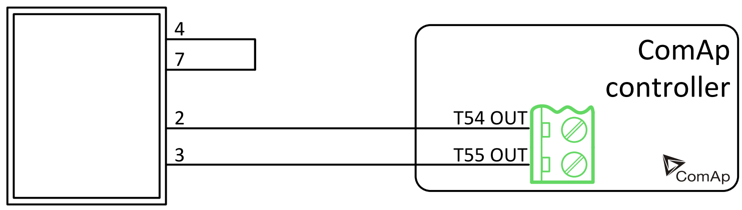
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 1.00 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 2.00 V

Catterpillar VR6-B



Voltage Control:

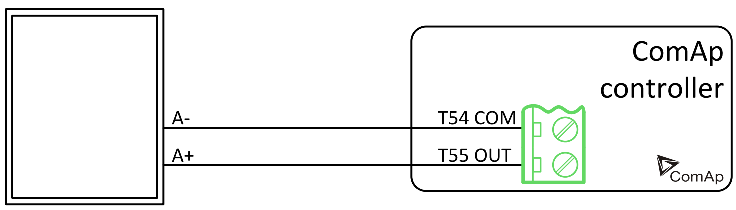
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

ENGGA WT- 2



Voltage Control:

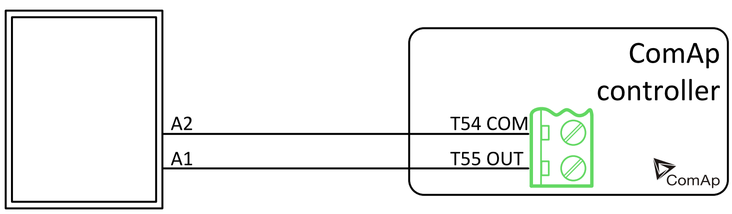
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

ENGGA WT- 3



Voltage Control:

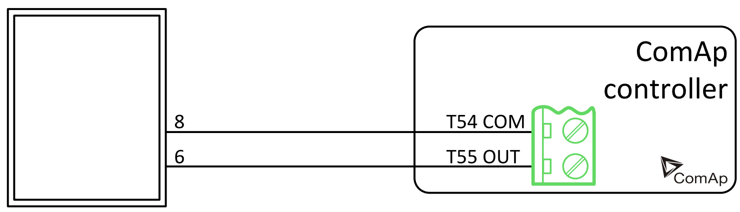
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

KATO KCR 360



Voltage Control:

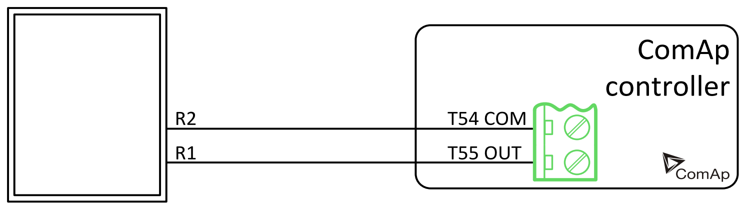
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

KATO KCR 760



Voltage Control:

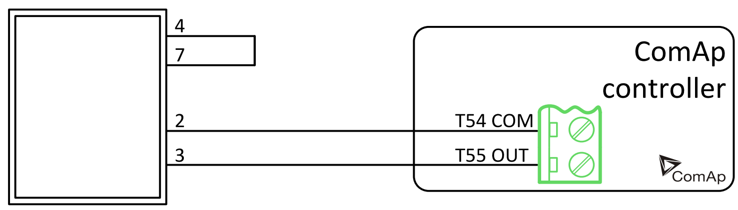
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = -0.20 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

KATO KCR K-65-12B



Voltage Control:

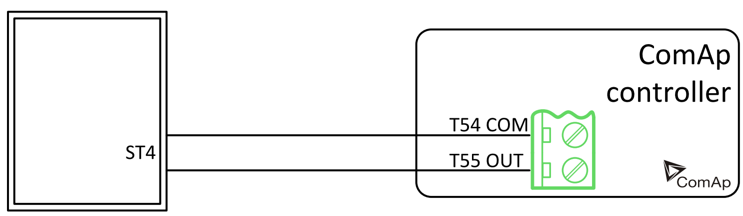
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

Kutai EA448



AVRi output is connected instead Remote voltage trimmer 470 Ω to terminal ST4. Module R726 is not required.

Voltage Control:

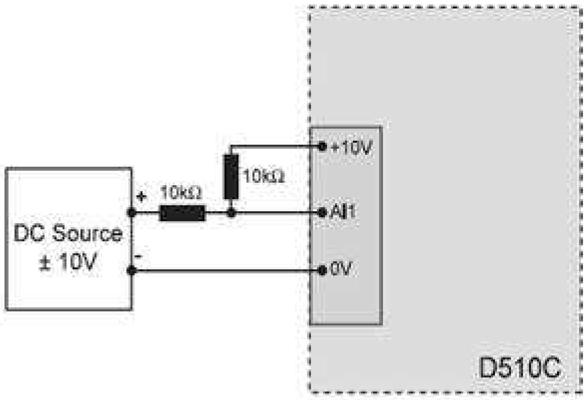
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 1.00 V

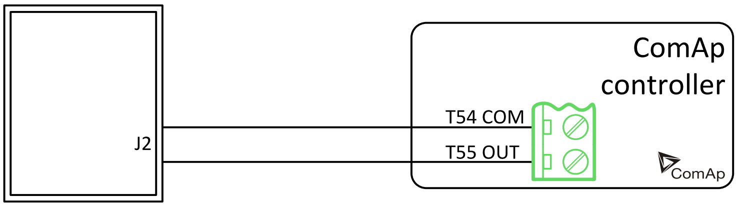
Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 2.00 V

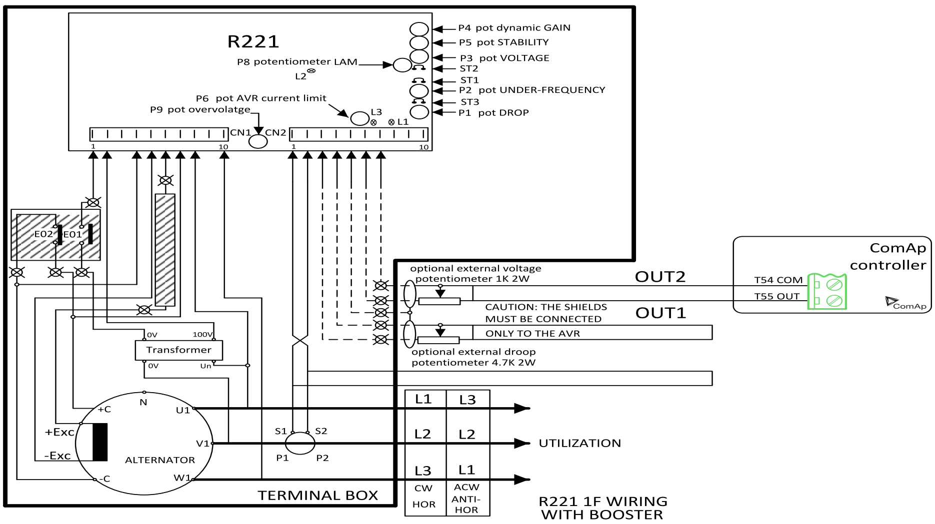
Leroy somer D510C

 AVRi output is connected instead Remote voltage trimmer 470 Ω to terminal J2. module R726 is not required.	Regulator of automatic voltage. **Volt/PF ctrl::** *AVR DCout bias* = 50% *VoltRegChar* = POSITIVE

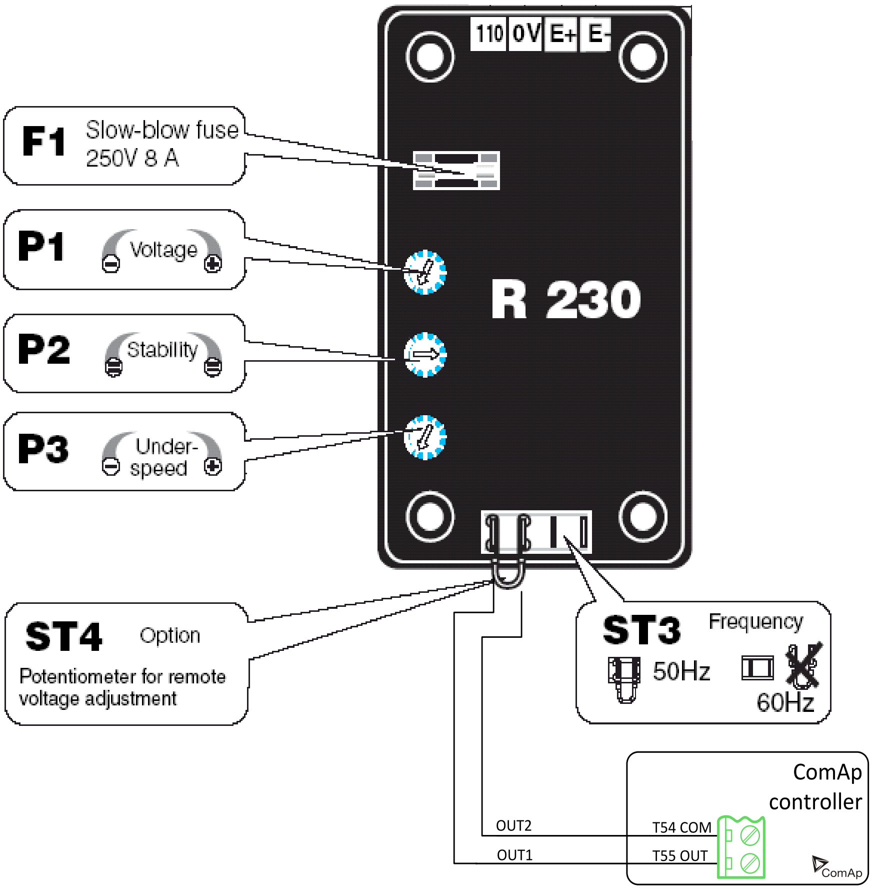
Leroy Somer: R 129

 AVRi output is connected instead Remote voltage trimmer 470 Ω to terminal J2. module R726 is not required.	**Voltage Control:** *Voltage Regulator Character* = POSITIVE *Voltage Regulator Bias* = 1.00 V *Voltage Regulator Low Limit* = 0.00 V *Voltage Regulator High Limit* = 2.00 V

Leroy Somer: R 221, R 222

 Module R726 is not required. AVRi trim to minimum counter clockwise +5%.	**Voltage Control:** *Voltage Regulator Character* = POSITIVE *Voltage Regulator Bias* = -1.00 V *Voltage Regulator Low Limit* = -2.10 V *Voltage Regulator High Limit* = 2.10 V

Leroy Somer: R 230

 Module R726 is not required. AVRi trim minimum counter clockwise.	**Voltage Control:** *Voltage Regulator Character* = POSITIVE *Voltage Regulator Bias* = 0.00 V *Voltage Regulator Low Limit* = -2.00 V *Voltage Regulator High Limit* = 2.00 V

Leroy Somer: R 230

<table>
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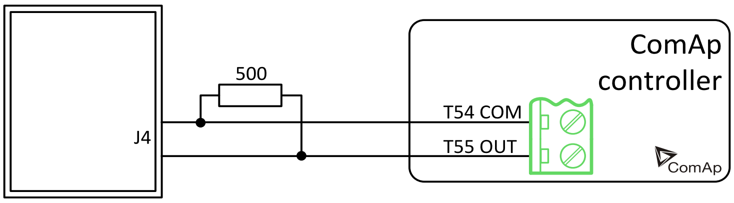

Remove Link J4 and replace through R500

Primary voltage setting with resistors connected: 230V

<u>progress hint:</u>

- Disconnect one wire (OUT 1), set voltage on running Generator to U = nom.
- Measure Voltage over Resistor
- Depending on Value increase AVRi potentiometer to get Range
- Set exact Value with Bias Voltage//PF regulation (gain = 0)
- Stop Gen-set and connect when equal Voltage and polarity is achieved
- Set again regulation loop on demand
</td>
<td>
Voltage Control:

Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit =-2.00 V

Voltage Regulator High Limit = 2.00 V
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Leroy Somer: R 250

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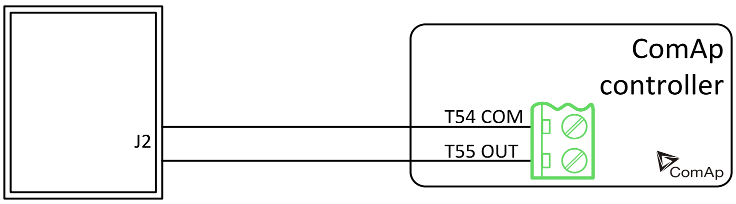

</td>
<td>
Voltage Control:

Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 1.00 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 2.00 V
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Leroy Somer: R 438 LS, R448

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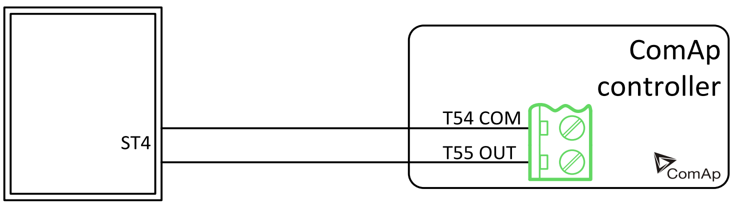

AVRi output is connected (trimmer 470 Ω to terminals) ST4. (Module R726 is not required.).
</td>
<td>
Voltage Control:

Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 1.00 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 2.00 V
</td>
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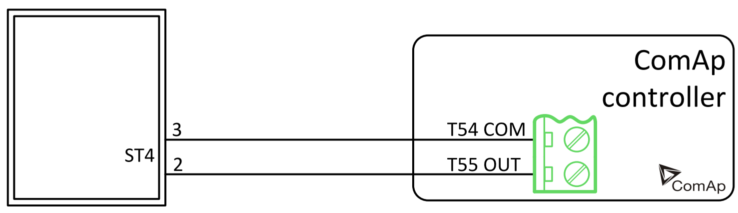
Leroy Somer: R 449



Module R726 is not required..

Voltage Control:

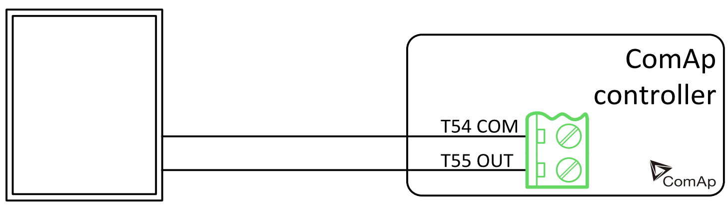
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

Leroy Somer: R 450



Use AVRi instead pf potentiometer 1000 Ω. Read Leroy Somer R 450 manual before use.

Voltage Control:

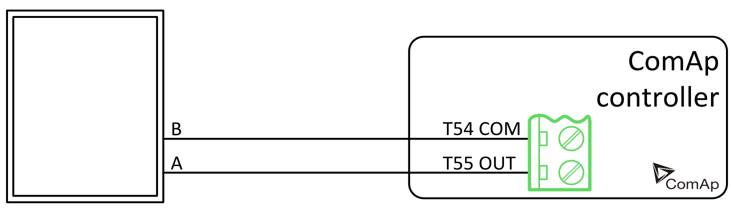
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 1.00 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 2.00 V

Marathon DVR2000E



Voltage Control:

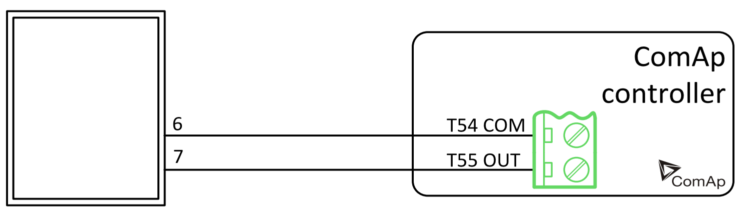
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -5.00 V

Voltage Regulator High Limit = 5.00 V

Marathon PM100, 200



Voltage Control:

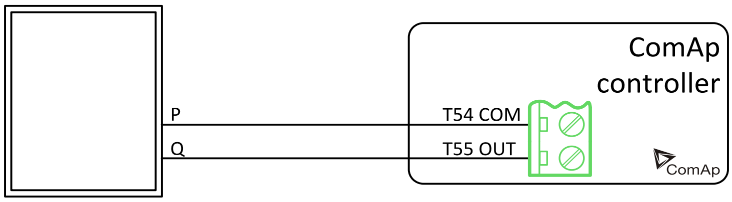
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

MarelliGenerators MARK 5 (M16FA655A)



Voltage Control:

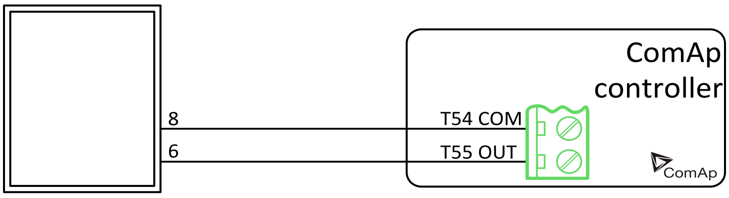
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.60 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 4.00 V

MarelliMotori (M40FA610A)



Voltage Control:

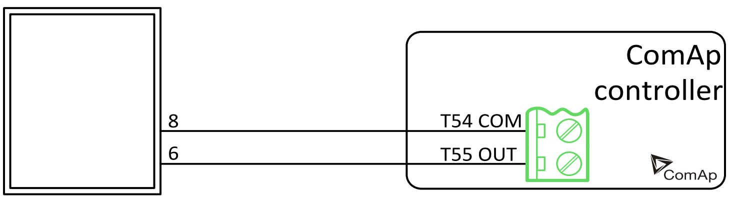
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -3.50 V

Voltage Regulator High Limit = 3.50 V

MarelliMotori Mark I (M40FA640A/A)



Voltage Control:

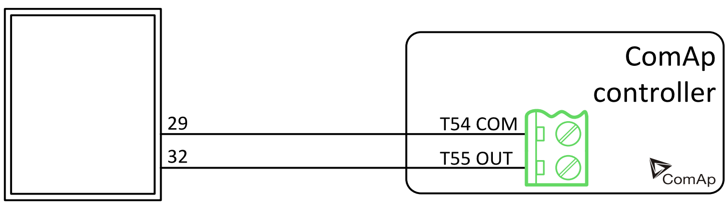
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -3.50 V

Voltage Regulator High Limit = 3.50 V

Mecc Alte DER1



Remove jumpers connecting input 27 to 28 and input 31 to 32.

> ***Note:*** *For values exceeding the limits of ±10 V, the external input is automatically disabled.*

Voltage Control:

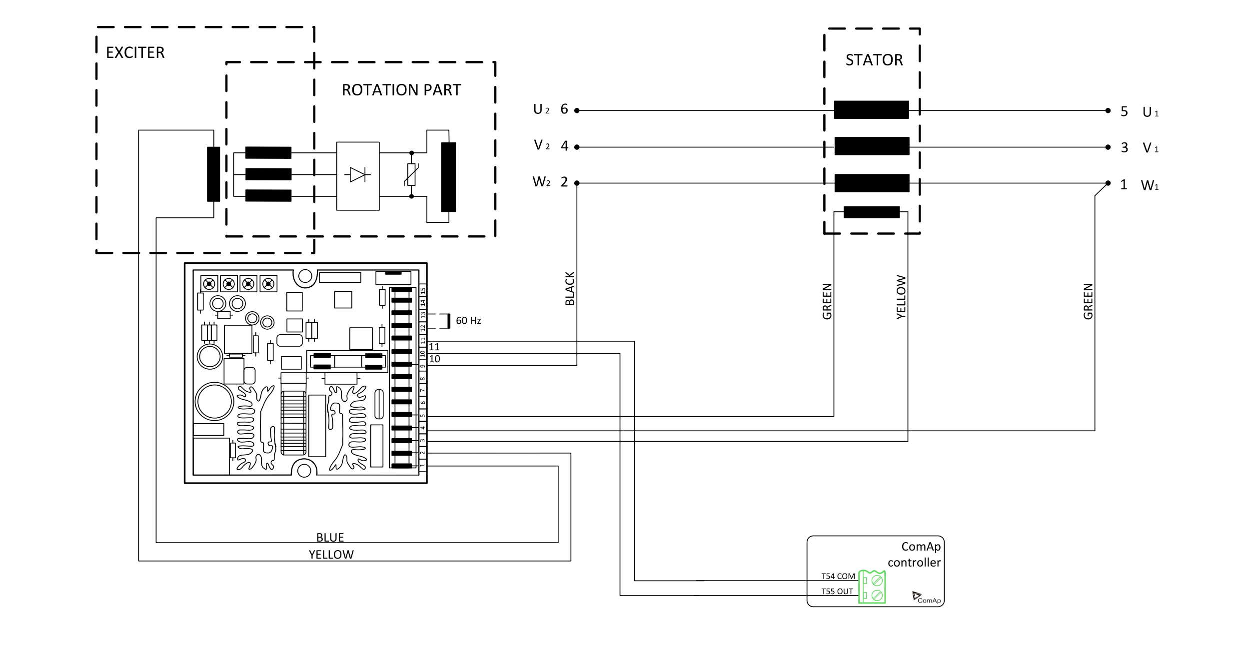
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit =-10.00 V

Voltage Regulator High Limit = 10.00 V

Mecc Alte DSR



The Vext input (connector CN1 – terminals 10 and 11) permits analogical remote control of output voltage with a programmable variation range of up to ±10% (parameter 16, by default the setting is ±5%) with respect to the value set. If you want to use continuous voltage, it will be effective if it is in the range between 0 V and +2,5 V. The input tolerates voltages from –5 V to +5 V, but for values exceeding the limits of 0 V / +2,5 V (or in the event of disconnection) it is automatically disabled and the voltage adjustment goes back to the value set through the trimmer (if enabled) or through parameter 19 (as shown on the picture). Changing of DSR parameters requires PC with dedicated software and DI1-DSR unit! DSR automatically detects presence of transformer for parallel operation (if used it works with droop, if not used it works isochronous).

Voltage Control:

Voltage Regulator Character = POSITIVE

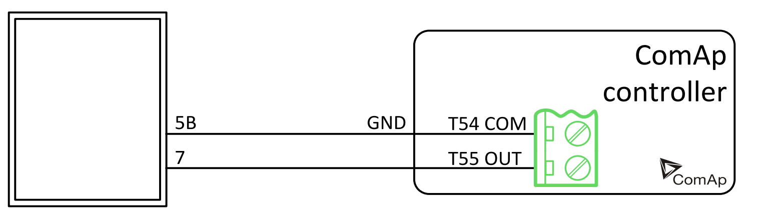
Voltage Regulator Bias = 1.25 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 2.50 V

Note: *For values exceeding the limits of 0 V / +2.5 V, the external input is automatically disabled.*

Mecc Alte Spa: S.R.7/2



Voltage Control:

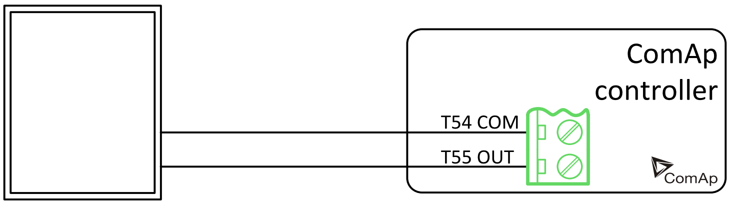
Voltage Regulator Character = NEGATIVE

Voltage Regulator Bias = 8 V

Voltage Regulator Low Limit = 4.00 V

Voltage Regulator High Limit = 12.00 V

Mecc Alte Spa U.V.R.6



AVRi output is connected instead Remote voltage trimmer 100 kΩ (T55 OUT = top position wire and T54 COM = second top position).

Voltage Control:

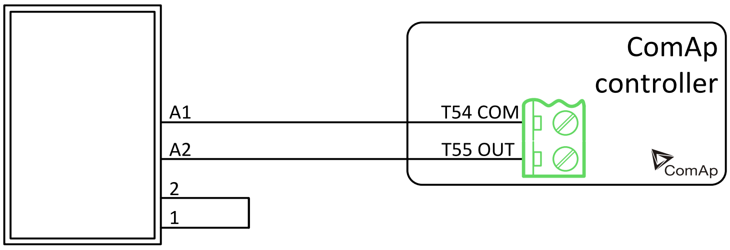
Voltage Regulator Character = NEGATIVE

Voltage Regulator Bias = 8.00 V

Voltage Regulator Low Limit = 4.00 V

Voltage Regulator High Limit = 12.00 V

Newer Leroy Somer



Regulation signal +/- 0...2,5 V

Voltage Control:

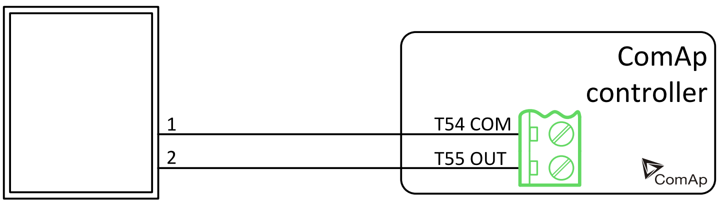
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.50 V

Voltage Regulator High Limit = 2.50 V

Piller



AVRi output is connected instead Remote voltage trimmer 100 kΩ.

Voltage Control:

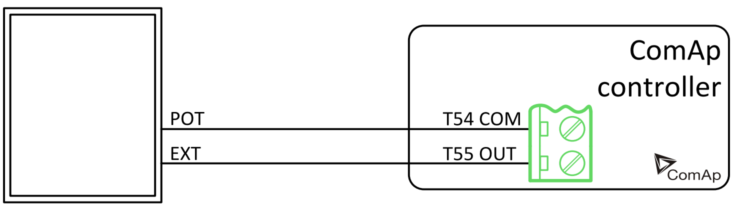
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = -0.44 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

SINCRO AVR BL4 or AVR BL3



Voltage Control:

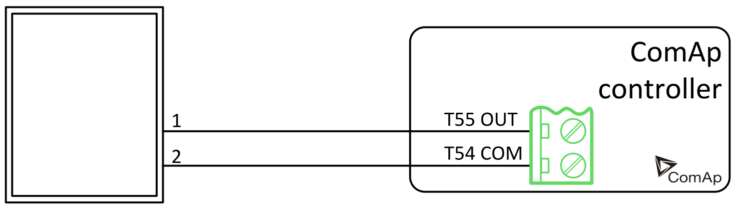
Voltage Regulator Character = NEGATIVE

Voltage Regulator Bias = 1.20 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 6.00 V

Stamford AS480



AVRi output is connected instead of external resistor for voltage adjusting.

Voltage Control:

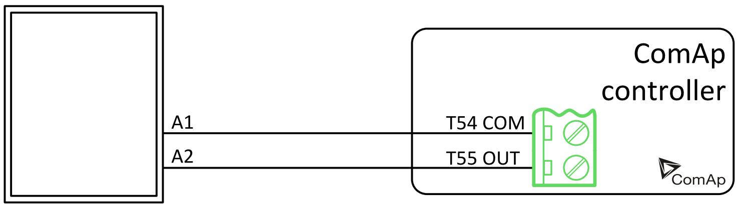
Voltage Regulator Character = NEGATIVE

Voltage Regulator Bias = 1.00 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 2.00 V

Stamford MX 341



Disconnect the droop CT (terminal S1&S2) and short the droop CT leads.

Voltage Control:

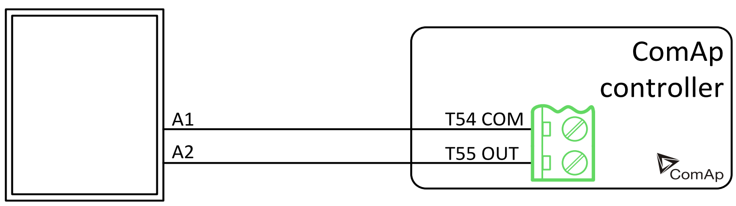
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 1.00 V

Voltage Regulator Low Limit = 0.00 V

Voltage Regulator High Limit = 2.00 V

Stamford SX 440, AS 440, MX 321, SX 421



PFC3 module is not required.

Voltage Control:

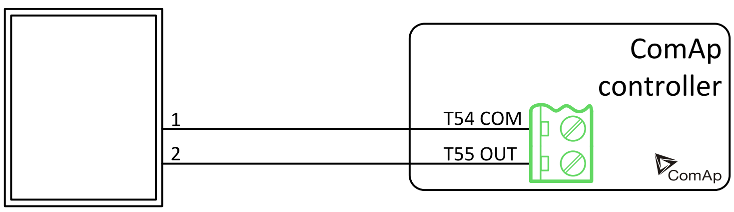
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

Stamford SX 460



AVRi output is connected instead of external resistor for voltage adjusting.

Voltage Control:

Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0.00 V

Voltage Regulator Low Limit = -2.00 V

Voltage Regulator High Limit = 2.00 V

back to Appendix

8.4 Speed governors interfaces

> **IMPORTANT: Read carefully Speed governor instructions before connecting controller Speed governor interface! It is not sufficient to use suggested wiring settings, it is necessary as well to adjust speed governor settings!**

8.4.1 Electronic engines interface

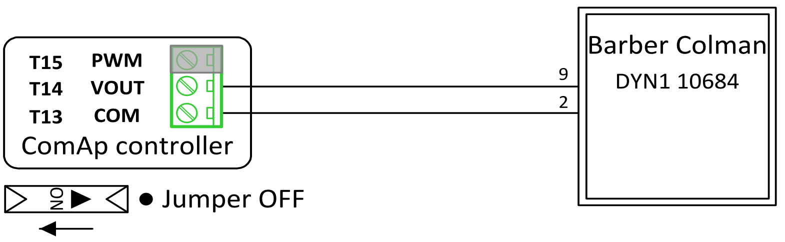
All below mentioned interface examples describe analog interface even if they are (in some cases) used for Electronic Control Units (electronic engines) with CAN data bus. There are several possibilities to connect CAN bus interface between Electronic engine and ComAp controller. Refer to ComAp Electronic Engines Support manual.

8.4.2 Controller Speed Regulator Output voltage limits

Setpoints **Sync/Load Control:** Speed Governor Low Limit [0.01 V] and Speed Governor High Limit [0.01 V] limit low and high levels of output voltage. E.g. instead of full -10 V to +10 V Speed governor output range can be set Speed Governor Low Limit = 0.00 V and Speed Governor High Limit = 5.00 V to reduce the output range from 0 to 5 V.

8.4.3 Speed governors interfaces alphabetically

Barber Colman DYN1 10684



Speed/Load control:

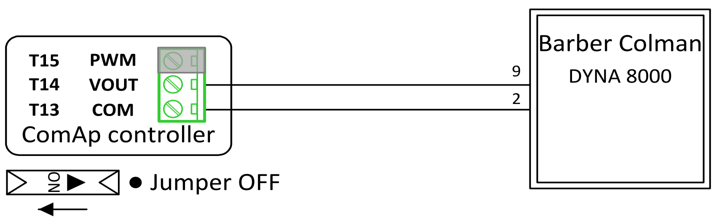
Speed Govovernor Bias = 6,00 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 4 V

Speed Governor High Limit = 8 V

Barber Colman DYNA 8000



Speed/Load control:

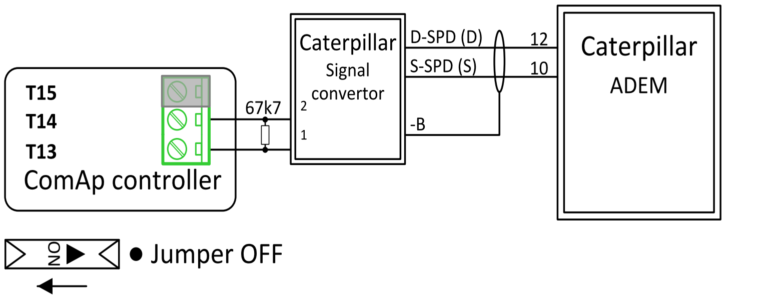
Speed Governor Bias = 6,00 V

Speed Regulator Character = POSITIVE

SpeedGovernor Low Limit = 4 V

Speed Governor Hi Limit = 8 V

Caterpillar ADEM + Signal convertor



Speed/Load control:

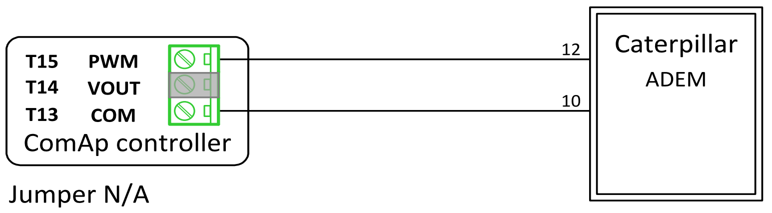
Speed Governor Bias = 5,10 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0 V

Speed Governor High Limit = 10 V

Caterpillar ADEM



Speed/Load control:

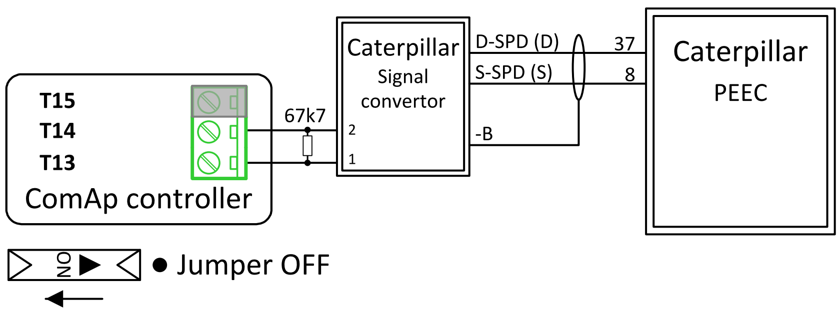
Speed Gov overnor Bias = 5,10 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0 V

Speed Governor High Limit = 10 V

Caterpillar PEEC + Signal convertor



Speed/Load control:

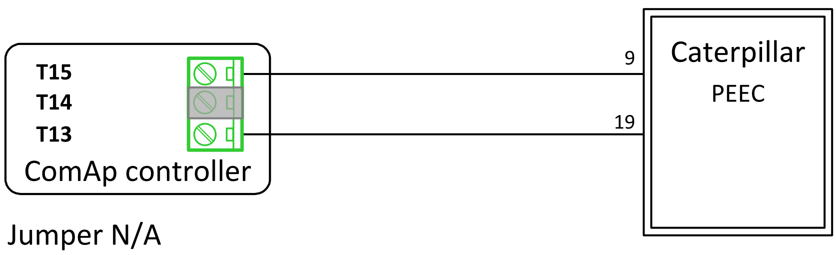
Speed Governor Bias = 5,10 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0 V

Speed Governor High Limit = 10 V

Caterpillar PEEC

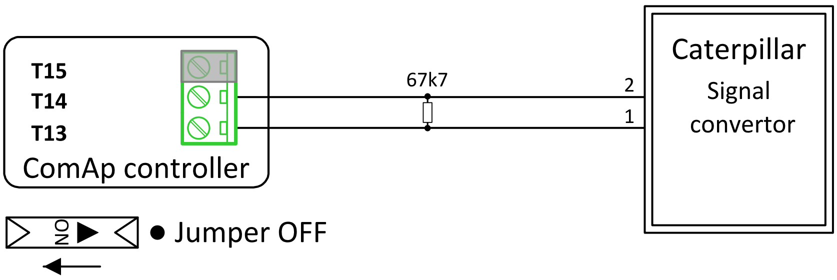


Speed/Load control:

Speed Governor PWM rate = 500 Hz

Caterpillar Signal Converter

It is not necessary to use Caterpillar Signal Converter with InteliGen 500 Use direct PWM output instead.



Potentiometer turns clockwise (droop 0%)

Speed/Load control:

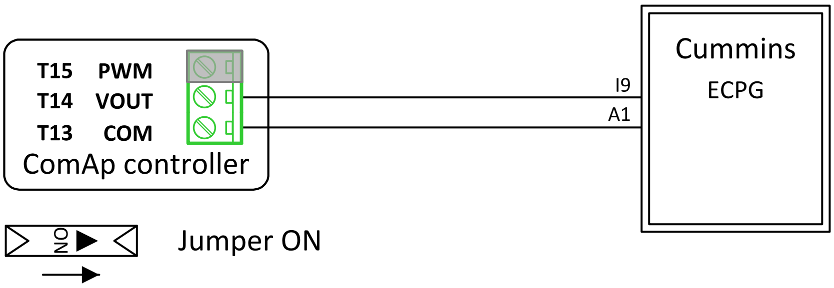
Speed Governor Bias = 5,10 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0 V

Speed Governor High Limit = 10 V

Cummins ECPG

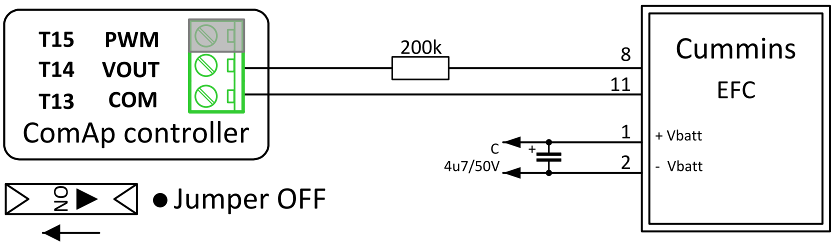


Speed/Load control:

Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Cummins EFC



Spurious operation of the controller push buttons is caused by excessive interference from the speed controller when capacitor is not connected between power supply terminals 1 and 2.

Speed/Load control:

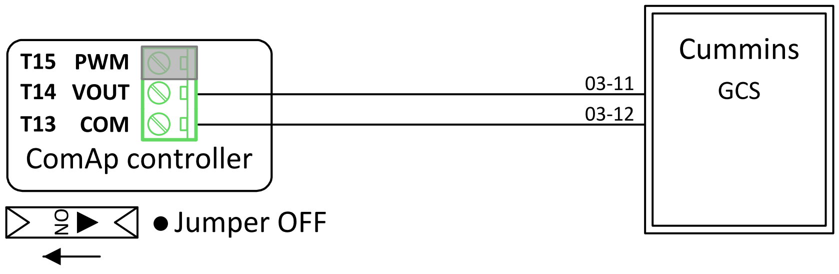
Speed Governor Bias = 6,40 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 5 V

Speed Governor High Limit = *7,8 V*

Cummins GCS



Speed/Load ctrl:

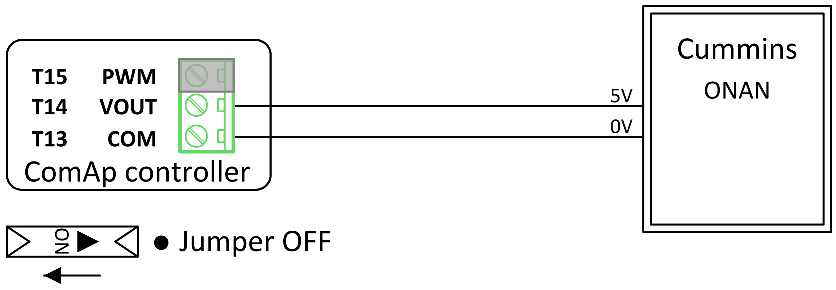
Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 2,5 V

Speed Governor High Limit = 7,5 V

Cummins ONAN



Speed/Load ctrl:

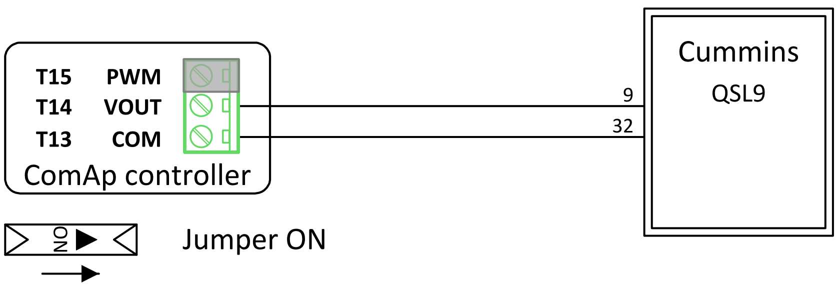
Speed Govovernor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0V

Speed Governor High Limit = 5 V

Cummins QSL9



Speed/Load ctrl:

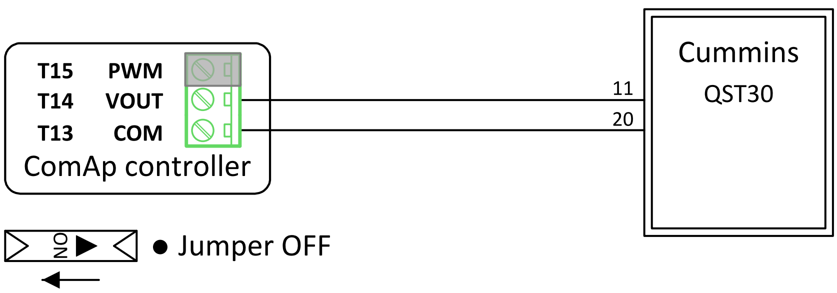
Speed Governor Bias = 3,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 2,5 V

Speed Governor High Limit = 5 V

Cummins QST30

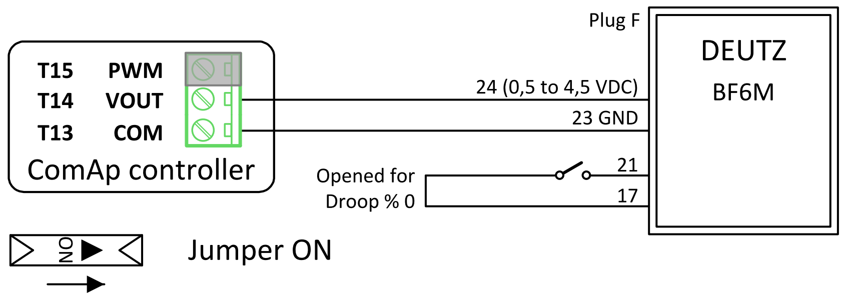


Speed/Load ctrl:

Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

DEUTZ BF6M



Speed/Load ctrl:

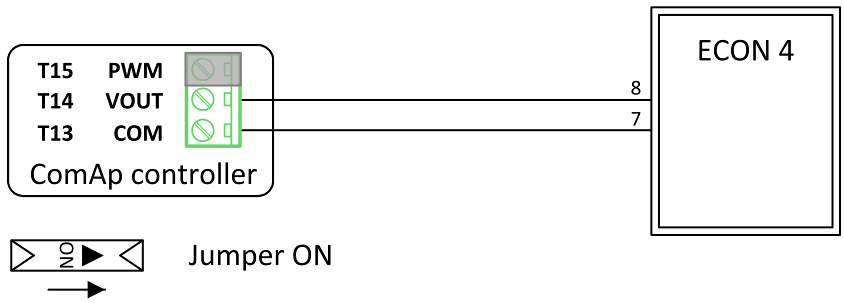
Speed Governor Bias = 2.50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0.5 V

Speed Governor High Limit = 4.5 V

ECON 4



Speed/Load ctrl:

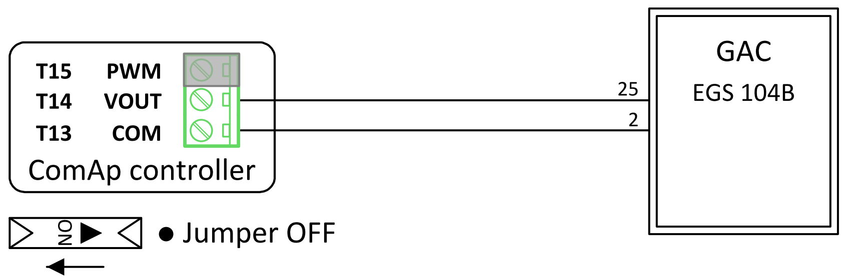
Speed Governor Bias = 5,1 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,0 V

Speed Governor High Limit = 10 V

GAC EGS 104B



Speed/Load ctrl:

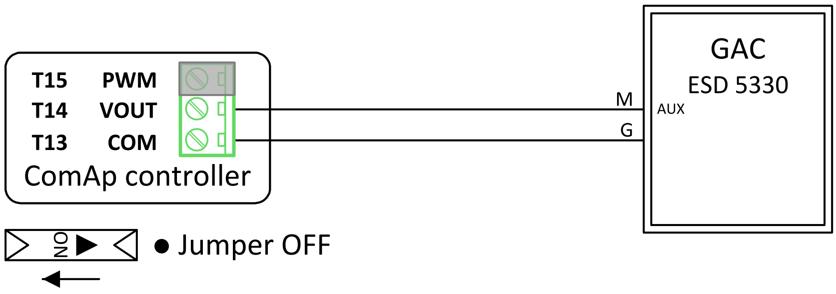
Speed Governor Bias = 5,00 V

Speed Regulator Character = NEGATIVE

Speed Governor Low Limit = 4 V

Speed Governor High Lim = 6 V

GAC ESD 5330

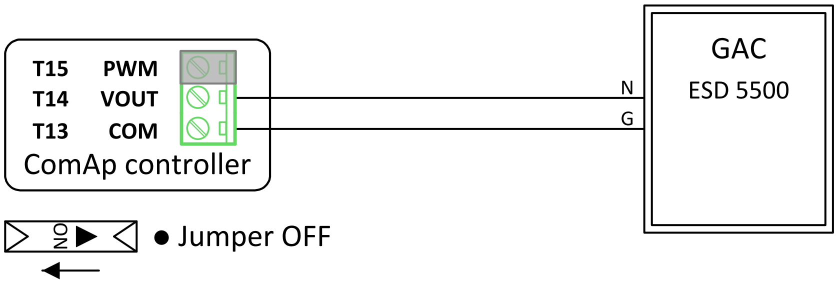


Speed/Load ctrl:

Speed Gov Bias = 5,00 V

Speed Regulator Character = NEGATIVE

GAC ESD 5500



Speed/Load ctrl:

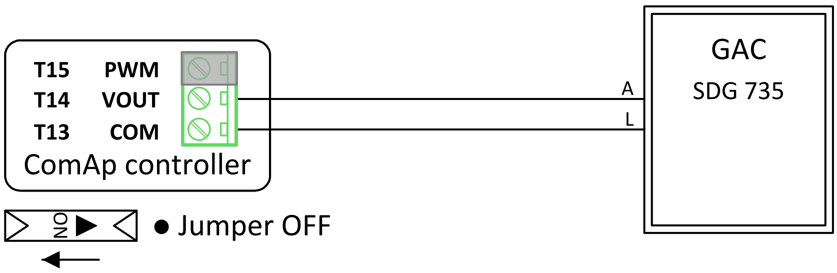
Speed Governor Bias = 5,00 V

Speed Regulator Character = NEGATIVE

Speed Governor Low Limit = 4 V

Speed Governor High Limit = 6 V

GAC SDG 735



Speed/Load ctrl:

Speed Governor Bias = 5,00 V

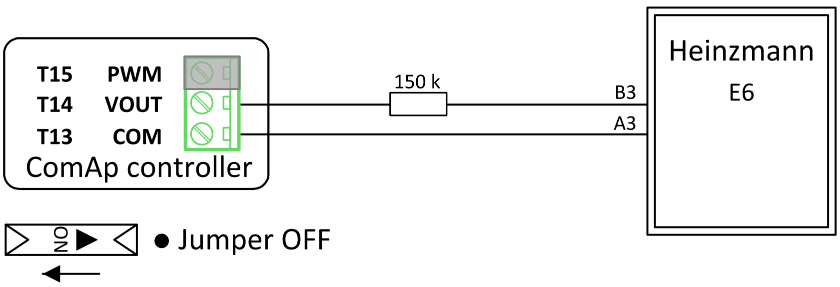
Speed Regulator Character = NEGATIVE

Speed Governor Low Limit = 2,5 V

Speed Governor High Limit = 7,5 V

Tau act. = 1

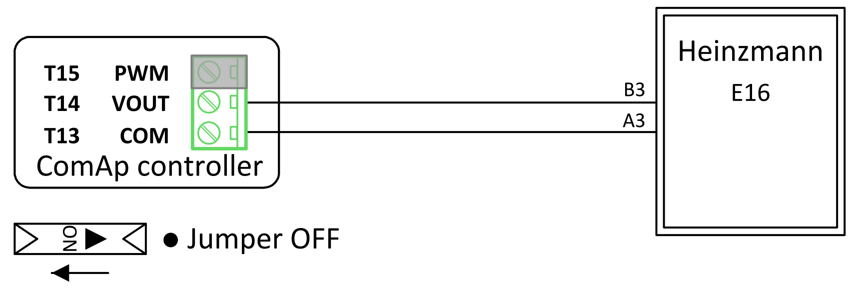
Heinzmann E6



Speed/Load ctrl:

Speed Governor Bias = 5,00 V *Speed Regulator Character* = POSITIVE

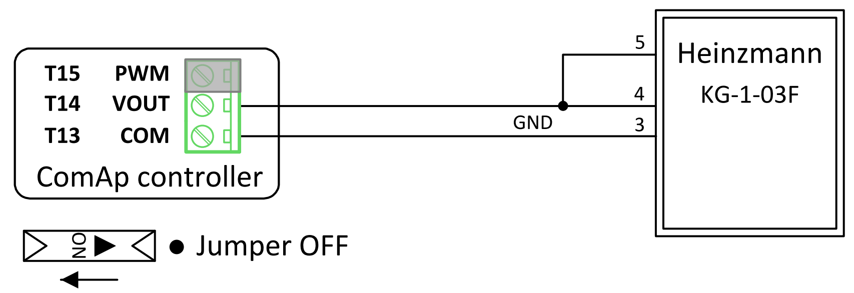
Heinzmann E16



Speed/Load ctrl:

Speed Governor Bias = 0,00 V *Speed Regulator Character* = POSITIVE

Heinzmann KG-1-03F

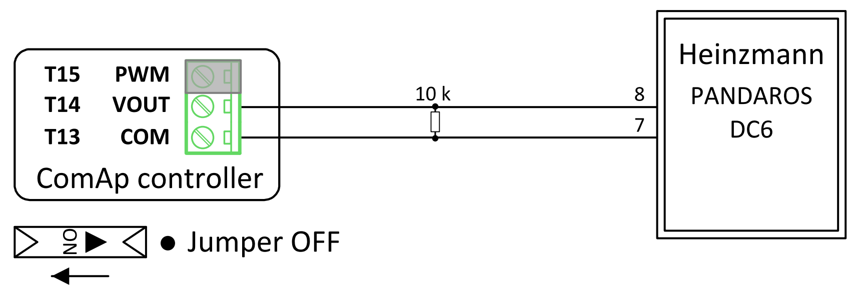


Speed/Load ctrl:

Speed Governor Bias = 0,00 V

Speed Regulator Character = POSITIVE

Heinzmann PANDAROS DC6



Terminals A3 and B3 are on OEM 14-pin connector.

Mounted on Perkins 40xx engines.

Speed/Load ctrl:

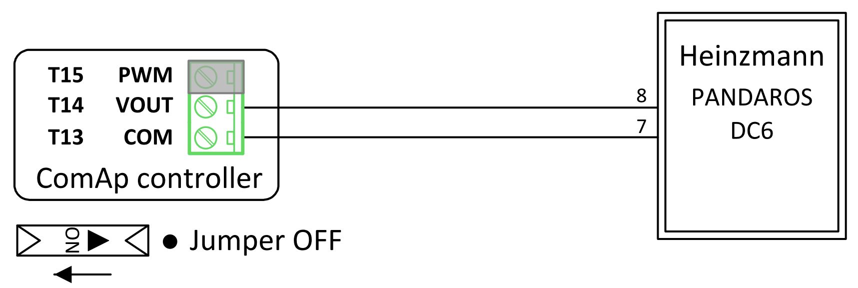
Speed Governor Bias = 5 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,8 V

For connection w/o resistor refer to the next setting

Heinzmann PANDAROS DC6



Speed/Load ctrl:

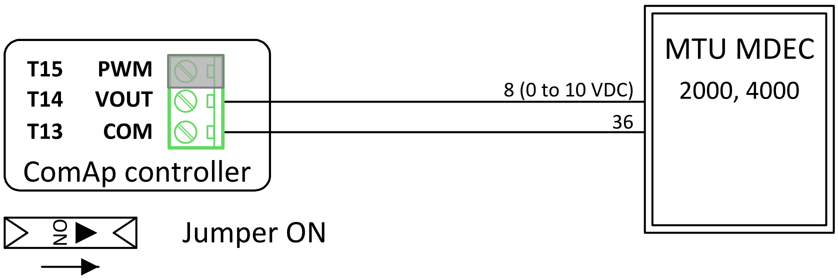
Speed Governor Bias = 2,7 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0 V

Speed Governor High Limit = 6 V

MTU MDEC 2000, 4000



Speed/Load ctrl:

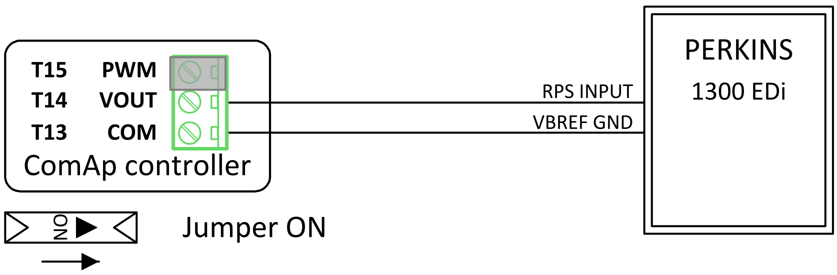
Speed Governor Bias = 4,90 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0 V

Speed Governor High Limit = 10 V

PERKINS 1300 EDi



Speed/Load ctrl:

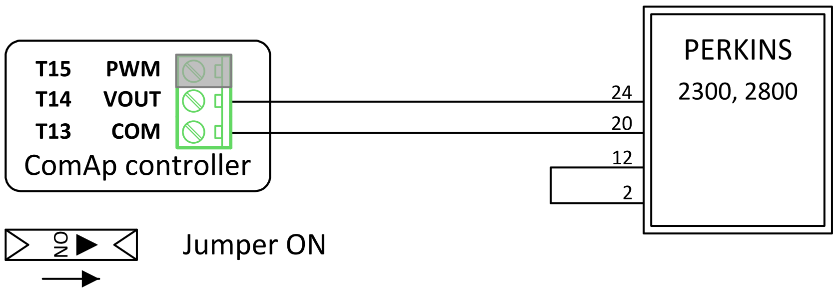
Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,8V

Speed Governor High Limit = 4,5 V

PERKINS 2300, 2800



Above mentioned pin numbers refer to the Customer Interface Connector. The J1 connector on ECM has the following numbering:

20 = J1/3; 24 = J1/17

Speed/Load ctrl:

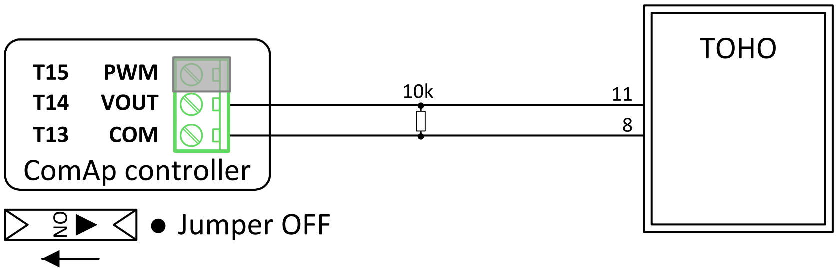
Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,5 V

Speed Governor High Limit = 4,5 V

TOHO

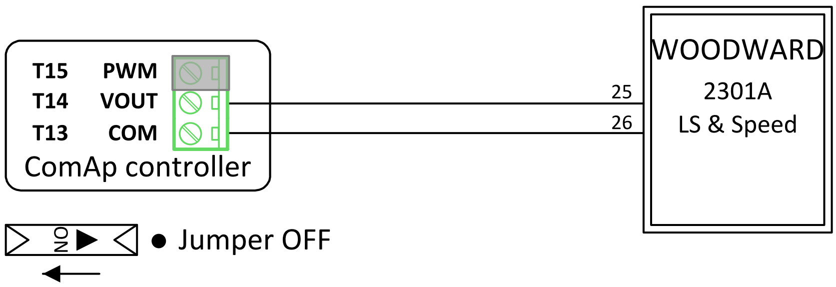


Speed/Load ctrl:

Speed Governor Bias = 4,00 V

Speed Regulator Character = POSITIVE

WOODWARD 2301A LS and Speed

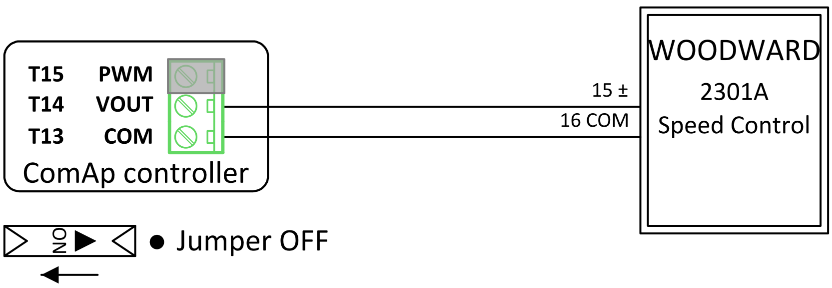


Speed/Load ctrl:

Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

WOODWARD 2301A Speed Control

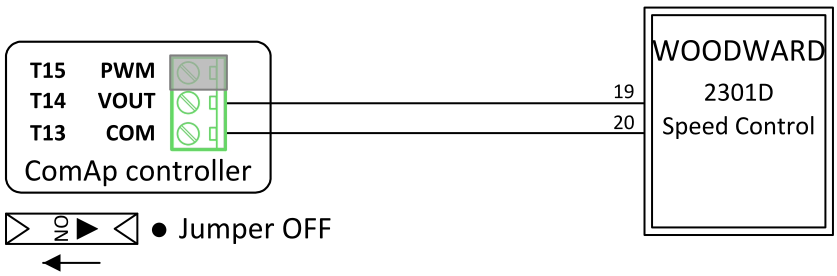


Speed/Load ctrl:

Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

WOODWARD 2301D Speed Control



Terminals 19 and 20 are marked as Analog inputs #1.

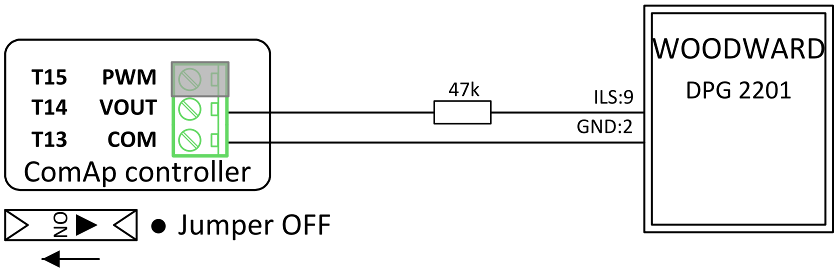
25,26 = Speed Signal Inputs

Speed/Load ctrl:

Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

WOODWARD DPG 2201



For Woodward DPG 2223 the ILS terminal is 10.

Speed/Load ctrl:

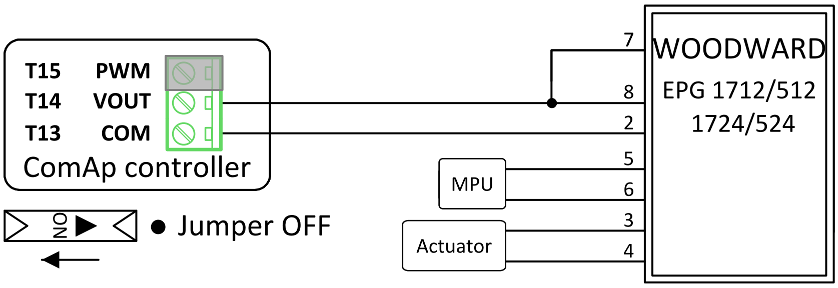
Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0 V

Speed Governor High Limit = 5 V

WOODWARD EPG 1712/512 (1724/524)



Speed/Load ctrl:

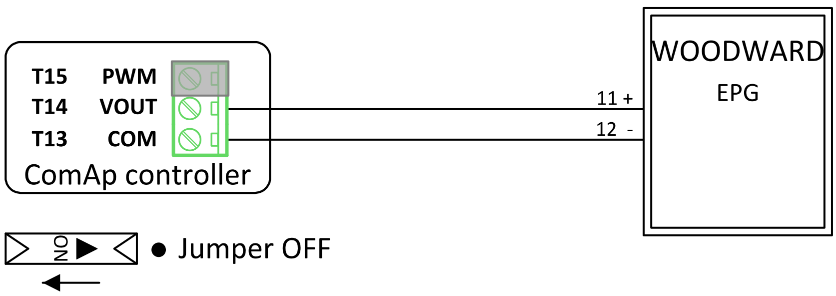
Speed Governor Bias = 3,1 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 6,5V

Speed Governor High Limit = 0,0 V

WOODWARD EPG



Woodward EPG speed governor (revision F)has the limits as follows:

Speed Governor Low Limit = -3 V

Speed Governor High Limit = + 2 V

Speed Governor Bias = - 0,5 V

Speed/Load ctrl:

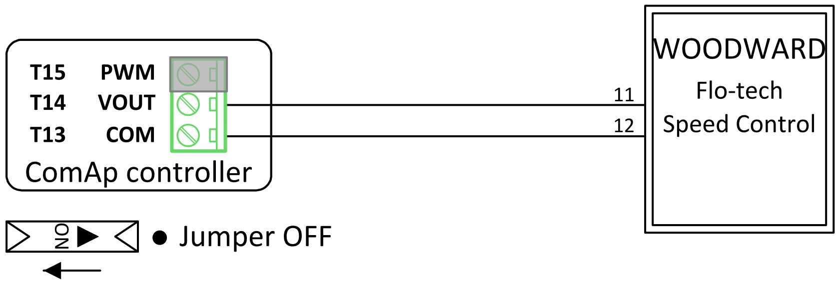
Speed Governor Bias = 0,00 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = - 3 V

Speed Governor High Limit = 3 V

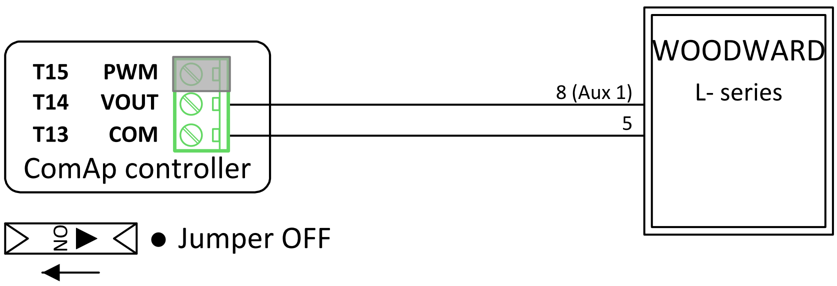
WOODWARD Flo - tech Speed Control



Speed/Load ctrl:

Speed Governor Bias = 0.00 V

WOODWARD L - series



Speed/Load ctrl:

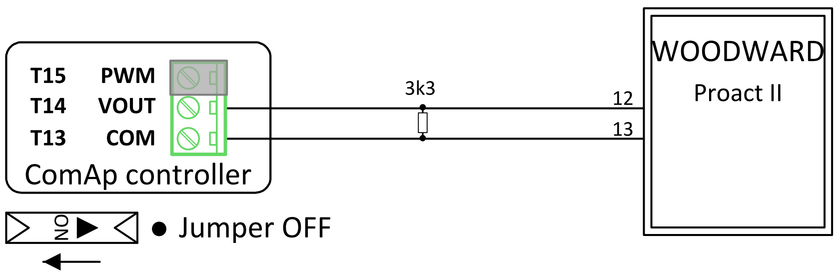
Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Govenor Low Limit = 0 V

Speed Governor High Limit = 5 V

WOODWARD Proact II



Speed/Load ctrl:

Speed Governor Bias = 0,00 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = - 2,5V

Speed GovernorHigh Limit = 2,5 V

back to Appendix

8.5 Modules

8.5.1 Plug-in modules

> **IMPORTANT: 2nd generation of InteliGen 500 controllers does not support new modules and 3rd generation does not support all old modules.**

The available communication plug-in modules are:

- CM-RS232-485 – communication module for connection via RS232 or RS485 line
- CM-4G-GPS – communication module for connection via 4G
- CM-GPRS – communication module for connection via GPRS
- CM-Ethernet – communication module for internet connection via Ethernet

The available extension plug-in modules are:

- EM-BIO8-EFCP – extension module with 8 binary inputs/outputs and with earth fault current protection

Note: *Controller has 2 plug-in module slots.*

Supported combinations of plug-in modules

Module	CM-4G-GPS	CM-GPRS	CM-RS232-485	EM-BIO8-EFCP
CM-4G-GPS	✗	✗	✓	✓
CM-GPRS	✗	✗	✓	✓
CM-RS232-485	✓	✓	✗	✓
EM-BIO8-EFCP	✓	✓	✓	✓

Communication modules

CM-RS232-485

CM-RS232-485 is optional plug-in card to enable InteliGen 500 the RS232 and RS485 communication. This is required for computer or Modbus connection. The CM-RS232-485 is a dual port module with RS232 and RS485 interfaces at independent COM channels. The RS232 is connected to COM1 and RS485 to COM2.

Image 8.225 CM-RS232-485 interface

IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.

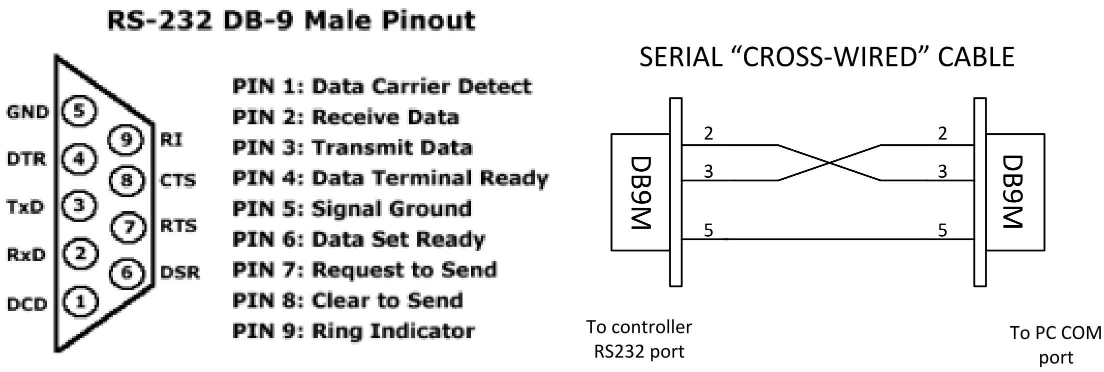


Image 8.226 Pinout of RS232 line

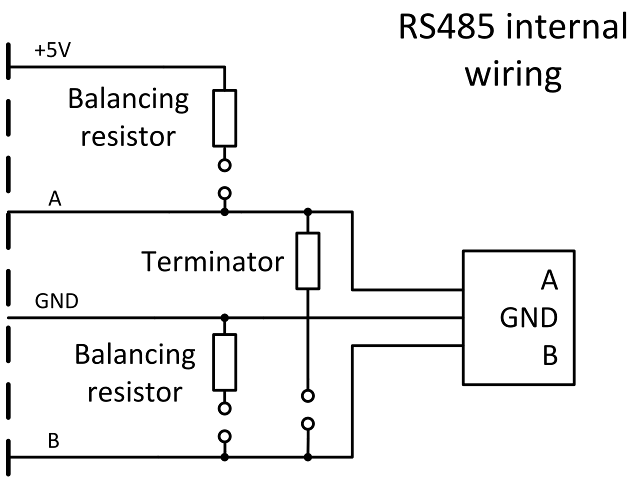


Image 8.227 Pinout of RS485 line

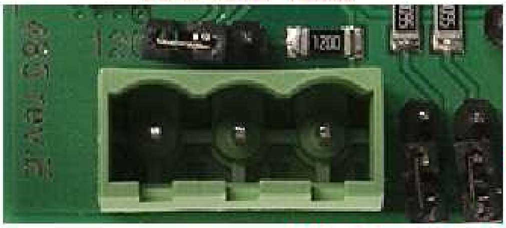


Image 8.228 Jumpers description

***Note:** Balancing resistors should both be closed at only one device in the whole RS485 network.*

Maximal distance of line is 10 m for RS232 line and 1200 m for RS485 line.

Terminator 120 Ω

Balancing resistor +5 V

Technical data

Power consumption	40 mA / 8 VDC 26 mA / 12 VDC 14 mA / 24 VDC 10 mA / 36 VDC
Isolation	Galvanic separation

Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Install package to computer or open PSI to install it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

CM-GPRS

CM-GPRS plug-in module is a GSM/GPRS modem which can works in two modes of operation based on the settings in the setpoint **Mode (page 536)**

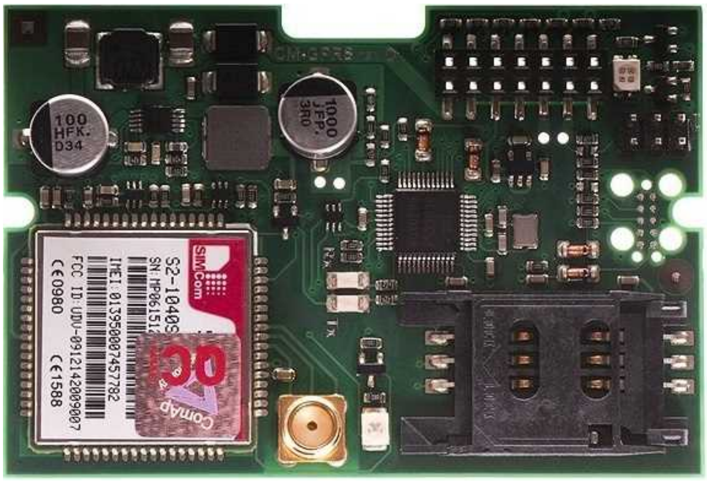


Image 8.229 CM-GPRS module

> **IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.**

> **IMPORTANT: CM-4G-GPS and CM-GPRS modules can't be used in one controller in the same time.**

Note: *GPRS and CSD services must be provided by your GSM/GPRS operator for successful operation.*

Note: *The GPRS and CSD connection should not be used for the firmware update process.*

CM-GPRS module works with:

- WebSupervisor – internet-based remote monitoring solution
- AirGate – powerful connection technology to make internet access as simple as possible

Technical data

Power consumption	32 mA / 8 VDC 18 mA / 12 VDC 10 mA / 24 VDC 12 mA / 36 VDC

SIM card settings

SIM card to be used in CM-4G-GPS or CM-GPRS modules must be adjusted as follows:

- SMS service enabled
- Packet data (Internet access) enabled (when required for the selected mode of operation)
- PIN code security disabled

How to start using CM-GPRS module

- You will need a controller, CM-GPRS module, antenna and SIM card with SMS and packet data service.

Make sure that your SIM supports the packet data network type you want to use. I.e. if you want to use the module in GPRS (2.5G) network you have to confirm with the operator that the particular SIM card does support 2.5G network.

- Contact your mobile operator for getting packet data APN (APN = Access Point Name), username and password.

Example: APN Name = "internet", UserName = [blank], Password = [blank].

- Make sure SIM card does not require PIN code. Use any mobile phone to switch the SIM PIN security off.
- Place the SIM card into slot on CM-GPRS card
- Connect the antenna to Cellular module antenna connector.
- Switch off the controller.
- Insert CM-GPRS module into controller
- Power up the controller.
- Select the mode of CM-GPRS module by adjusting setpoint **Mode (page 536)**.
- Enter correct APN Name, APN User Name and APN User Password in controller's setpoint group CM-GPRS which is accessible by PAGE button from any measurement screen on controller. Setpoints can be set on controller's front panel keyboard or by InteliConfig .
- Switch the controller off and on.
- Wait for approx 2 - 4 minutes for first connection of the system to AirGate. AirGate will generate automatically the AirGate ID value. Then navigate to measurement screens where you will find signal strength bar and AirGate ID identifier.

Image 8.230 Main screen of CM-GPRS module

Image 8.231 Screen of AirGate

GSM Diag Code – Diagnostic code for CM-GPRS modem

GSM Diag Code – Common list of diagnostic codes for cellular modules

Code	Description
0	OK. No error.
1	Not possible to hang up.
2	Modul is switched off
3	Module is switched on
4	Module – error in initialization
5	Module – not possible to set the APN
6	Module – not possible to connect to GPRS network
7	Module – not possible to retrieve IP address
8	Module – not accepted DNS IP address
9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected
19	No CDMA network
20	Unsuccessful registration to CDMA network
21	SIMCom/ME909s: can´t read FW version
22	SIMCom: GSM signal not found
23	SIMCom: can´t detect module speed
24	SIMCom: HW reset issued
25	PUK is required
26	Error of SIM card detected
27	ME909s: can't set module bps
28	ME909s: can't set link configuration
29	ME909s: can't do power-off
30	ME909s: can't do power-on
31	ME909s: can't do hardware reset
32	ME909s: ME909s not started
33	ME909s: switch off issued
34	ME909s: switch on issued

35	ME909s: HW reset issued
36	ME909s: can't switch echo off
37	ME909s: can't find out state of registration
38	ME909s: GSM signal not found
39	ME909s: no SIM memory for SMS
40	ME909s: waiting for registration
41	Can't read operator name
42	ME909s: can't set flow control
43	APN not typed
255	Only running communication is needed to indicate

AirGate Diag – Diagnostic Code for AirGate connection

Code	Description
0	Waiting for connection to AirGate Server
1	Controller registered, waiting for authorization
2	Not possible to register, controller blacklisted
3	Not possible to register, server has no more capacity
4	Not possible to register, other reason
5	Controller registered and authorized

Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Install package to computer or open PSI to install it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

CM-4G-GPS

CM-4G-GPS plug-in module containing a GPS receiver and GSM/WCDMA/LTE modem which can work in two modes of operation based on the settings in the setpoint **Mode (page 536)**.

Image 8.232 CM-4G-GPS module

> **IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.**

> **IMPORTANT: CM-4G-GPS and CM-GPRS modules cant be used in one controller in the same time.**

> **IMPORTANT: Operating temperature of module is from -30 °C to +75 °C.**

Note: *Cellular data service must be enabled in your SIM card by your mobile operator for successful operation.*

CM-4G-GPS module works with:

- WebSupervisor – internet-based remote monitoring solution
- AirGate – powerful connection technology to make internet access as simple as possible

CM-4G-GPS module also works like GPS locator. Geo-fencing function can be used with this module.

Technical data

General

Width × Height × Depth	73.8 × 50.3 × 15
Weight	~35 g
Power supply	8-36 V DC
Power consumption	1.7 W
Peak power consumption	10 W
Operating temperature	-30 ˚C to +70 ˚C
Storage temperature	-40 ˚C to +80 ˚C

GNSS

Antenna interface	SMA female, 2.8 V / 20 mA
Antenna type	Active

Cellular

Supported networks and frequency bands	- 2G (GSM/GPRS/EDGE) Quad band, 850/900/1800/1900 MHz - 3G (UMTS/HSPA+) Seven band, 800 (BdXIX) / 850 (BdV) / 900 (BdVIII) / AWS (BdIV) / 1800 (BdIX) / 1900 (BdII) / 2100MHz (BdI) - 4G (LTE) Twelve band, 700 (Bd12 <MFBI Bd17>, Bd28) 800 (Bd18, Bd19, Bd20) 850 (Bd5) / 900 (Bd8) / AWS (Bd4) / 1800 (Bd3) / 1900 (Bd2) / 2100 (Bd1) / 2600MHz (Bd7)
Antenna interface	2x SMA female (Main and Diversity)

SIM card settings

SIM card to be used in CM-4G-GPS or CM-GPRS modules must be adjusted as follows:

- SMS service enabled
- Packet data (Internet access) enabled (when required for the selected mode of operation)
- PIN code security disabled

How to start using CM-4G-GPS module

- You will need a controller, CM-4G-GPS module, antenna and SIM card with SMS and packet data service.

Note: *Make sure that your SIM supports the packet data network type you want to use. – i.e. if you want to use the module in LTE (4G) network you have to confirm with the operator that the particular SIM card supports 4G network.*

- Contact your mobile operator for getting packet data APN (APN = Access Point Name), username and password.

Example: APN Name = "internet", UserName = [blank], Password = [blank].

- Make sure SIM card does not require PIN code. Use any mobile phone to switch the SIM PIN security off.
- Place the SIM card into slot on CM-4G-GPS card
- Connect the antenna to Cellular module antenna connector.
- If you want to use the built-in GPS receiver, also connect an **active** GPS antenna to the GPS antenna connector.
- Switch off the controller.
- Insert CM-4G-GPS module into controller
- Power up the controller.
- Select the mode of CM-4G-GPS module by adjusting setpoint **Mode (page 536)**.
- Enter correct APN Name, APN User Name and APN User Password in controller's setpoint group CM-4G-GPS which is accessible by PAGE button from any measurement screen on controller. Setpoints can be set on controller’s front panel keyboard or by InteliConfig.
- Switch the controller off and on.
- Wait for approx 2 – 4 minutes for first connection of the system to AirGate. AirGate will automatically generate the AirGate ID value. Then navigate to measurement screens where you will find signal strength bar and AirGate ID identifier.

Image 8.233 Main screen of CM-4G-GPS module

Image 8.234 Screen of AirGate

GSM Diag Code – Common list of diagnostic codes for cellular modules

Code	Description
0	OK. No error.
1	Not possible to hang up.
2	Modul is switched off
3	Module is switched on
4	Module – error in initialization
5	Module – not possible to set the APN
6	Module – not possible to connect to GPRS network
7	Module – not possible to retrieve IP address
8	Module – not accepted DNS IP address
9	Error in modem detection
10	Error in initialization of analog modem
11	SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking
12	No GSM signal
13	Not possible to read the SIM card parameters
14	GSM modem did not accepted particular initialization command, possibly caused by locked SIM card
15	Unknown modem
16	Bad answer to complement initialization string
17	Not possible to read GSM signal strength
18	CDMA modem not detected
19	No CDMA network

20	Unsuccessful registration to CDMA network
21	SIMCom/ME909s: can´t read FW version
22	SIMCom: GSM signal not found
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24	SIMCom: HW reset issued
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27	ME909s: can't set module bps
28	ME909s: can't set link configuration
29	ME909s: can't do power-off
30	ME909s: can't do power-on
31	ME909s: can't do hardware reset
32	ME909s: ME909s not started
33	ME909s: switch off issued
34	ME909s: switch on issued
35	ME909s: HW reset issued
36	ME909s: can't switch echo off
37	ME909s: can't find out state of registration
38	ME909s: GSM signal not found
39	ME909s: no SIM memory for SMS
40	ME909s: waiting for registration
41	Can't read operator name
42	ME909s: can't set flow control
43	APN not typed
255	Only running communication is needed to indicate

AirGate Diag – Diagnostic Code for AirGate connection

Code	Description
0	Waiting for connection to AirGate Server
1	Controller registered, waiting for authorization
2	Not possible to register, controller blacklisted
3	Not possible to register, server has no more capacity
4	Not possible to register, other reason
5	Controller registered and authorized

Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Install package to computer or open PSI to install it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig

- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

Extension modules

EM-BIO8-EFCP

EM-BIO8-EFCP is optional plug-in card. Through this card, the controller can accommodate one AC current (CT) measuring input (1A or 5A input) and up to 8 binary inputs or outputs. In InteliConfig PC configuration tool it is possible to easily choose whether particular I/O will be binary input or output.

Image 8.235 EM-BIO8-EFCP interface

Note: *This protection is active ONLY when Engine is running.*

IMPORTANT: Any manipulation with plug-in module shall be done with disconnected power supply to controller.

IMPORTANT: Earth fault current measurement is supported by controller only in slot A.

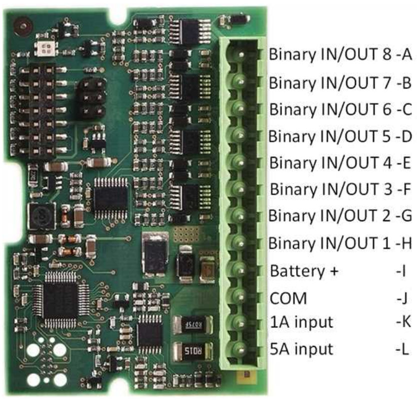


Image 8.236 Overview of EM-BIO8-EFCP

Note: *Current inputs are supported only in MRS 16 and AMF 25 controllers.*

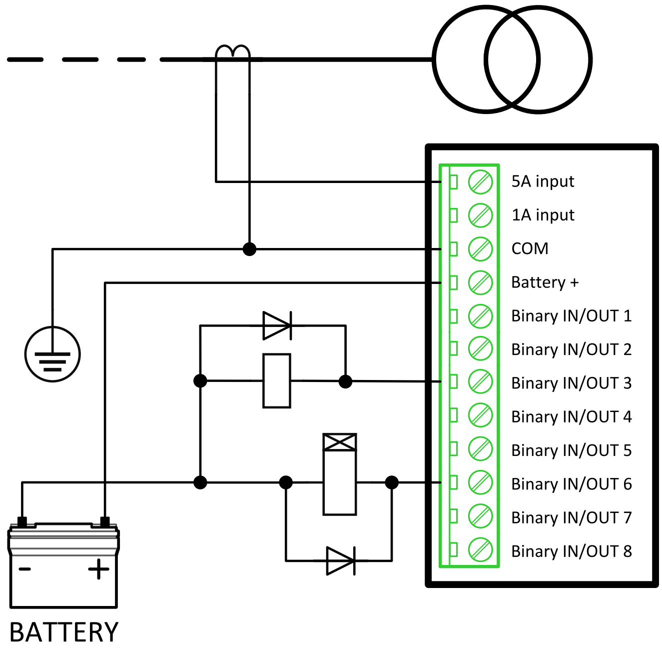


Image 8.237 EM-BIO8-EFCP wiring

Note: *There is a possibility to contact directly to binary input terminals.*

Note: *Current inputs are supported only in MRS 16 and AMF 25 controllers.*

EM-BIO8-EFCP technical data

Power supply

Power supply range	8-36 VDC
Power consumption	40 mA / 8 VDC 27 mA / 12 VDC 22 mA / 24 VDC 19 mA / 36 VDC

Binary inputs

Number	Up to 8, non-isolated
Close/Open indication	0-2 VDC close contact >6 VDC open contact

Binary outputs

Number	Up to 8 , non-isolated
Max. current	0,5A
Switching to	positive supply terminal

Current measuring input

Number of inputs	2
Nominal input current	1A/5A
Load (CT output impedance)	< 0,1
Max measured current from CT	10 A
Current measurement tolerance	2% from Nominal current
Max peak current from CT	150 A / 1 s
Max continuous current	10 A

Earth fault current measurement

The Earth Fault protection is done by the extension module EM-BIO8-EFCP.

When the measured current exceeds the set value, which indicates that part of the current is dispersed to earth, and when the set **Earth Fault Delay (page 549)** time elapses, the **Earth Fault Current Protection (page 548)**, **Sd Earth Fault Current (page 911)** alarms and **AL EARTH FAULT (PAGE 745)** output are activated. Earth Fault protection is not active when Gen-set does not run and when the **Earth Fault Current Protection (page 548)** is disabled.

> **IMPORTANT: Earth fault current measurement is not intended to protect human health, but the device!**

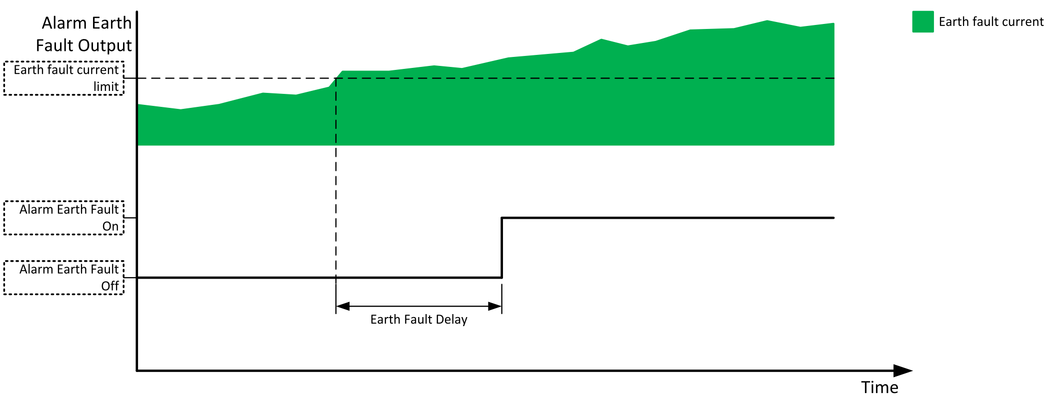


Image 8.238 Earth fault current protection

Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Install package to computer or open PSI to install it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

8.5.2 CAN modules

The available extension CAN modules are:

- Inteli AIN8 – extension CAN module with 8 analog inputs
- Inteli IO8/8 – extension CAN module with 8 binary inputs, 8 binary outputs and 2 analog outputs
  - this CAN module can be switched to Inteli IO16/0 – extension CAN module with 16 binary inputs and 2 analog outputs

Supported combinations of modules

Slot	Inteli AIN8	Inteli AIN8TC	Inteli IO8/8	Inteli IO16/0	IGL-RA15	IGS-PTM	Inteli AIO9/1
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3	✓	✓	✓	✓	✓	✗	✗
4	✓	✓	✓	✓	✓	✗	✗
5	✗	✗	✓	✓	✗	✗	✗

IMPORTANT: In slot 3, 4 and 5 CAN modules Inteli IO8/8 and Inteli IO16/0 are supported without analog outputs. Analog outputs of these CAN modules are supported only in slot 1 and 2.

It is possible to add up to 80 binary inputs or up to 68 binary outputs or up to 32 analog inputs on CAN modules.

Extension modules

Inteli AIN8

Inteli AIN8 module is an extension module equipped with analog inputs. Inteli AIN8 module is connected to controller by CAN1 bus.

Image 8.239 Inteli AIN8

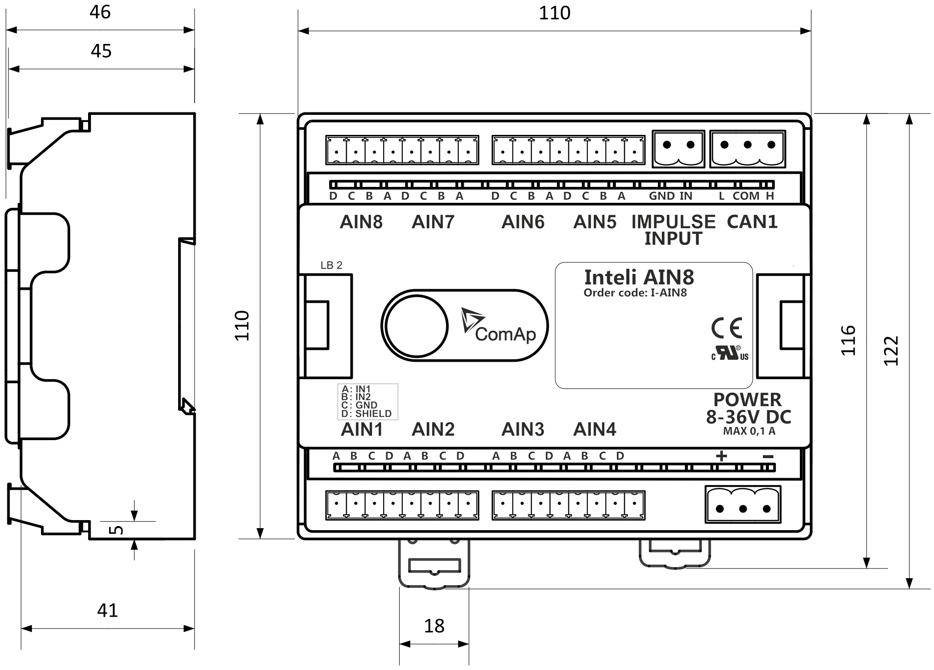
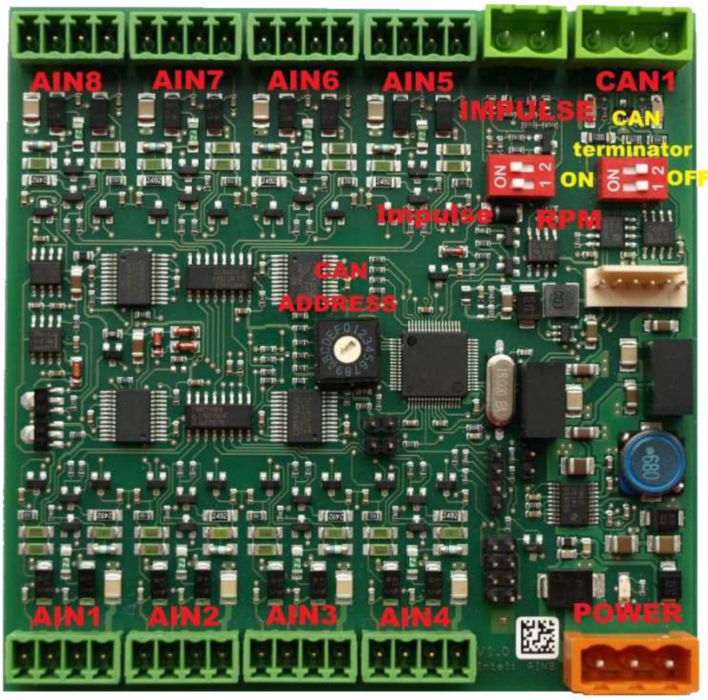


Image 8.240 Inteli AIN8 dimensions

Note: *All dimensions are in mm.*

Terminals



Analog input	8 analog Inputs
CAN	CAN1 line
Power	Power supply
CAN LED Tx, Rx	Indication transmitted or received data
Status LED	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON" – switch both switches)

Note: *Impulse input is not supported.*

Analog inputs

- 8 channels
- can be configured as:
  - resistor three wire input
  - current input
  - voltage input

All inputs can be configured to any logical function or protection.

IMPORTANT: Impulse input is not supported in controller.

Supported sensors

Sensors		
User curves	NI100 [°F] (fix)	0-5 V
PT100 [°C] (fix)	NI1000 [°F] (fix)	0-10 V
PT1000 [°C] (fix)		4-20 mA passive
NI100 [°C] (fix)	0-2400 Ω	4-20 mA active

Sensors		
NI1000 [°C] (fix)	0-10 kΩ	0-20 mA passive
PT100 [°F] (fix)	±1 V	±20 mA active
PT1000 [°F] (fix)	0-2.4 V	

CAN address

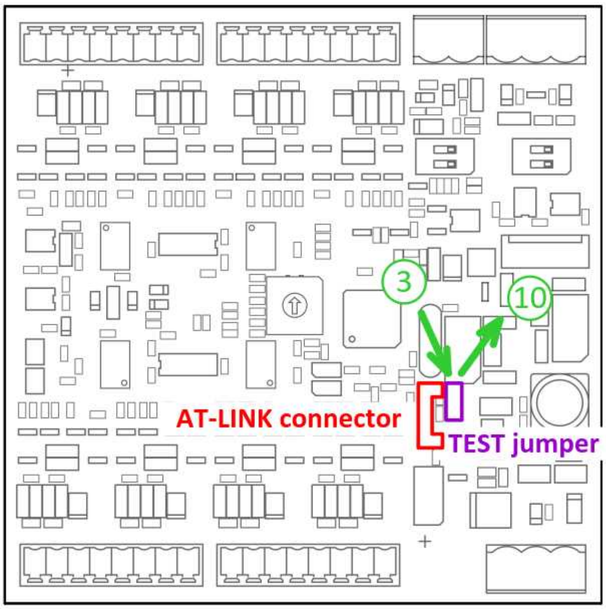
DIP switch determinates CAN address for analog inputs.

Note: *When setting the CAN address to zero, the appropriate group of signals is deactivated.*

Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Remove the top cover of module
3. Put the TEST jumper on pins
4. Connect the unit with PC via RS232-null modem cable and AT-Link conv



5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli AIN8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press the Start button
9. Wait till process is done (If the process does not start – after 60 seconds the "Timeout" will be evaluated. In this case please check:

- You have proper connection with the unit
- COM port selection is correct
- Module has power supply, (no CAN bus connection, status LED lights continuously)

10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blink)
12. Module FW is upgraded

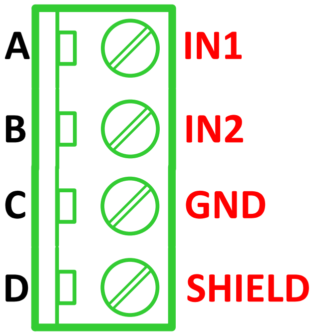
LED indication

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address).
Lights	Power supply is in the range and the communication between Inteli AIN8 and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller).

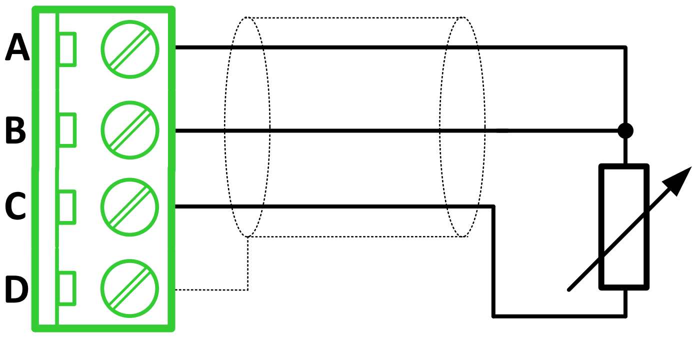
Wiring

The following diagrams show the correct connection of sensors.

Terminator

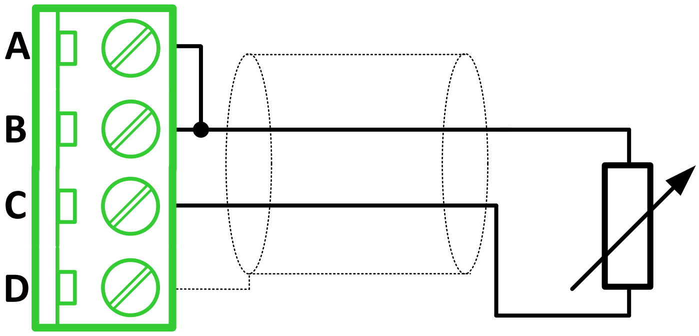


Resistance sensor - 3 wires



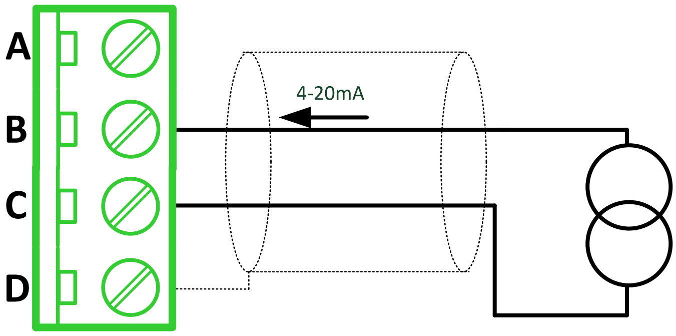
Note: *Ranges: Pt100, Pt1000, Ni100, Ni1000, 0-2400 Ω, 0-10 kΩ*

Resistance sensor – 2 wires



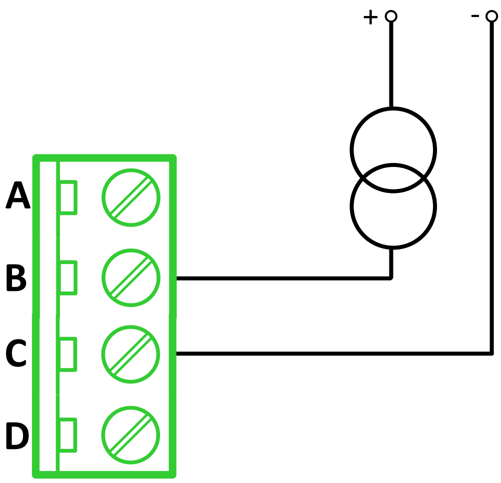
Note: *Ranges: Pt100, Pt1000, Ni100, Ni1000, 0-2400 Ω, 0-10 kΩ*

Current sensor - active



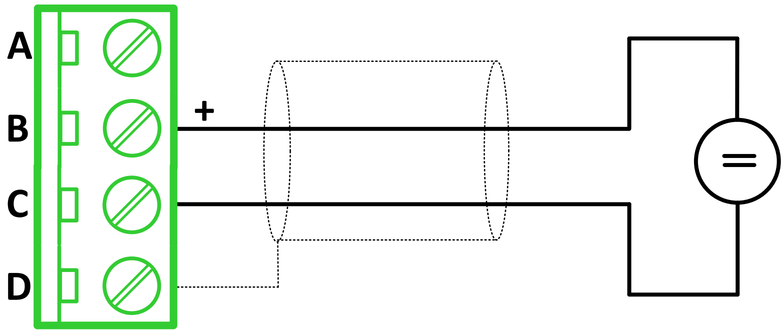
Note: *Ranges: ±20 mA, 4 – 20 mA*

Current sensor - passive



Note: *Ranges: 0 – 20 mA, 4 – 20 mA*

Voltage sensor



Note: *Ranges: ±1 V, 0 – 2,5 V, 0 – 5 V, 0 – 10 V*

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	35 mA at 24 V ÷ 100 mA at 8 V
Interface to controller	CAN1
Protection	IP20
Storage temperature	-40 °C to +80 °C
Operating temperature	-30 °C to +70 °C
Dimensions (WxHxD)	110 × 110 × 46 mm (4.3" × 4.3" × 1.8")
Weight	221.5 grams

Analog inputs

Number of channels	8
Voltage	Range 0-10 V Accuracy: ±0.25 % of actual value + ±25 mV
Current	Range: ±20 mA Accuracy: ±0.25 % of actual value + ±50 μA
Resistive	Range: 0- 10 kΩ Accuracy: ±0.5 % of actual value + ±2 Ω

Inteli AIN8TC

Inteli AIN8TC module is an extension module equipped with 8 analog inputs dedicated for thermocouple sensors only.

The detection of communication speed is indicated by rapid flashing of status LED. Once the speed is detected the module remains set for this speed even when the communication is lost. Renewal of communication speed detection is done by resetting of the module.

Image 8.241 Inteli AIN8TC

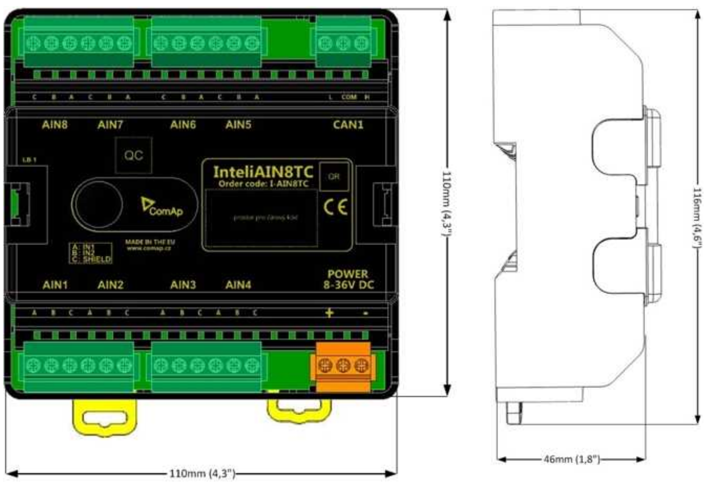
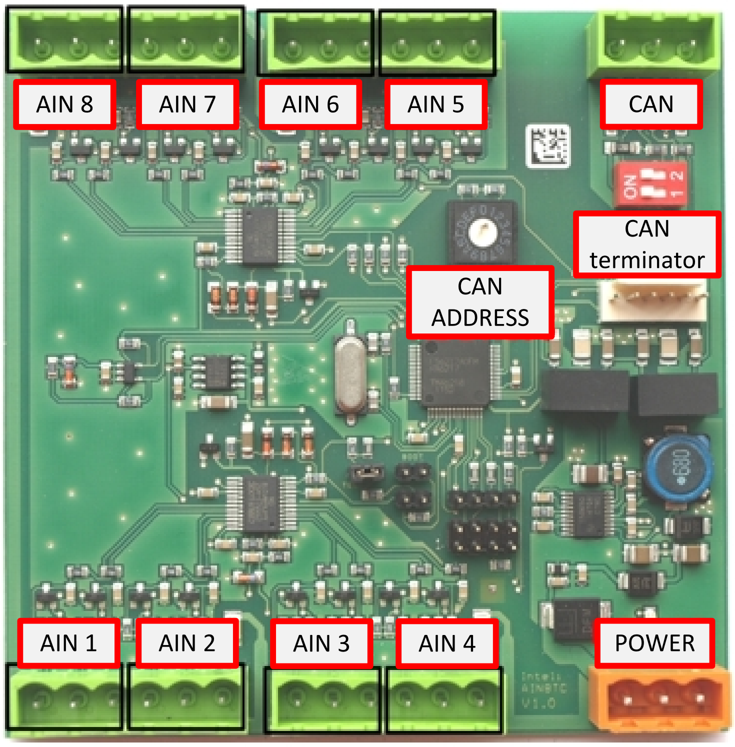


Image 8.242 Inteli AIN8TC dimensions

Terminals



ANALOG INPUT	8 analog Inputs
CAN	CAN1 line
POWER	Power supply
CAN LED Tx, Rx	Indication transmitted or received data
Status LED	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON")
TEST jumper	Upgrade of SW
AT-LINK	Connector for AT-LINK

Analog inputs

- 8 channels
- can be configured as thermocouple sensors only

Supported sensors

Sensors
Thermocpl J [°C] (fix)
Thermocpl K [°C] (fix)
Thermocpl L [°C] (fix)
Thermocpl J [°F] (fix)
Thermocpl K [°F] (fix)
Thermocpl L [°F] (fix)
Thermocpl (nc) J [°C] (fix)

Thermocpl (nc) K [°C] (fix)
Thermocpl (nc) L [°C] (fix)
Thermocpl (nc) J [°F] (fix)
Thermocpl (nc) K [°F] (fix)
Thermocpl (nc) L [°F] (fix)

Note: *"nc" means not cold junction compensation (by external sensor). In this case is used internal temperature sensor on the PCB*

CAN address

DIP switch determinates CAN address for analog inputs.

Note: *When setting the CAN address to zero, the appropriate group of signals is deactivated.*

Programming Firmware

Firmware is upgraded via AT-link (TTL). For programming it is necessary to close jumper TEST.

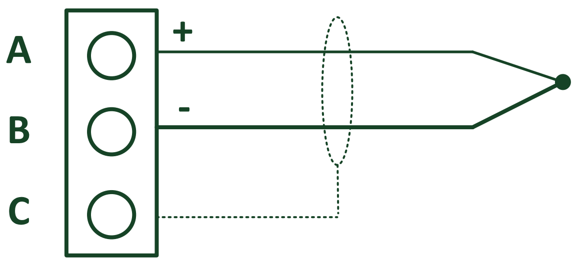
For programming FlashProg PC tool version 4.2 or higher must be used.

LED indication

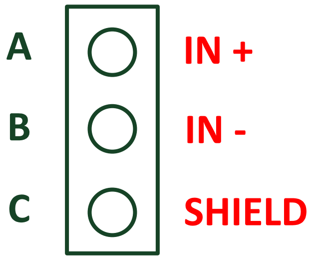
LED status	Description
Dark	FW in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address)
Fast flashing	Detection of CAN communication speed
Lights	Power supply is in the range and the communication between Inteli AIN8TC and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller)

Wiring

Analog inputs



Terminator



Technical data

Dimension (W × H × D)	110 × 110 × 46 mm (4.3” × 4.3” × 1.8”)
Weight	237.5 grams
Interface to controller	CAN1

Analog inputs (not electric separated)	8, no galvanic separated
Measuring	±100 mV
Accuracy	± 0.1 % of actual value + ± 100 μV (± 3 °C)
Internal sensor for measuring cold junction - Accuracy	±1 °C in temperature range -20 °C ÷ +70 °C
Galvanic separation	CANbus is galvanic separated from the measurement and power supply. All analog inputs are galvanic separated from power supply. Analog inputs are not galvanic separated between channels

Power supply	8 to 36 V DC
Protection	IP20
Current consumption	35 mA at 24 V ÷ 100 mA at 8 V
Storage temperature	- 40 °C to + 80 °C
Operating temperature	- 30 °C to + 70 °C
Heat radiation	2 W

Thermocouples which are galvanically separated and galvanically non-separated are supported.

Inteli AIO9/1

Inteli AIO9/1 module is an extension module equipped with analog inputs and outputs – designed for DC measurement.

The detection of communication speed is indicated by rapid flashing of status LED. Once the speed is detected the module remains set for this speed even when the communication is lost. Renewal of communication speed detection is done by resetting of the module.

Image 8.243 Inteli AIO9/1

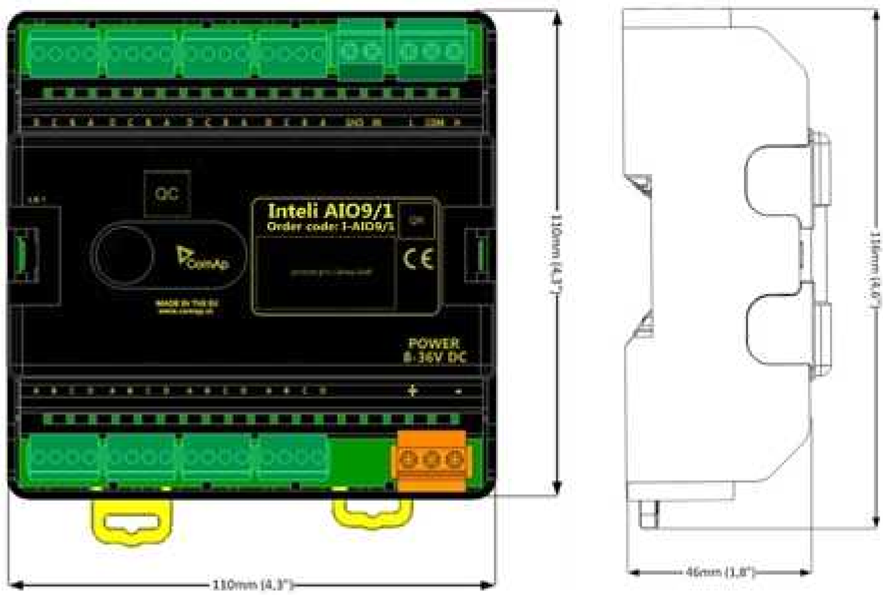
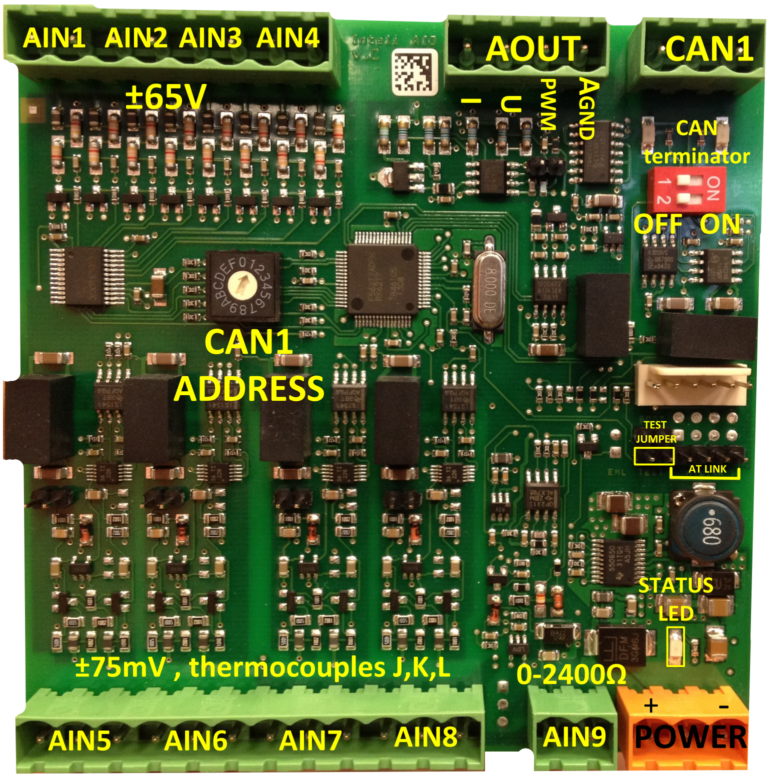


Image 8.244 Inteli AIO9/1 dimensions

Terminals



ANALOG INPUT	9 channels
ANALOG OUTPUTS	1 channel
CAN	CAN1 line
POWER	Power supply
CAN LED Tx, Rx	Indication transmitted or received data
Status LED	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON")
TEST jumper	Upgrade of SW
AT-LINK	Connector for AT-LINK (Upgrade of SW)

Analog inputs

- 4 channels AIN1 – AIN4 can be configured as:
  - Sensor ±65V (determined for measurement of battery voltage)
- 4 channels AIN5 – AIN8 can be configured as:
  - Thermocouples – type J,K or L (in °C or °F)
  - Sensor ±75mV DC – (for connecting current shunts)
- 1 channel AIN9 can be configured as:
  - RTD (Pt1000, Ni1000)
  - Common resistance 0-2400Ω

Analog outputs

- 1 channel AOUT1. Type of output:
  - 0-10V DC
  - 0-20mA
  - PWM (5 V, freq 2.4 Hz ÷2.4 kHz)
- Analog output has 4-pins connector – GND and one pin for each type of output.

All analog inputs can be configured to any logical function or protection.

Supported sensors

Sensors
User curves
PT1000 [°C] (fix)
NI1000 [°C] (fix)
PT1000 [°F] (fix)
NI1000 [°F] (fix)
0-2400 Ω (fix linear)
±65 V DC (fix linear)
±75 mV (fix linear)
Thermocpl J [°C] (fix)
Thermocpl K [°C] (fix)
Thermocpl L [°C] (fix)
Thermocpl (nc) J [°C] (fix)
Thermocpl (nc) K [°C] (fix)
Thermocpl (nc) L [°C] (fix)
Thermocpl (nc) J [°F] (fix)
Thermocpl (nc) K [°F] (fix)
Thermocpl (nc) L [°F] (fix)

Address and DIP switch setting

Address configuration

DIP switch determinates CAN address for analog inputs and outputs.

Programming Firmware

Firmware upgrade is available via AT-link (TTL). For programming it is necessary to close jumper TEST and switch OFF and ON the power supply.

For programming use FlashProg PC tool version 4.4 or higher.

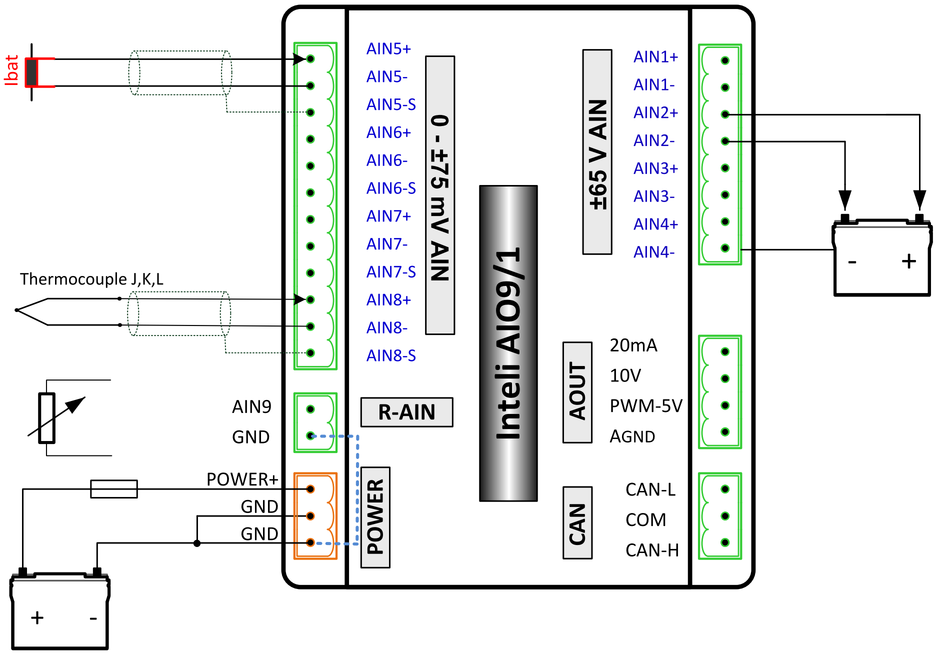
LED indication

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address)

Fast flashing	Detection of CAN communication speed
Lights	Power supply is in the range and the communication between Inteli AIN8TC and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller)

Wiring

The following diagrams show the correct connection of sensors.



Measuring resistance – AIN9

- 2 – wire measurement

Ranges: Pt1000, Ni1000, 0 – 2400 Ω.

Analog input 9 is determined for measuring resistance only.

Technical data

Dimension (W × H × D)	110 × 110 × 46 mm (4.3” × 4.3” × 1.8”)
Weight	248 grams
Interface to controller	CAN1 – galvanic separated from power supply and measurement,

Analog inputs (not electric separated)		9 channels
AIN1-AIN4 – Voltage inputs	Range	0-65 V ± 0.25 % of actual value + ± 120 mV Measurement is not galvanic separated from power supply, but IN- is not interconnected with GND – there is floating measurement.
	Accuracy of measurement	± 0,1 % of actual value + ± 100 μV (± 3 °C)
AIN5-AIN8 – Voltage inputs	Range	± 75 mV (nominal) (measurement up to ±80 mV)
	Accuracy of measurement	± 0.1 % of actual value + ± 75 μV Galvanic separated from power supply
AIN9 resistance input	Range	0- 2400 Ω
	Accuracy of measurement	± 0.5 % of actual value + ± 4 Ω Pt1000, Ni1000 ± 2,5 °C It is not galvanic separated from power supply.

Analog output
I 0-20mA /500Rmax. ± 1 % of actual value + ± 200 uA U 0-10V ± 0.5 % of actual value + ± 50 mV PWM – 5 V, 200 Hz-2.4kHz 15 mA max. Galvanic separated from power supply

Galvanic separation	CAN bus is galvanic separated from the measurement and power supply

Power supply	8 to 36 V DC
Protection	IP20
Current consumption	150 mA at 24 V ÷ 400 mA at 8 V
Storage temperature	- 40 °C to + 80 °C
Operating temperature	- 30 °C to + 80 °C

The product is fully supported in firmware IGS-NT 3.1.1 or higher.

For information about support of this module in IGS-NT fw branches and ID-DCU – please read New Feature Lists.

Inteli IO8/8

Inteli IO8/8 module is an extension module equipped with binary inputs, binary outputs and analog outputs.

Inteli IO8/8 is the name of the module, but it is possible to configure the module (by internal switch) to two configurations:

- Inteli IO8/8 – 8 binary inputs, 8 binary outputs and 2 analog outputs
- Inteli IO16/0 – 16 binary inputs, 0 binary outputs and 2 analog outputs

The detection of communication speed is indicated by rapid flashing of status LED. Once the speed is detected the module remains set for this speed even when the communication is lost. Renewal of communication speed detection is done by resetting of the module.

Image 8.245 Inteli IO8/8

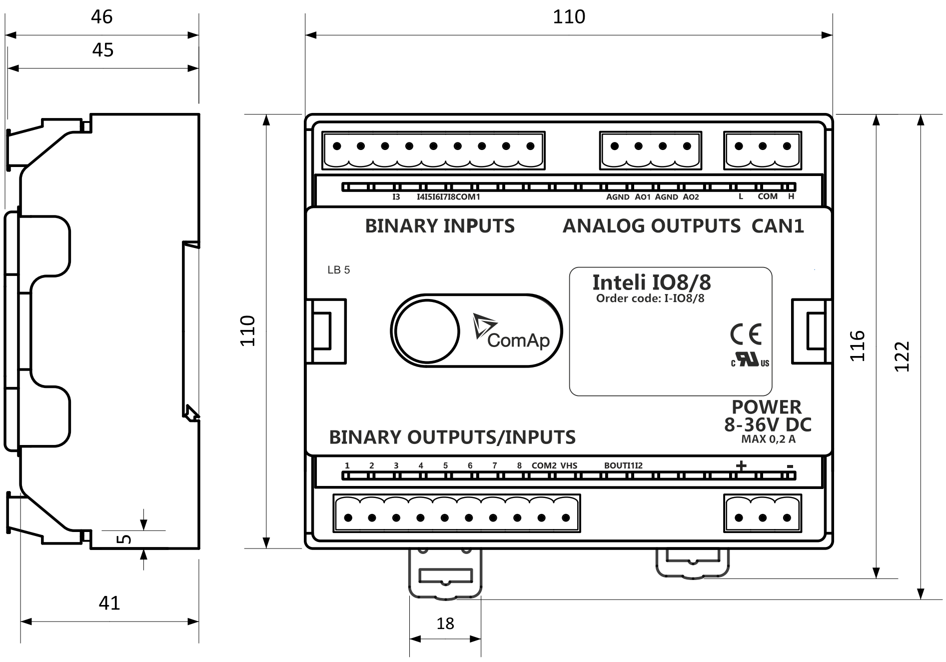
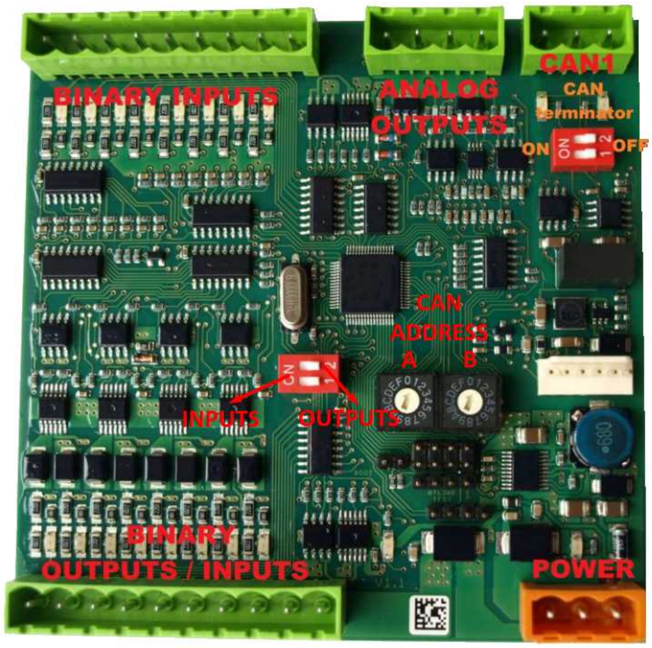


Image 8.246 Inteli IO8/8 dimensions

Note: *All dimensions are in mm.*

Terminals



Binary inputs	8 binary inputs
Binary outputs	8 binary outputs (8 binary inputs)
Analog outputs	2 analog outputs
CAN	CAN1 line
Power	Power supply
Binary inputs LEDs	8 LEDs for binary input indication
Binary outputs LEDs	8 LEDs for binary output indication
CAN LED	Indication transmitted or received data
Status	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON" – switch both switches)

Inputs and outputs

Binary inputs

- 8 channels
- can be configured as:
  - pull up
  - pull down

All 8 inputs are configured to one type together.

All inputs can be configured to any logical function or protection.

Binary outputs

- 8 channels
- can be configured as:
  - High side switch
  - Low side switch

All 8 inputs are always configured to one type (HSS/LSS) together. All 8 outputs can be modified to inputs by switch on the PCB (Inteli IO8/8 to Inteli IO16/0).

Analog outputs

- 2 channels
- can be configured as:
  - voltage 0-10V
  - current 0-20mA
  - PWM (level 5 V, with adjustable frequency from 200 Hz to 2400 Hz, with step 1 Hz)

All inputs/outputs can be configured to any logical function or protection.

Output state check

Output state check function evaluates in real time the state of binary outputs and adjusted (required) state. In case of failure (a difference between the required state and real state) history record and alarm are issued (type of the alarm is set by "Protection upon module failure" – (No protection / Warning / Shutdown)).

This function is designed for short-circuit or other failure, which causes change of set state of binary output.

CAN address

In Inteli IO8/8 mode CAN address for binary inputs is determined by DIP switch A, CAN address for binary output and analog outputs is determined by DIP switch B.

In Inteli IO16/0 mode CAN address for binary inputs is determined by DIP switch A, first group of 8 input has address A, second group of 8 inputs has address A+1. CAN address of analog outputs is set by DIP switch B.

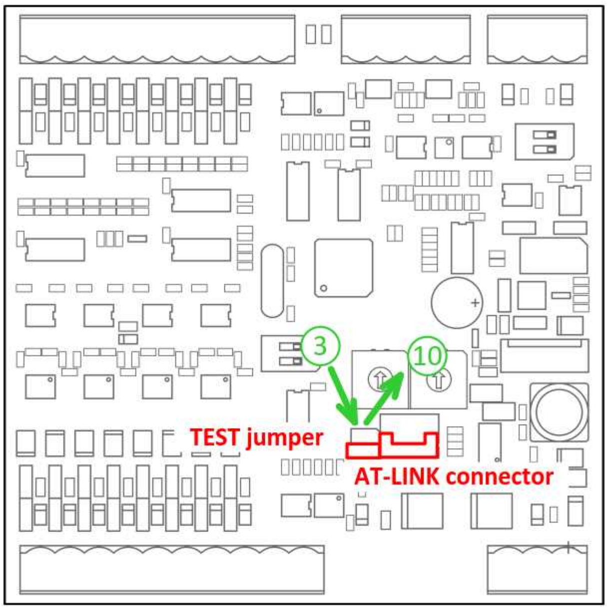
***Note:** When setting the CAN address to zero, the appropriate group of signals is deactivated.*

Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Remove the top cover of module
3. Put the TEST jumper on pins

4. Connect the unit with PC via RS232-null modem cable and AT-Link conv



5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli IO8/8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press the Start button
9. Wait till process is done (if the process does not start – after 60 seconds the "Timeout" will be evaluated). In this case please check:
   - You have proper connection with the unit
   - COM port selection is correct
   - Module has power supply, (no CAN bus connection, status LED lights continuously)
10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blink)
12. Module FW is upgraded

LED indication

Binary input

Each binary input has an LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

Binary output

Each binary output has an LED which indicates output signal. Binary output LED is shining when binary output is set. When this LED is shining, then the module is configured as 8 binary inputs and 8 binary outputs. When this LED is dark, the module is configured as 16 binary inputs.

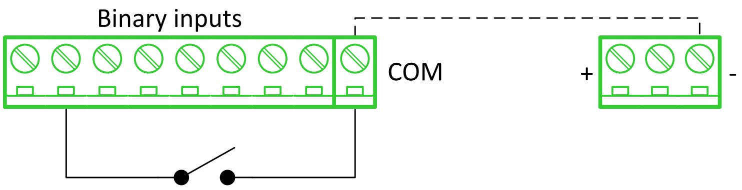
LED at power connector – status LED

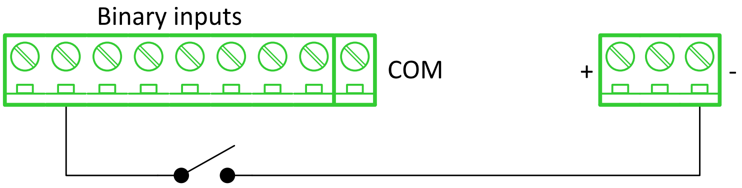
LED status	Description
Dark	FW in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address).
Lights	Power supply is in the range and the communication between Inteli IO8/8 and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn’t communicate with the controller).

Wiring

The following diagrams show the correct connection of inputs and outputs.

Binary inputs – pull up

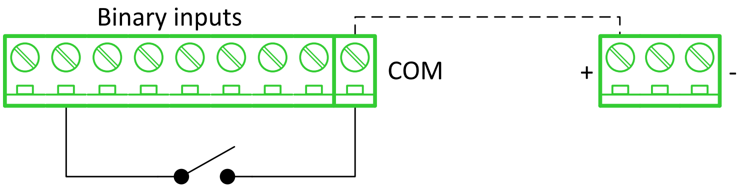


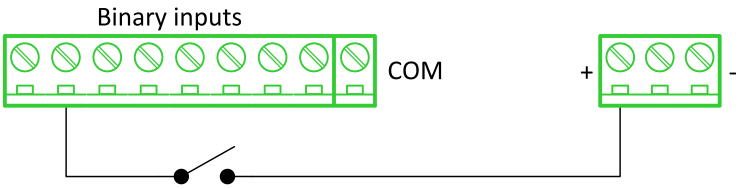


There are two options of wiring. On upper picture you can see example of binary input is connected between BIN2 and COM (COM is connected internally to the GND (-) – dashed line).

In lower picture is an example of wiring between BIN2 and GND (-). Both ways are correct.

Binary inputs – pull down

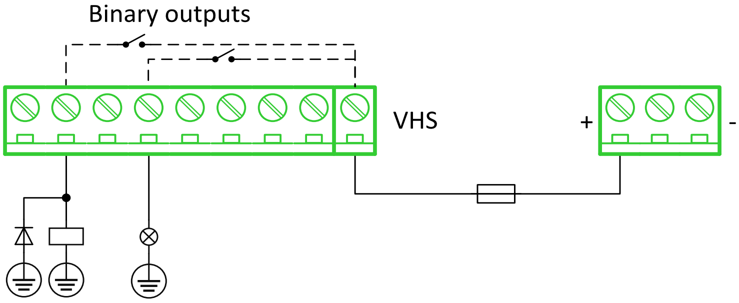




There are two options of wiring. In the upper picture you can see an example of binary input connected between BIN2 and COM (COM is connected internally to the Ucc (+) – dashed line).

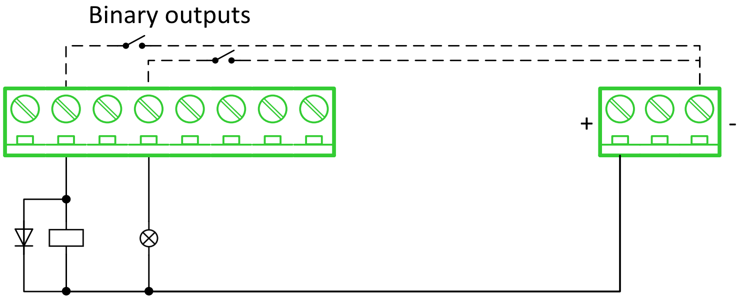
In the lower picture is an example of wiring between BIN2 and Ucc (+). Both ways are correct.

Binary outputs – high side



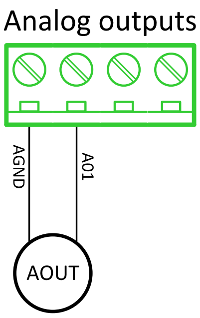
When high side setting of outputs is chosen – binary output must be connected to the negative potential directly Terminal VHS (voltage High side) must be connected to positive potential directly. Maximal current of each binary output is 500 mA. Size of fuse depends on load.

Binary outputs – low side



When low side setting of outputs is chosen – binary output must be connected to the positive potential of power supply directly. Negative potential is connected internally – dashed line.

Analog outputs



Note: *Limit of analog ground (AGND) is 100 mA.*

IMPORTANT: Terminator for analog output has special analog ground (AGND), which must not be connected to the GND.

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	35 mA at 24 V ÷ 100 mA at 8 V
Interface to controller	CAN1
Protection	IP20
Storage temperature	-40 °C to +80 °C

Operating temperature	-30 °C to +70 °C
Dimensions (W × H × D)	110 × 110 × 46 mm (4.3” × 4.3” × 1.8”)
Weight	240 grams

Analog outputs

Number of channels	2
Voltage	Range 0-10 V Accuracy: ±20 mV + ±0.5 % of actual value Imax 5 mA
Current	Range: 0-20 mA Accuracy: ±100 μA + ±0.5 % of actual value Rmax 500 Ω
PWM	Level 5 V Frequency – adjustable 200÷2400 Hz Imax 20 mA

Binary inputs

Number of channels	8 for Inteli IO8/8, 16 for Inteli IO16/0
Input resistance	4400 Ω
Input range	0 to 36 V DC
Switching voltage level for open contact indication	0 to 2 V DC
Max voltage level for close contact indication	6 to 36 V DC

Binary outputs

Number of channels	8 for Inteli IO8/8, 0 for Inteli IO16/0
Max current	500 mA
Max switching voltage	36 V DC

IGS-PTM

IGS-PTM module is extension module equipped with binary inputs, binary outputs, analog inputs and analog output. IGS-PTM module is connected to controller by CAN1 bus.

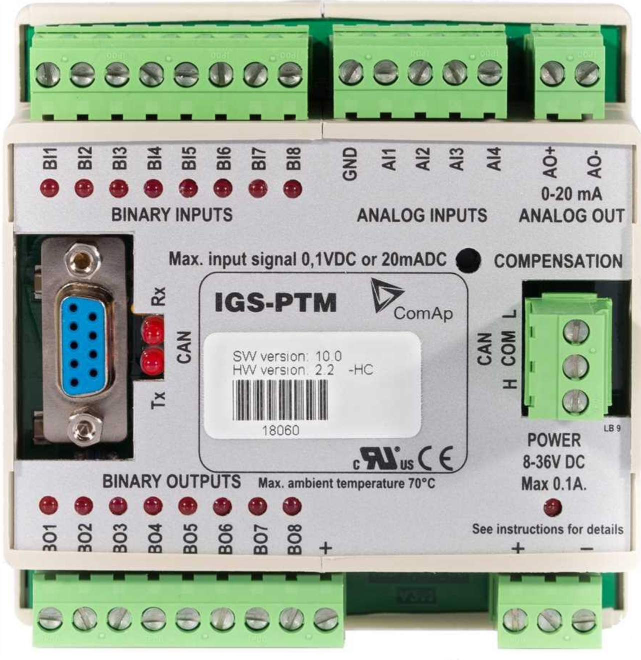


Image 8.247 IGS-PTM

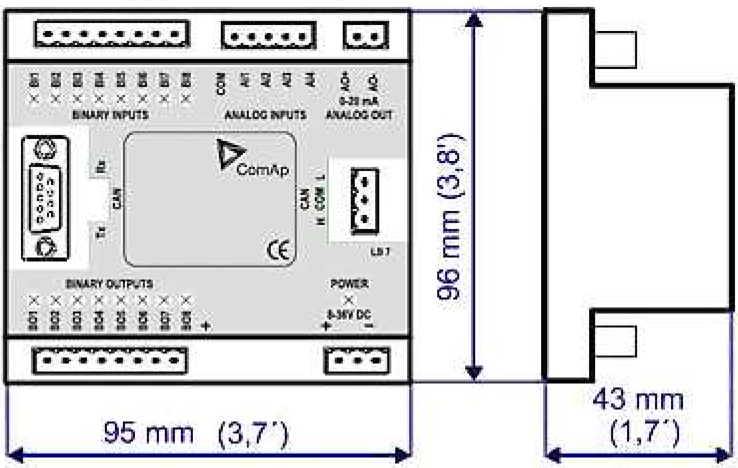
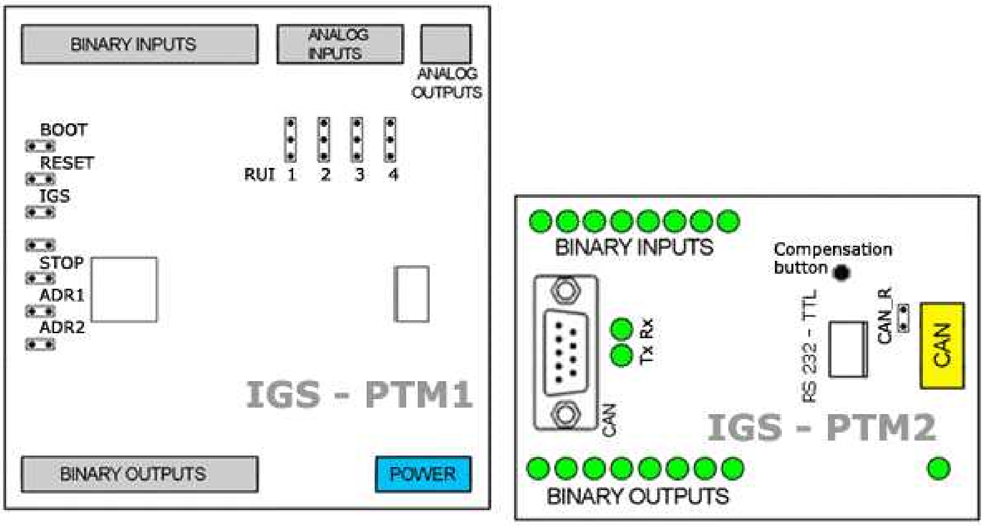


Image 8.248 IGS-PTM dimensions

Terminals



Binary inputs	8 binary inputs
Analog inputs	4 analog inputs
Analog outputs	1 analog output
Binary outputs	8 binary outputs
CAN	CAN1 line
RS232-TTL	Interface for programming
Power	Power supply

Analog inputs

Analog inputs can be configured for:

- Resistance measurement
- Current measurement
- Voltage measurement

The type of analog input is configured via jumpers RUI located on lower PCB.

RUI	Analog input configuration
1 - 2	Resistance measuring
2 - 3	Current measuring
no jumper	Voltage measuring

Supported sensors

Sensors	
PT100 [°C] (fix)	User curves
NI100 [°C] (fix)	0-100 mV
PT100 [°F] (fix)	0-2400 Ω
NI100 [°F] (fix)	±20 mA

CAN address

Controller type selection

The type of controller to be used with IGS-PTM must be selected via jumper labelled IGS accessible at the lower PCB.

IGS jumper	Controller type
OPEN	IL-NT, IC-NT
CLOSE	IG-NT, IS-NT, InteliLite

Address configuration

If InteliLite controller type is selected (by IGS jumper), address of IGS-PTM could be modified via jumpers labelled ADR1 and ADR2.

ADR1	ADR2	ADR offset	BIN module	BOUT module	AIN module
Open	Open	0 (default)	1	1	1
Close	Open	1	2	2	2
Open	Close	2	3	3	3
Close	Close	3	4	4	4

Programming firmware

Firmware upgrade is available via AT-link (TTL). For programming it is necessary to close jumper BOOT. RESET jumper is used to reset the device. Close jumper to reset the device. For programming FlashProg PC tool should be used.

LED indication

Binary input

Each binary input has an LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

Binary output

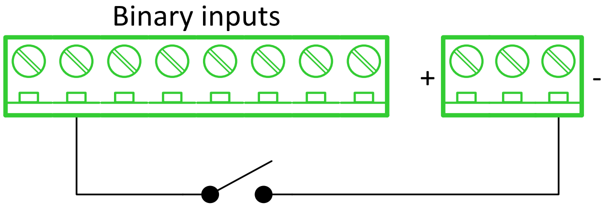
Each binary output has an LED which indicates output signal. Binary output LED is shining when binary output is set.

LED at power connector – status LED

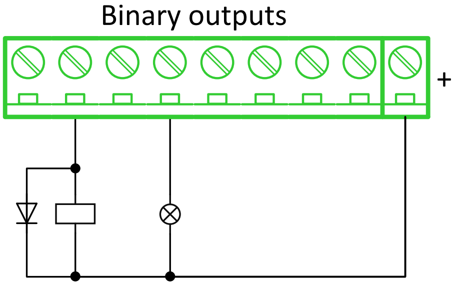
LED status	Description
Dark	No required power connected.
Quick flashing	Program check failure.
One flash and pause	Compensation fail.
Three flashes and pause	Compensation successful.
Flashes	There is no communication between IGS-PTM and the controller.
Lights	Power supply is in the range and communication between IGS-PTM and controller properly works.

Wiring

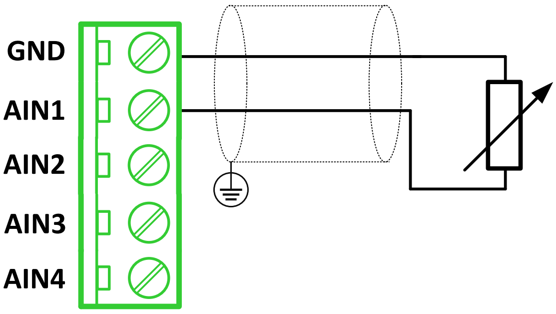
Binary inputs



Binary outputs



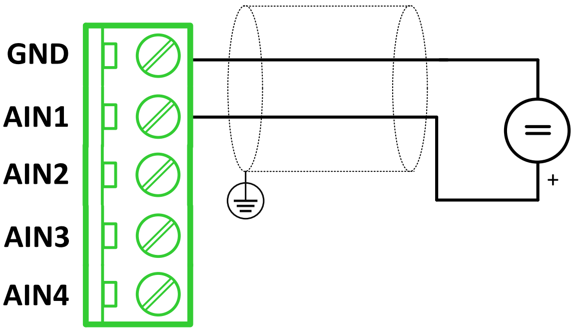
Resistance sensor



Note: *Range: 0-2400 Ω*

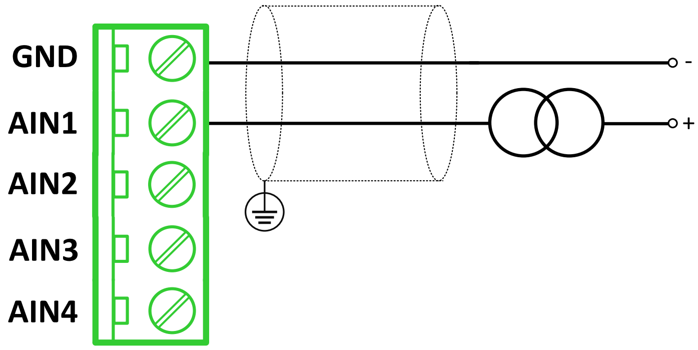
> **IMPORTANT: Physical analog input range is 0-250 Ω. In sensor configuration in PC tool it is necessary to chose 0-2400 Ω sensor HW type to ensure proper function of analog input.**

Voltage sensor



Note: *Range 0-100 mV*

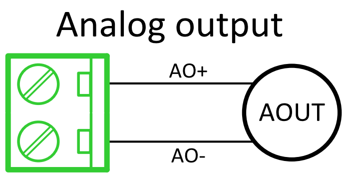
Current sensor – passive



__Note:__ Range: ±0-20 mA

> **IMPORTANT: Physical analog input range is 0-20 mA. In sensor configuration in PC tool it is necessary to chose ±20 mA active sensor HW type to ensure proper function of analog input.**

Analog outputs



__Note:__ Range: 0 to 20 mA ±0.33 mA

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	100 mA at 24V ÷ 500 mA
Interface to controller	CAN1
Protection	IP20
Storage temperature	-40 °C to +80 °C
Operating temperature	-30 °C to +70 °C
Dimensions (WxHxD)	95 × 96 × 43 mm (3.7" × 3.8" × 1.7")

Analog inputs

Number of channels	8
Voltage	Range 0-100 mV Accuracy: 1.5 % ±1 mV out of measured value
Current	Range: 0-20 mA Accuracy: 2.5 % ±0.5 Ω out of measured value
Resistive	Range: 0-250 Ω Accuracy: 1 % ±2 Ω out of measured value

Analog outputs

Number of channels	1
Current	Range: 0 to 20 mA ± 0.33 mA Resolution 10 bit

Binary inputs

Number of channels	8
Input resistance	4700 Ω
Input range	0 to 36 V DC
Switching voltage level for open contact indication	0 to 2 V DC
Max voltage level for close contact indication	8 to 36 V DC

Binary outputs

Number of channels	8
Max current	500 mA
Max switching voltage	36 V DC
Number of channels	8
Voltage	Range 0-100 mV Accuracy: 1.5 % ±.1 mV out of measured value
Current	Range: 0-20 mA Accuracy: 2.5 % ± 0.5 Ω out of measured value
Resistive	Range: 0-250 Ω Accuracy: 1 % ±2 Ω out of measured value

IGL-RA15

Remote annunciator (IGL-RA15) is designed as an extension signalling unit.

The unit is equipped with a fully configurable tricolor (red, orange, green) LED for intuitive operation together with high functionality.

Image 8.249 IGL-RA15

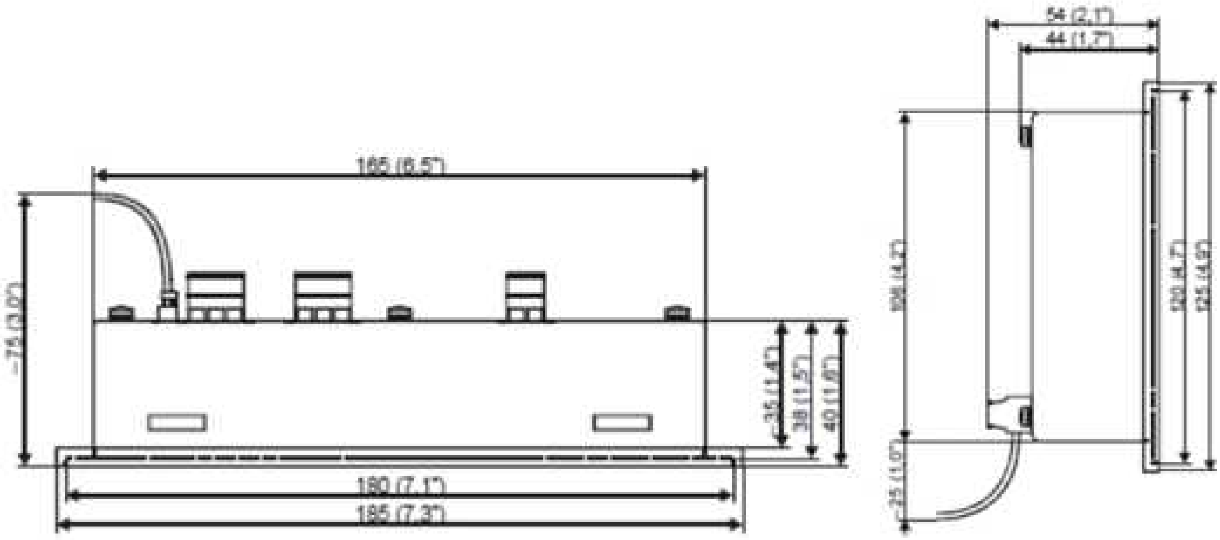


Image 8.250 IGL-RA15 dimensions

Terminals

Horn	Horn
CAN	CAN1 line
Power	Power supply

CAN address

Address	Jumper A	Jumper B
1	OPEN	OPEN
5+6	CLOSED	OPEN
Customer defined	CLOSED	CLOSED

SW changing of CAN1 address is enabled only when both jumpers are closed. Any one of these addresses (1+2 or 3+4 or 5+6 or 7+8) can be set via the following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- Press Lamp test sixteen times
- Set the address up by pressing Horn reset.
  - The number of red luminous LEDs means the CAN1 addresses (two for addresses 1+2, four for addresses 3+4, six for addresses 5+6 and eight for addresses 7+8)
- Press Lamp test

LED indication

Each LED color is adjusted independently of controller output settings. If controller output 1 is set as "Common Shutdown" it does not mean red LED1 color for iGL-RA15. The LEDs color can be adjusted by following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow

- Press Horn reset to change the LED1 color (green, yellow, red)
- Press Lamp test to switch to the next LED color adjusting
- Continue to adjust all LEDs color
- After LED15 color adjusting press Lamp test three times

Note: *If there is no operator action during address setting, color adjusting or timeout setting, the unit returns to normal operation without changes saving.*

Status LED

The signals LEDs are handled like binary outputs. This means everything that can be configured to binary outputs can be also configured to the LEDs of IGL-RA15.

LED status	Description
Lights	Configured logical output is active on the controller
Dark green LED	Configured logical output is not active on the controller
Dark yellow or red LED	Configured logical output is not active on the controller and horn reset was pressed.
Yellow or red LED blinks	Configured logical output is not active on the controller and horn reset was still not pressed.

Power LED

LED status	Description
Blinking green	The unit is OK and the communication to the master controller is OK.
Blinking red	The unit is OK, but the communication to the master controller is not running.
Blinking yellow	EEPROM check not passed OK after power on
Yellow	Horn timeout or controller address adjustment

Horn setting

The horn output is activated if any of red or yellow LED is on. Output is on until pressing Horn reset or horn timeout counts down. The timeout can be set via the following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- Press Lamp test fifteen times
- Set the horn timeout by pressing Horn reset.
    - The number of green luminous LEDs means timeout in 10 s (any for disabling horn output, 1 for 10s timeout, 2 for 10s timeout, 15 for disabling horn timeout).
    - Press Lamp test two times

Note: *If there is no operator action during address setting, color adjusting or timeout setting, the unit returns to normal operation without changes saving.*

The horn is activated:

- If any red or yellow LED lights up or
- At the end of the extended lamp test. See chapter **Lamp and horn test (page 991)**

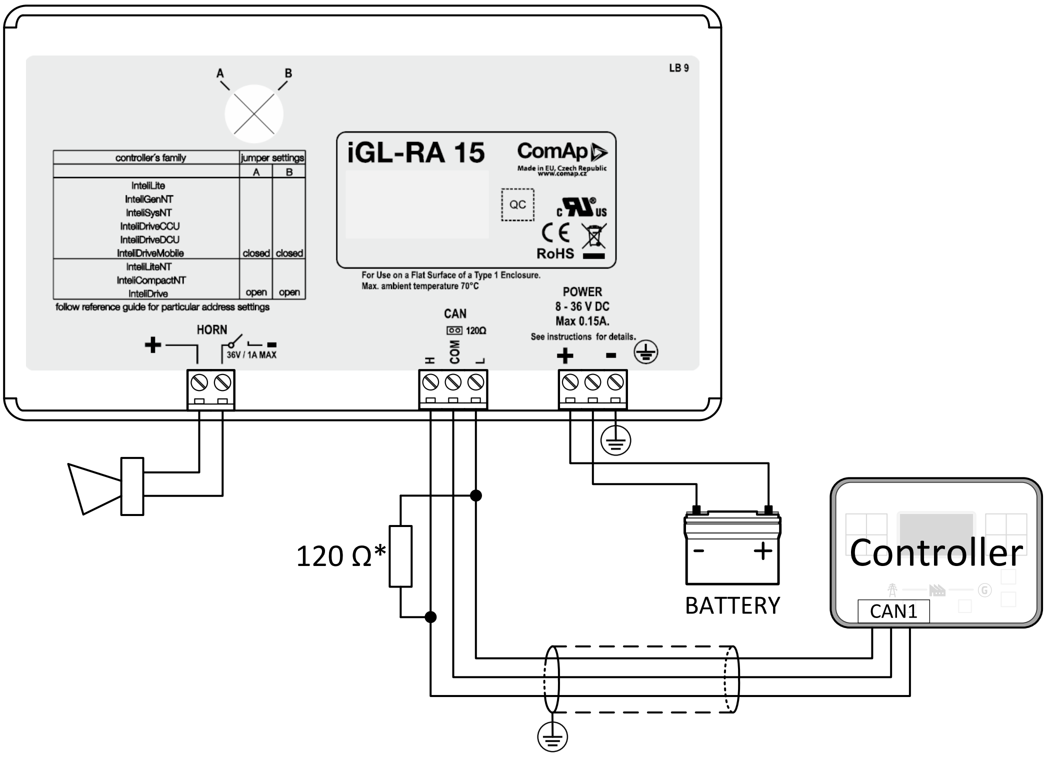
The horn can be silenced:

- By pressing horn reset button or
- It silences automatically after adjusted time

Lamp and horn test

Pressing and holding lamp test button for less than 2 s executes the basic lamp test. All LEDs light up with the configured color. If the button is held longer than 2 s, an extended test is started. Every LED is tested step-by-step in green color and then in red color. The horn is activated at the end of the test. Afterwards, that the unit returns to normal operation. The horn can be silenced with horn reset.

Wiring



* terminator resistor only when iGL-RA 15 is the last unit on the CAN1 bus.

Note: *The shielding of the CAN bus cable must be grounded at one point only!*

Note: *See the section* ***Technical data (page 236)*** *for recommended CAN bus cable type.*

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	0.35-0.1A (+1Amax horn output) depends on supply voltage
Protection	IP65
Humidity	85%
Storage temperature	-30 °C to +80 °C
Operating temperature	-20 °C to +70 °C
Dimensions (WxHxD)	180 × 120 × 55 mm
Weight	950 g

Horn output

Maximum current	1.0 A
Maximum switching voltage	36 V DC

CAN bus interface

Galvanic separated	
Maximal CAN bus length	200 m
Speed	250 kBd
Nominal impedance	120 Ω
Cable type	twisted pair (shielded)
Following dynamic cable parameters are important especially for maximal 200 meters CAN bus length	
Nominal Velocity of Propagation	min. 75 % (max. 4.4 ns/m)
Wire crosscut	min.0.25 mm^2
Maximal attenuation (at 1 MHz)	2 dB / 100 m
Recommended Industrial Automation & Process Control Cables	
BELDEN (www.belden.com)	› 3082A DeviceBus for Allen-Bradley DeviceNet › 3083A DeviceBus for Allen-Bradley DeviceNet › 3086A DeviceBus for Honeywell SDS › 3087A DeviceBus for Honeywell SDS › 3084A DeviceBus for Allen-Bradley DeviceNet › 3085A DeviceBus for Allen-Bradley DeviceNet › 3105A Paired EIA Industrial RS485 cable
LAPP CABLE (www.lappcable.com)	› Unitronic BUS DeviceNet Trunk Cable › Unitronic BUS DeviceNet Drop Cable › Unitronic BUS CAN › Unitronic-FD BUS P CAN UL/CSA

back to Appendix