ComAp
The heart of smart control

# InteliGen 200

## Controller for parallel gen-set applications

SW version 1.5.0


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Written by Michal Slavata
Prague, Czech Republic
ComAp a.s., U Uranie 1612/14a,
170 00 Prague 7, Czech Republic
Tel: +420 246 012 111
E-mail: info@comap-control.com, www.comap-control.com


Global Guide

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## 1.1 Clarification of notation

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

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

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

## 1.2 About this Global Guide

This manual contains important instructions for InteliGen 200 controllers family that shall be followed during installation and maintenance of the controllers.

This manual provides general information how to install and operate InteliGen 200 controllers.

This manual is dedicated for:

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

## 1.3 Legal notice

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**Security Risk Disclaimer**

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

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

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

General security recommendations and set of measures

1. AccessCode

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

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

• For each device use a different AccessCode.

2. Password

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

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

3. Controller Web interface

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

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

4. MODBUS/TCP

• The MODBUS/TCP protocol (port TCP/502) is an instrumentation protocol designed to exchange data between locally connected devices like sensors, I/O modules, controllers etc. From it's nature it does not

contain any kind of security – neither encryption nor authentication. Thus it is intended to be used only in closed private network infrastructures.

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

5. SNMP

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

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

Used Open Source Software: mBed-TLS

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

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

Used Font: zpix-pixel-font

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

Copyright (c) [2019] [Jason Fung]

# 1.4 General warnings

## 1.4.1 Remote control and programing

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

To be sure:

- Disconnect remote control
- Disconnect binary outputs

## 1.4.2 SW and HW versions compatibility

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

## 1.4.3 Dangerous voltage

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

Always connect grounding terminals!

In any case do not disconnect controller CT terminals!



## 1.4.4 Adjust the setpoints

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

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

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

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

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

# 1.5 Certifications and standards

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

# 1.6 Document history

| Revision number | Related sw. version | Date | Author |
|---|---|---|---|
| 8 | 1.5.0 | 27.9.2019 | Michal Slavata |
| 7 | 1.4.0 | 25.9.2019 | Michal Slavata |
| 6 | 1.3.0 | 20.5.2019 | Jan Donát |
| 5 | 1.3.0 | 4.4.2019 | Martin Klíma |
| 4 | 1.3.0 | 30.1.2019 | Michal Slavata |
| 3 | 1.1.0 | 6.8.2018 | Vladimír Zubák |
| 2 | 1.1.0 | 28.5.2018 | Vladimír Zubák |
| 1 | 1.0.0 | 28.12.2017 | Michal Slavata |

# 1.7 Symbols in this manual

3 x Phases

Active current sensor

AirGate

Alternating current

Analog modem

Battery

Binary output

Breaker contact

Breaker contact

Breaker

Breaker

Breaker

Capacitor

Coil

Connector - female

Connector - male

Contact

Contactor

Controller simplified

Module simplified

Current measuring

Current measuring

Diode

Ethernet male

Ethernet female

Fuel solenoid

Fuse

Fuse switch

Generator

Generator schematic

Grounding

GSM

GSM modem

IG-AVRi

IG-AVRi TRANS

Jumper

Load

Mains

Mains

Mobile provider

Passive current sensor

Pick - up

Relay coil

Relay coil of slow-operating

Resistor

Resistor adjustable

Resistive sensor RPTC

RS 232 male

RS 232 female

Starter

Switch - manually operated

Transformer

USB type B male

USB type B female

Voltage measuring

Wifi / WAN / LAN

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# 2 System overview

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## 2.1 General description

InteliGen 200 family controllers are comprehensive gen-set controllers for single generating sets operating in stand-by or parallel modes or for multiple gen-sets applications. A modular construction allows upgrades to different levels of complexity in order to provide the best solution for various customer applications. The controllers are equipped with a powerful graphic display showing icons, symbols and bar graphs for intuitive operation, which, together with its high level of functionality, sets new standards in Gen-set controls.

### 2.1.1 The key features of InteliGen 200

- 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 multiplies of the basic mains frequency and this may result in deformation of the voltage waveforms. The True RMS measurement gives accurate readings of effective values not only for pure sinusoidal waveforms, but also for deformed waveforms.

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

## 2.3 Configurability and monitoring

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

## 2.3.1 Supported configuration and monitoring tools

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

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

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

## 2.3.2 Configuration parts

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

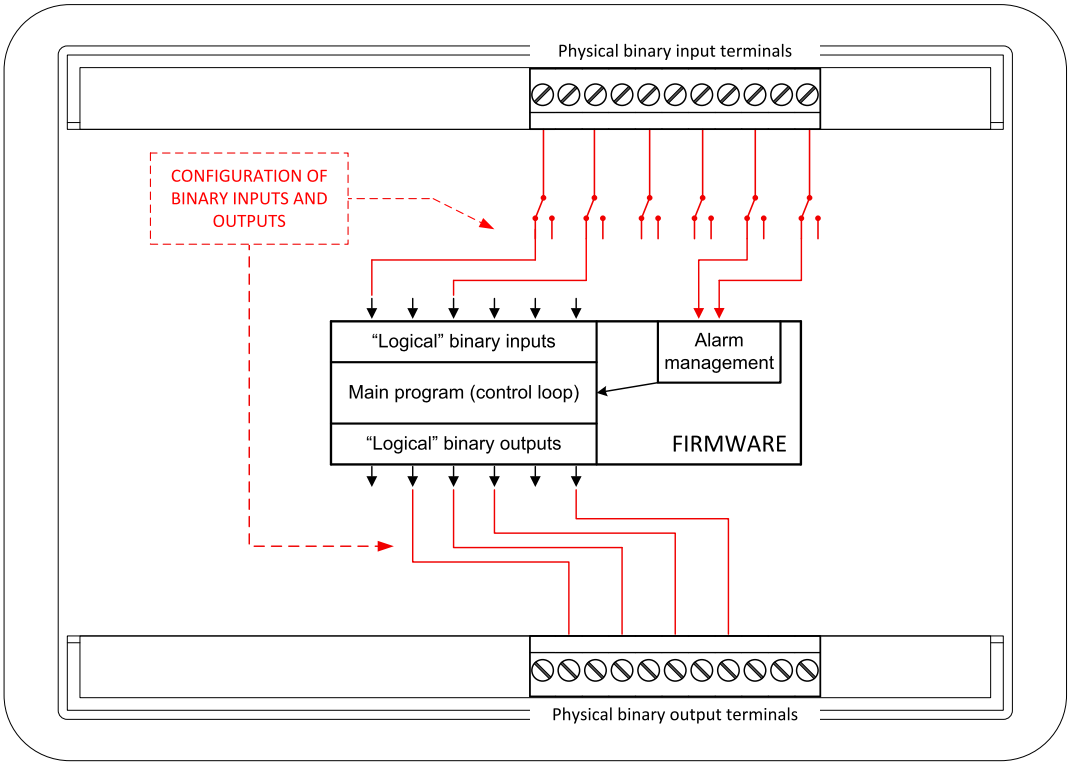



Image 2.1 Principle of binary inputs and outputs configuration

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 .ail3. An archive contains a full image of the controller at the time of saving (if the controller is online for the PC) except the firmware. Besides configuration it also contains current adjustment of all setpoints, all measured values, a copy of the history log and a copy of the alarm list.

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

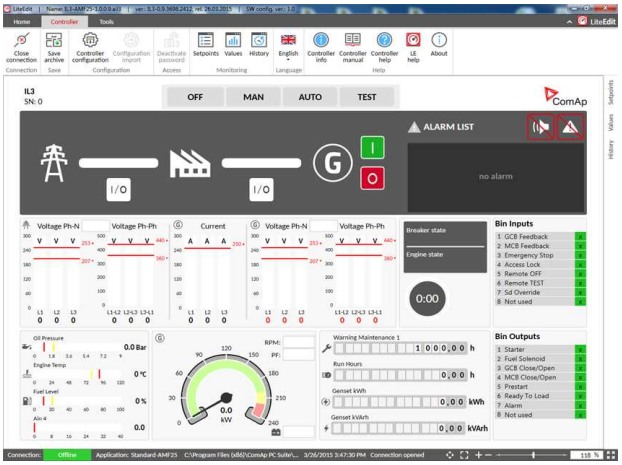
# 2.4 PC tools

## 2.4.1 InteliConfig

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

**This tool provides the following functions:**

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

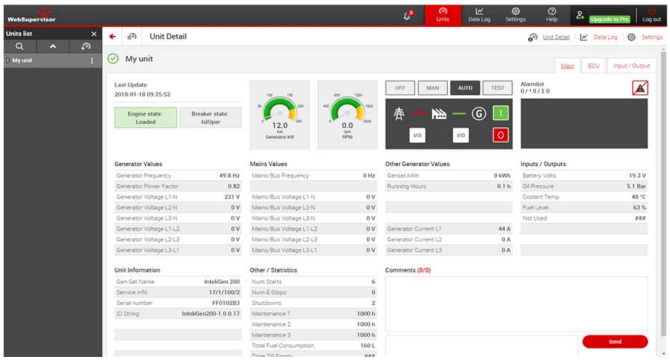



## 2.4.2 WebSupervisor

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

**This tool provides the following functions:**

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




WebSupervisor available at: www.websupervisor.net

Demo account:

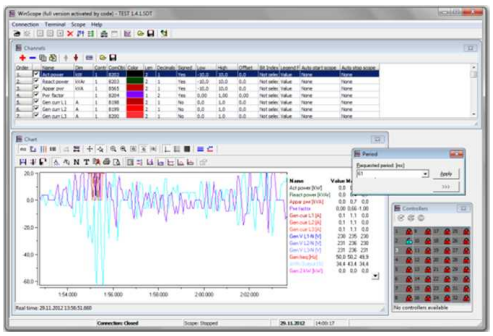
- Login: comaptest
- Password: ComAp123

## 2.4.3 WinScope

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

**This tool provides the following functions:**

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

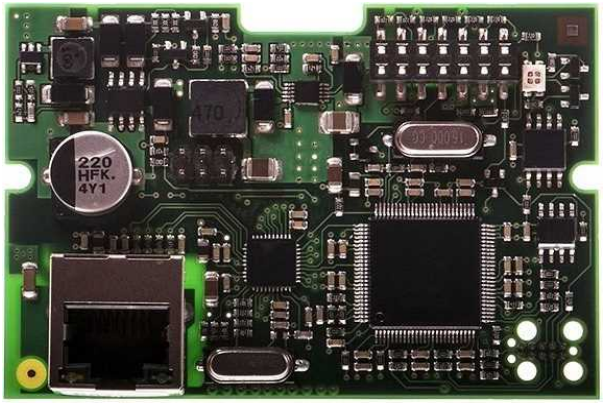


# 2.5 Plug-in modules

## 2.5.1 CM-Ethernet

Internet/Ethernet module including web server.

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



## 2.5.2 CM-4G-GPS

GSM/4G Internet module and GPS locator

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




## 2.5.3 CM-GPRS

GSM/GPRS Internet module

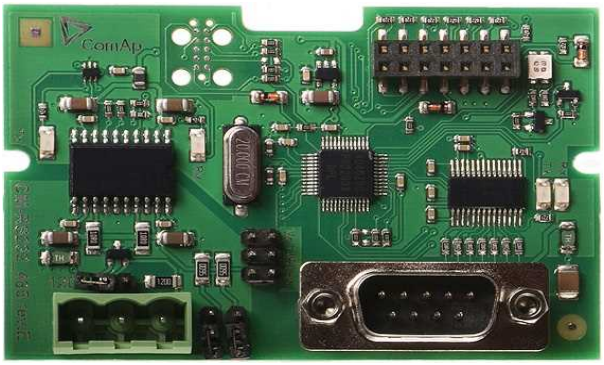
- Wireless integrated solution
- Quick and easy installation
- Support of WebSupervisor
- Instant alarm SMS notification
- System control over SMS
- Quad Band GPRS/EDGE modem, 850/900/1800/1900 MHz
- GPRS multi-slot class 10
- TCP/IP communication over GPRS



## 2.5.4 CM-RS232-485

Communication module with two communication ports.

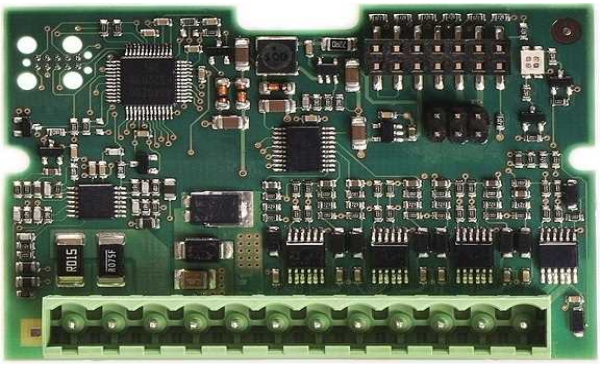
- RS232 and RS485 interface
- MODBUS
- Serial connection to InteliConfig



## 2.5.5 EM-BIO8-EFCP

Hybrid current input and binary input/output extension module.

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



# 2.6 CAN modules

## 2.6.1 Inteli AIN8

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

**Supported sensors:**

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



## 2.6.2 Inteli IO8/8

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

**Configuration 8/8**

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

**Configuration 16/0**

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




## 2.6.3 IGS-PTM

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

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



## 2.6.4 IGL-RA15

Remote annunciator.

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




## 2.6.5 I-LB+

Local Bridge.

- Communication bridge for sites with multiple controllers for local or remote monitoring and control
- Direct (RS232,RS485), modem, Modbus or USB connection to multiple controllers
- Communication speed up to 57600 bps (including Modbus mode)
- Analog / GSM / ISDN / CDMA modem support




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# 3 Applications overview

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3.2 MINT ..... 21

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## 3.1 SPtM

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

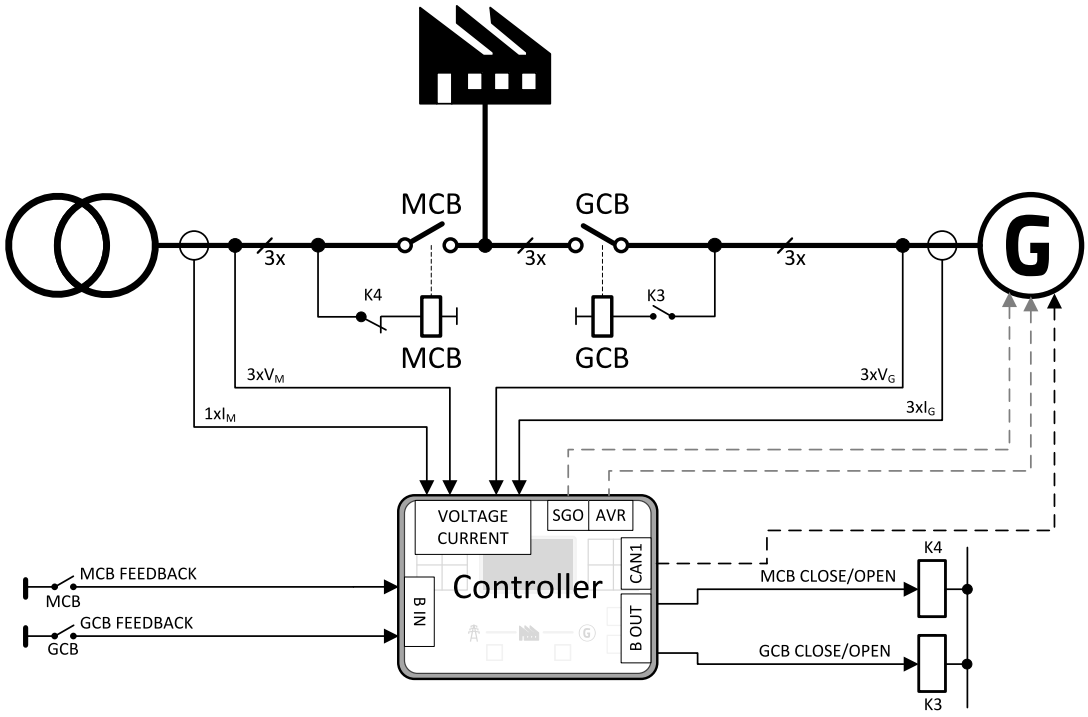



Image 3.1 Single parallel to mains application

# 3.2 MINT

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

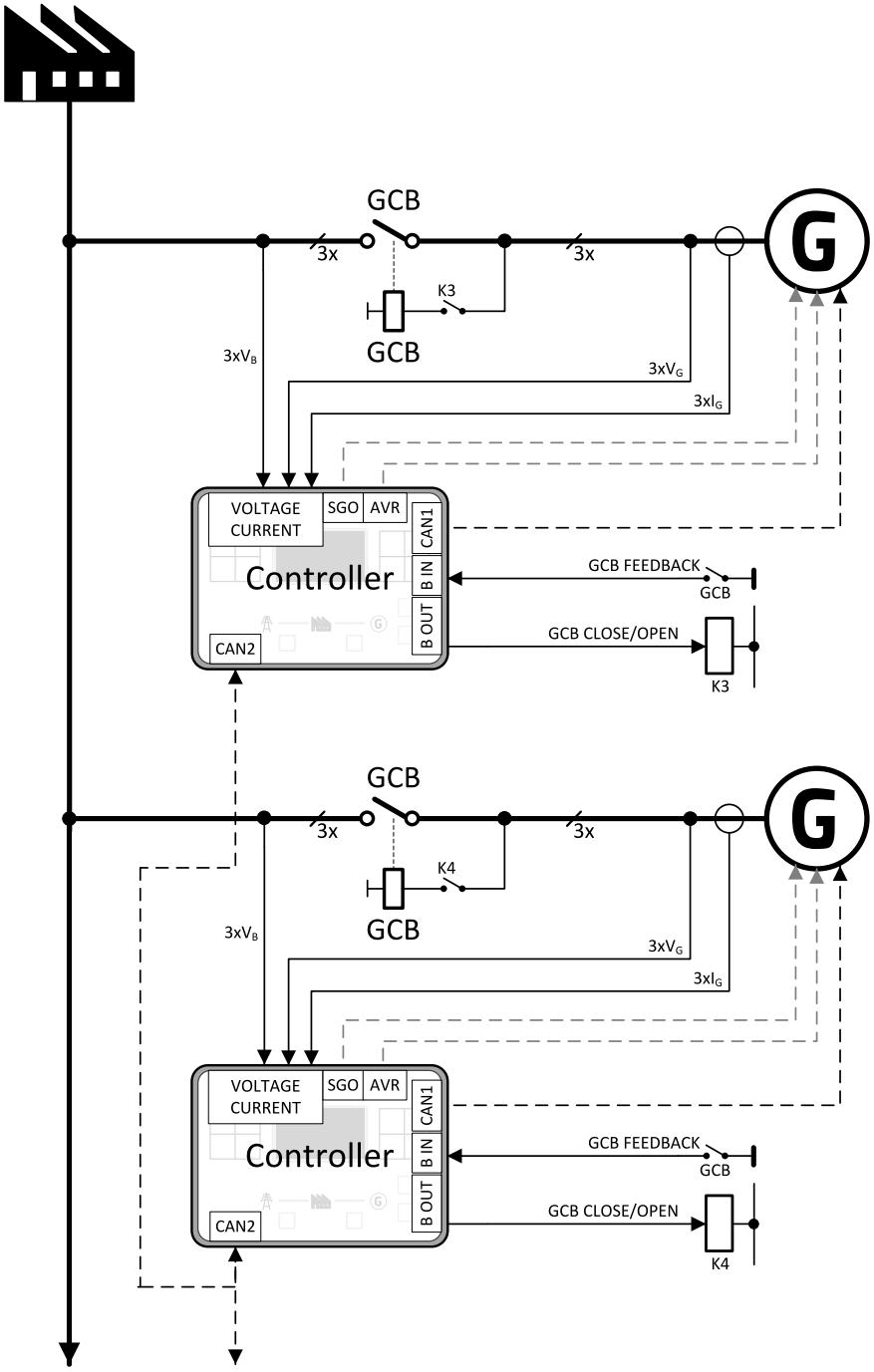



Image 3.2 Multiple island-parallel application without mains

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# 4 Installation and wiring

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## 4.1 Package content

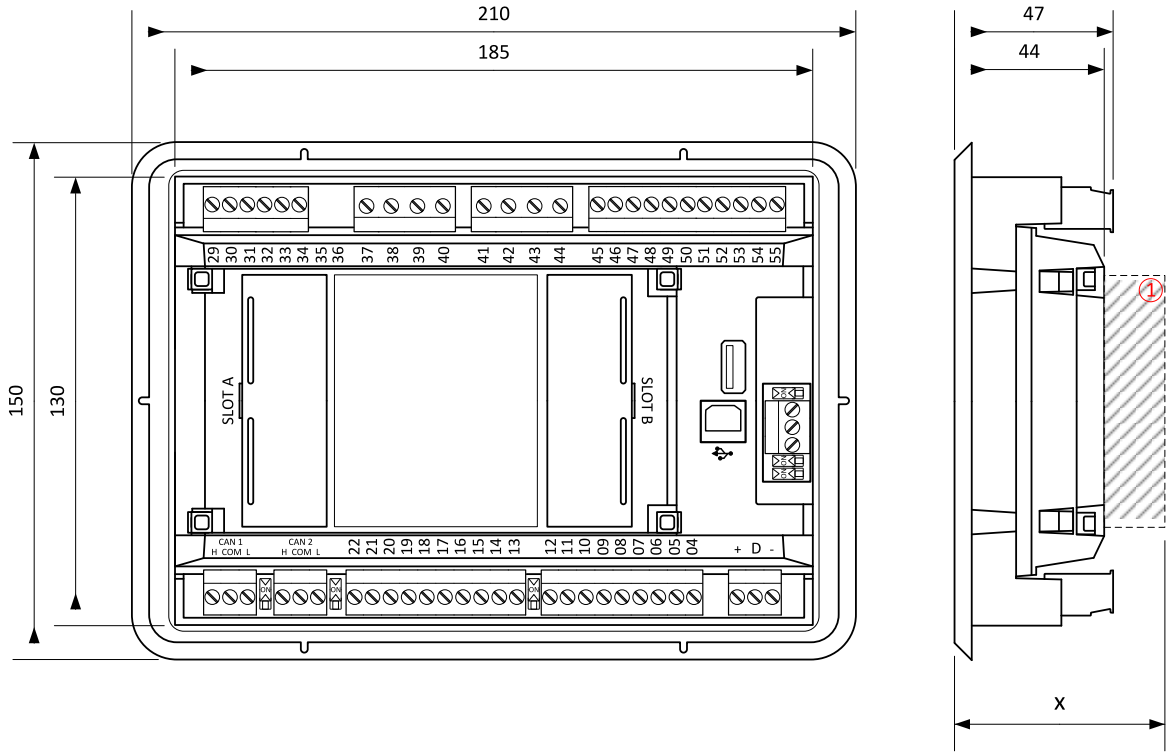
The package contains:

- Controller
- Mounting holders
- Terminal blocks

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

# 4.2 Controller installation

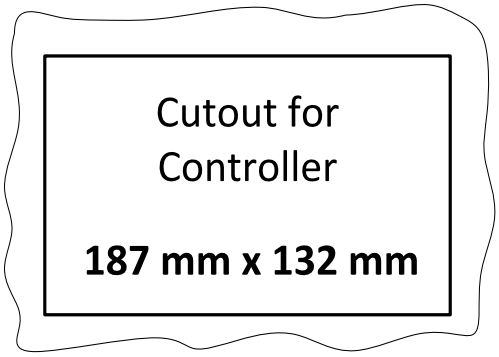
## 4.2.1 Dimensions




① Plug-in module

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

***Note:*** *Dimensions are in millimeters.*

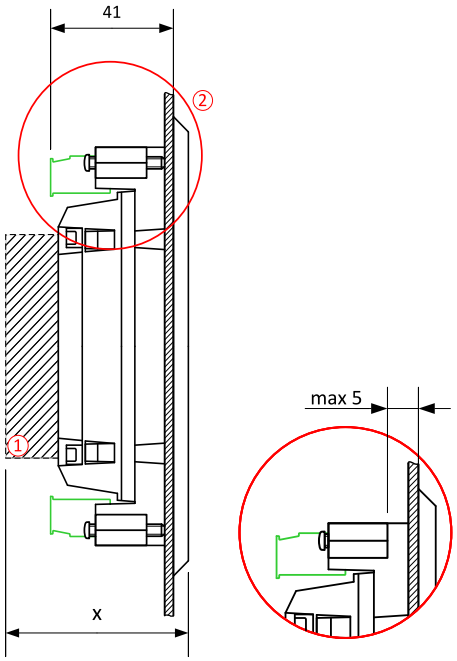



***Note:*** *Cutout is in millimeters.*

## 4.2.2 Mounting

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

## Panel door mounting




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

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

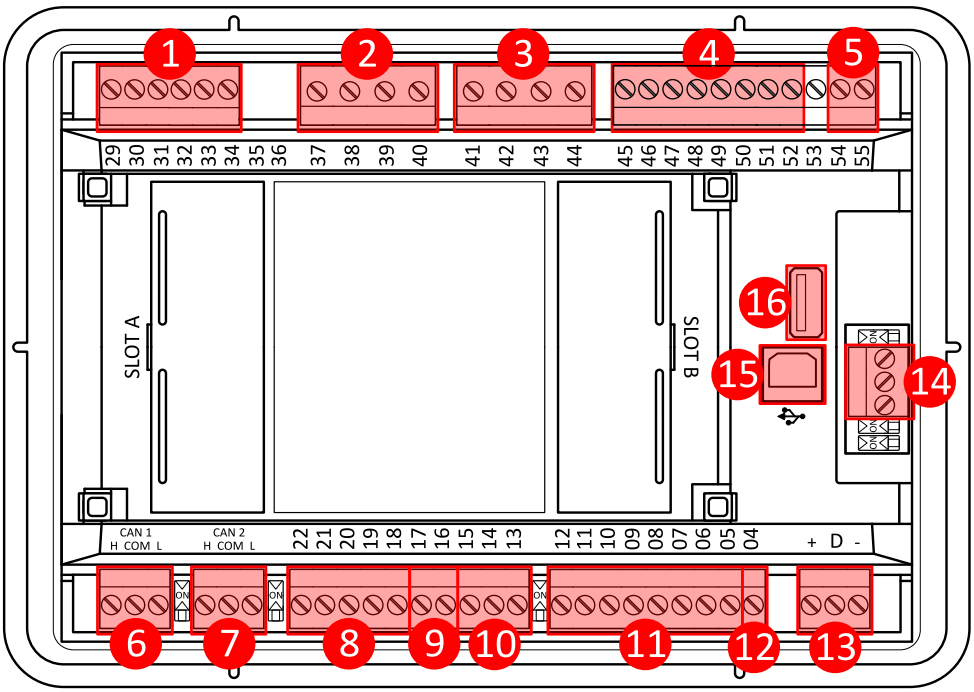
***Note:*** *The accessibility of live parts through openings in the enclosure, reliable retention of guards or barriers for prevention of risk of electric shock, etc., shall be considered in the end product evaluation.*

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

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

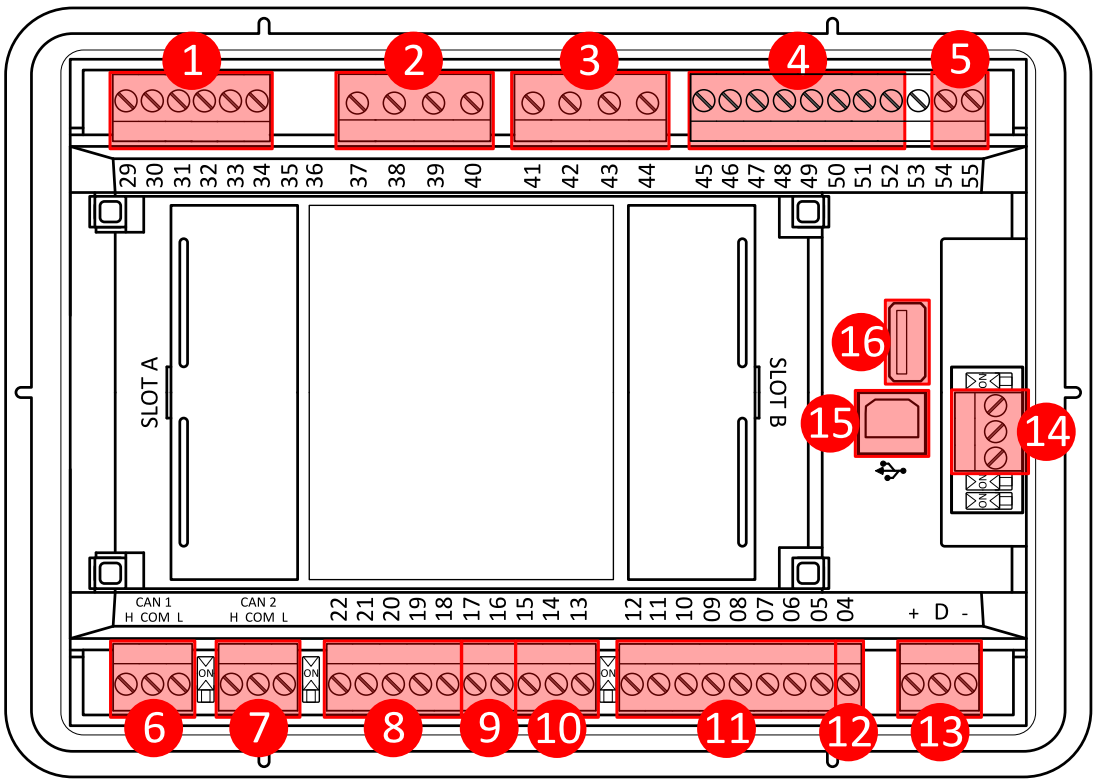
# 4.3 Terminal Diagram

| ① CURRENT MEASUREMENT | | ② 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 | | |
| T22 | A04 | | | ⑫ E-STOP | | ⑮ USB | |
| | | | | T04 | | ⑯ USB HOST | |

# 4.4 Recommended wiring




| | | | |
|---|---|---|---|
| 1 | Current inputs | 28 - 36 | **Current measurement wiring (page 30)** |
| 2 | Generator voltage inputs | 37 - 40 | **Voltage measurement wiring - SPtM (page 32)**<br>**Voltage measurement wiring - MINT (page 38)** |
| 3 | Mains/Bus voltage inputs | 41 - 44 | **Voltage measurement wiring - SPtM (page 32)**<br>**Voltage measurement wiring - MINT (page 38)** |
| 4 | Binary inputs | 45 - 52 | **Binary inputs (page 45)** |
| 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 48)** |
| 9 | RPM | 16 - 17 | **Magnetic pick-up (page 44)** |
| 10 | Speed governor | 13 - 15 | **Speed governor interface (page 57)** |
| 11 | Binary outputs | 05 - 12 | **Binary Outputs (page 46)** |

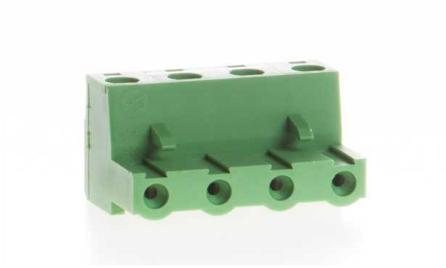
| | | | |
|---|---|---|---|
| 12 | E-Stop | 04 | **E-Stop (page 47)** |
| 13 | Power supply | "+" D "-" | **Power supply (page 28)** |
| 14 | RS485 | A, COM, B | **CAN bus and RS485 wiring (page 52)** |
| 15 | USB | USB B | **USB (page 57)** |
| 16 | USB HOST | USB A | **USB HOST (page 57)** |

**back to Installation and wiring**

## 4.4.1 General

To ensure proper function:

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

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

## 4.4.2 Grounding

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

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

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

## 4.4.3 Power supply

To ensure proper function:

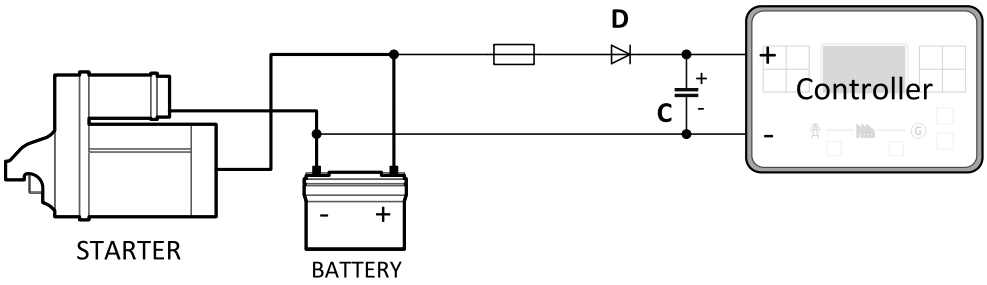
- Use power supply cable min. 1.5 $mm^2$

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

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

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

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




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

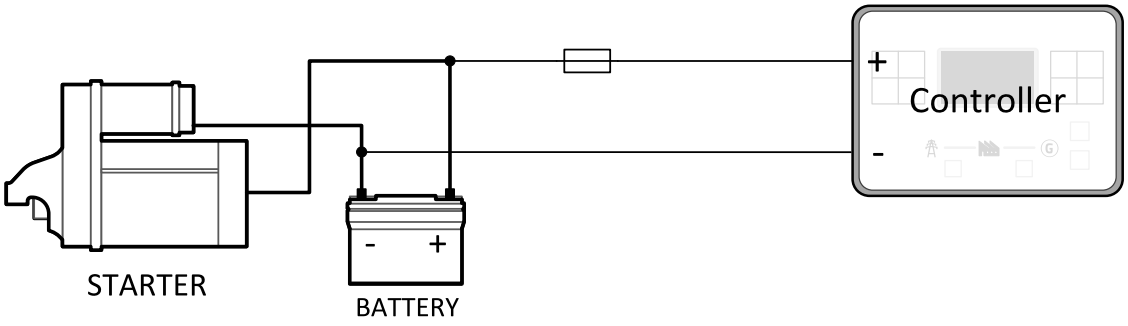
***Note:*** *In case of the dip to 0 V the high-side binary outputs will be temporarily switched off and after recovering to 4 V back on.*

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

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

### Power supply fusing

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




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

## 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 259)**, **Nominal Voltage Ph-N (page 261)**, **Nominal Voltage Ph-Ph (page 261)**, **Nominal Current (page 258)**, **Gen VT Ratio (page 261)** and **CT Ratio (page 259)** by appropriate setpoints in the Basic Settings group.

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

### Mains measurement wiring

Connect CT according to following drawings

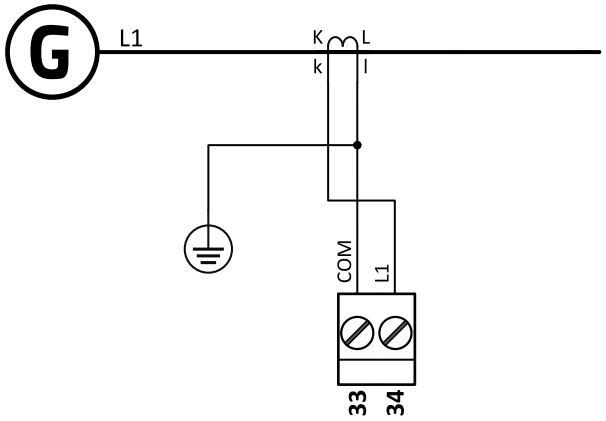



Image 4.1 Mains measurement wiring

# Current measurement wiring

The number of CT's is automatically selected based on selected value of setpoint **Connection type (page 259)** [3Ph4Wire / High Leg D / 3Ph3Wire / Split Ph / Mono Ph].

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

To ensure proper function:

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

## 3 phase application:

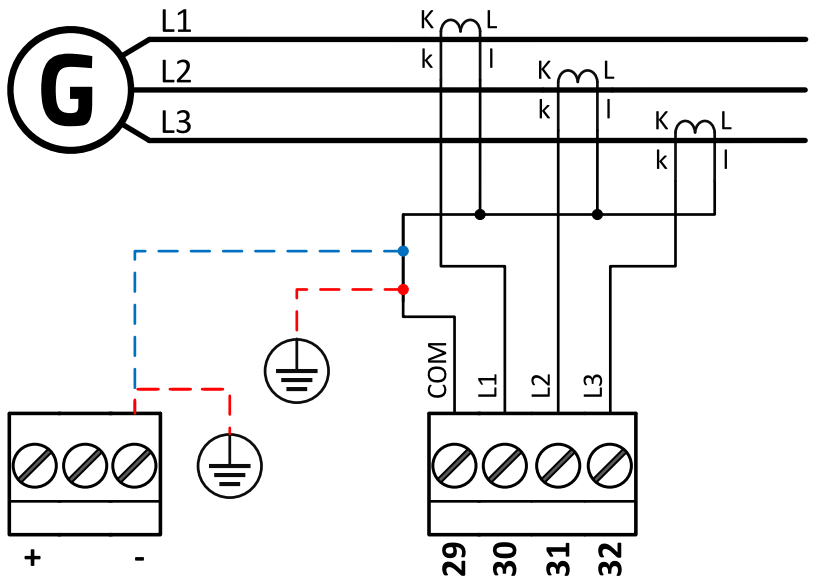



Image 4.2 3 phase application

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

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

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

## Split phase application:

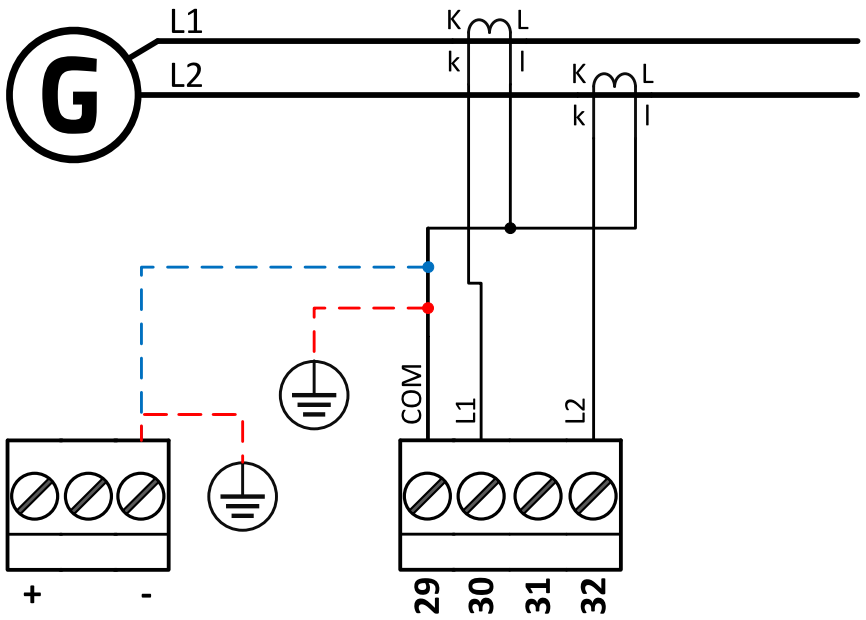



Image 4.3 Split phase application

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

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

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

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

### Mono phase application:

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

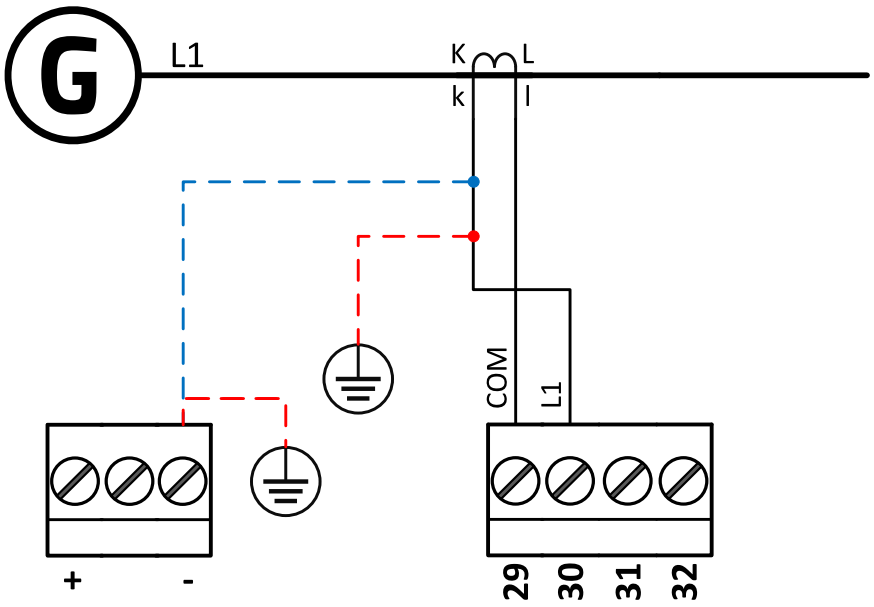



Image 4.4 Mono phase application

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

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

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

## Voltage measurement wiring - SPtM

There are 4 voltage measurement Connection Type (setpoint **Connection type (page 259)** [3Ph4Wire / High Leg D / 3Ph3Wire / Split Ph / Mono Ph]) options, every type matches to corresponding generator connection type.

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

The generator protections are evaluated from different voltages based on **Connection type (page 259)** setting:

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

## ConnectionType: 3 Phase 4 Wires

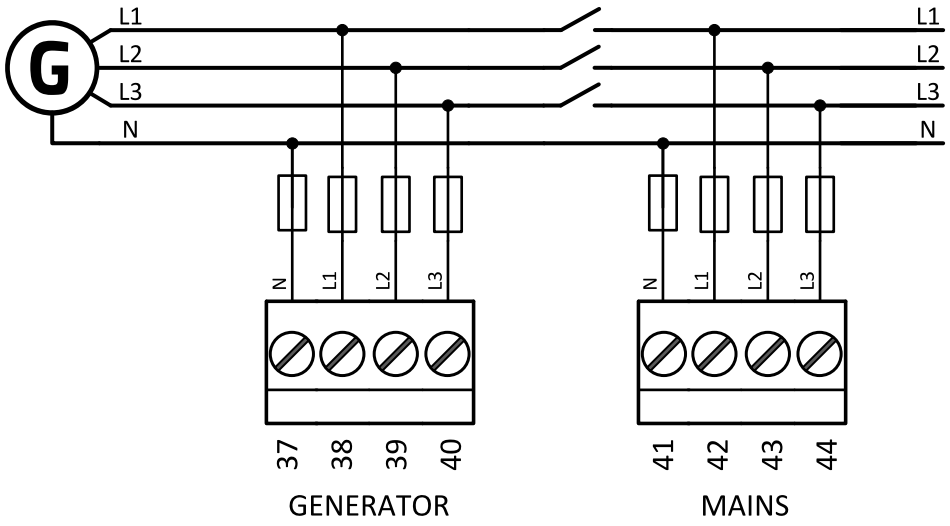



Image 4.5 3 phase application with neutral

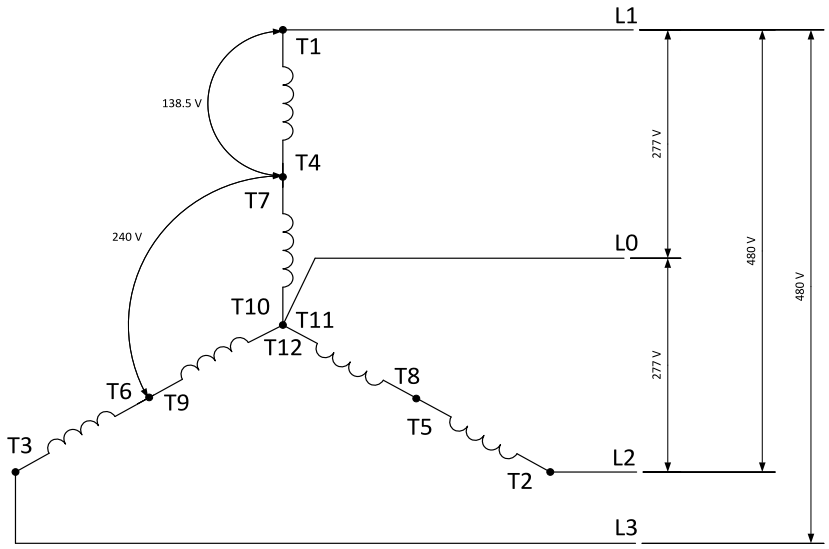



Image 4.6 Typical 3 Phase 4 Wires generator wiring

## ConnectionType: High Leg D

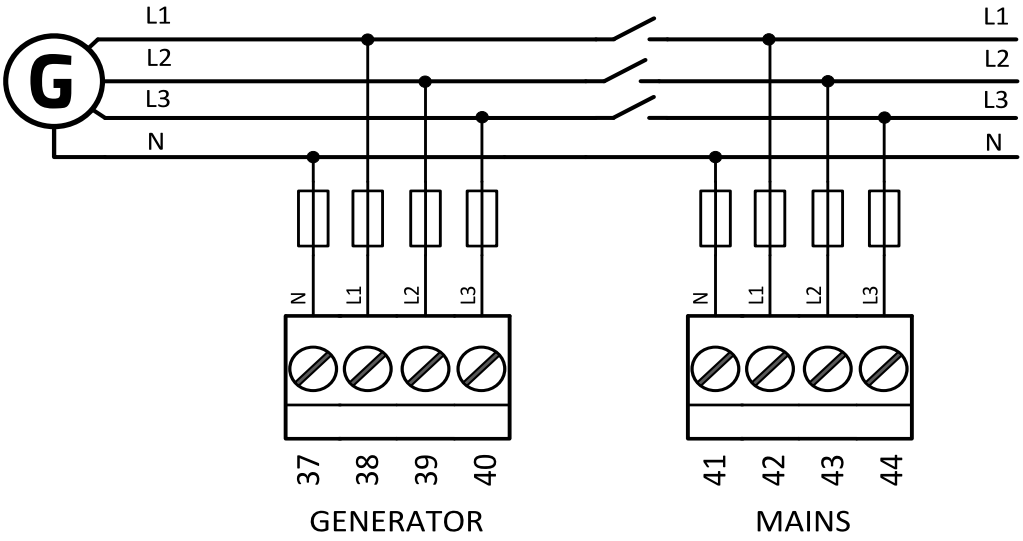



Image 4.7 High Leg Delta application

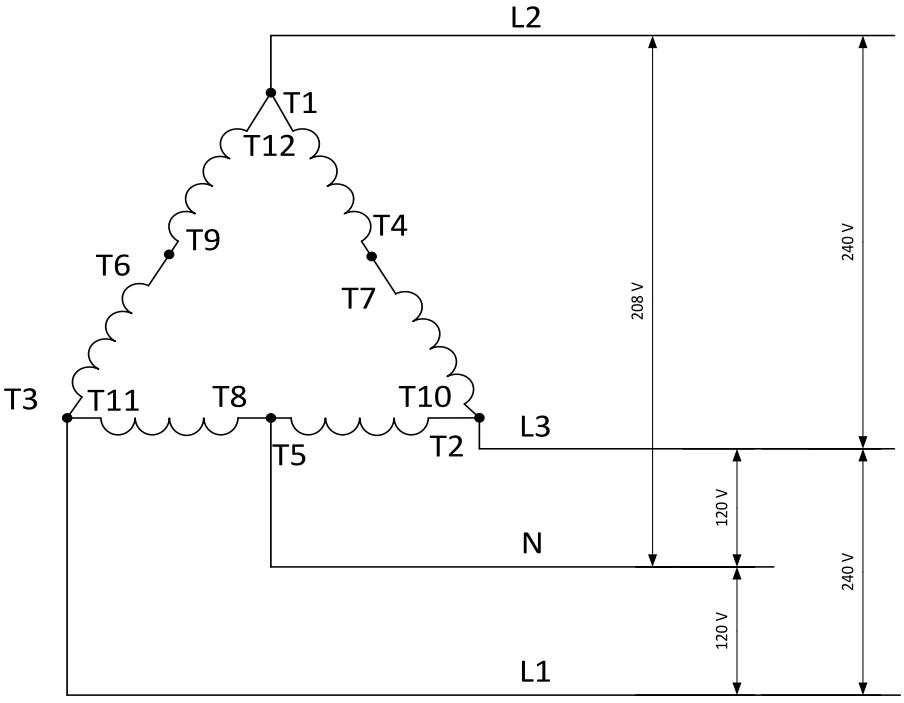



Table 4.1 Typical High Leg D generator wiring

## ConnectionType: 3 Phase 3 Wires

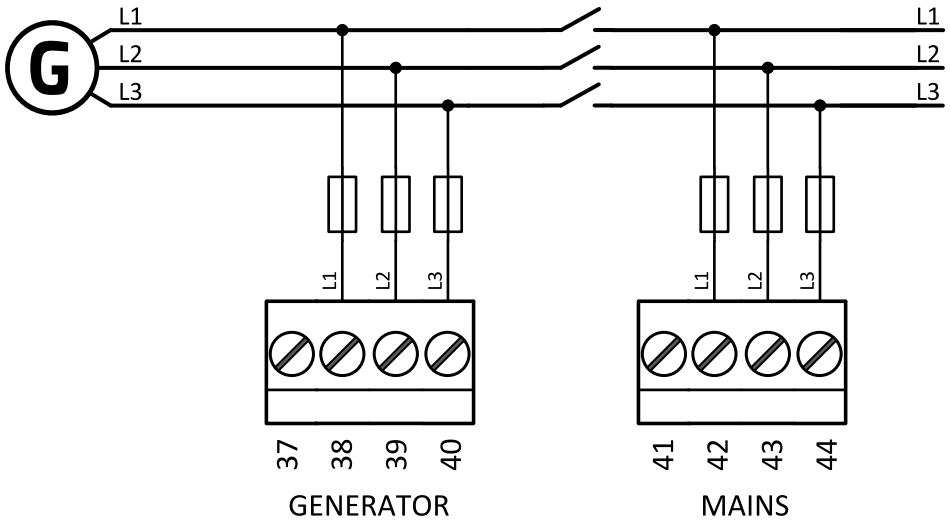



Image 4.8 3 phase application without neutral

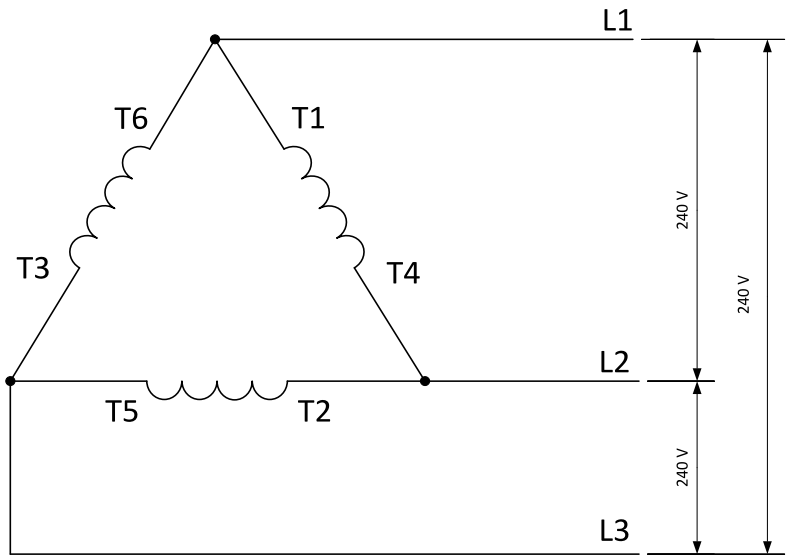



Image 4.9 Typical 3 Phase 3 Wires generator wiring

### ConnectionType: Split Phase

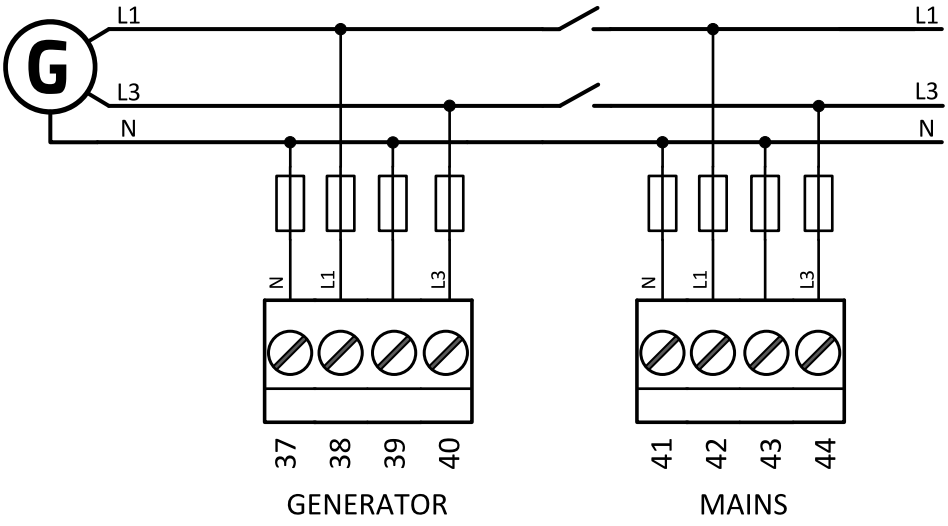
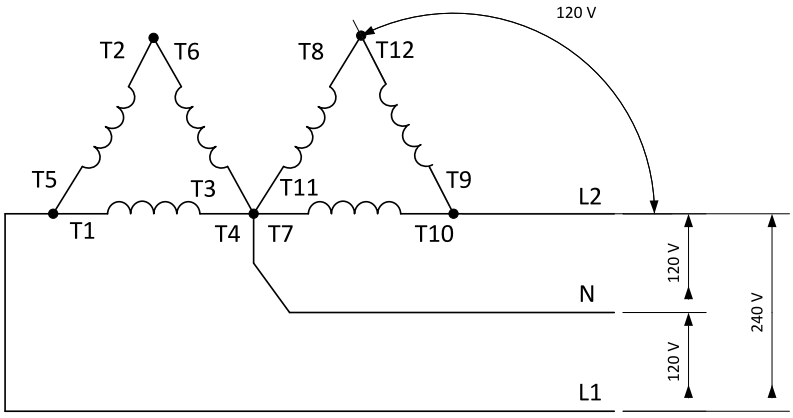



Image 4.10 Split phase application

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

DOUBLE DELTA Connection




ZIG ZAG (DOG LEG) Connection

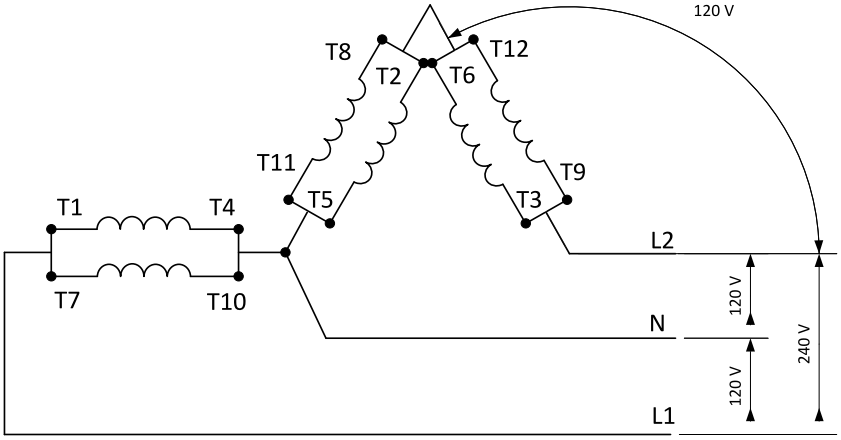



Image 4.11 Typical Split Phase generator wiring

### ConnectionType: Mono Phase

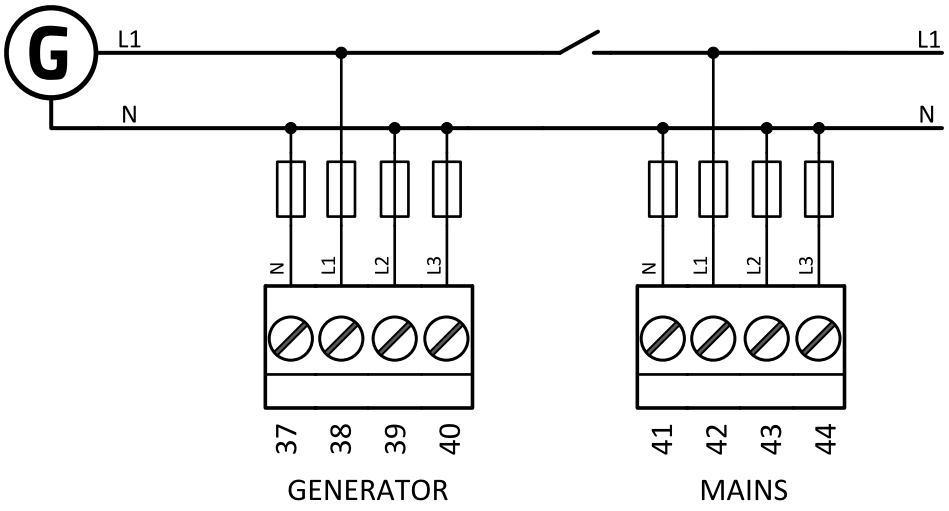



Image 4.12 Mono phase application

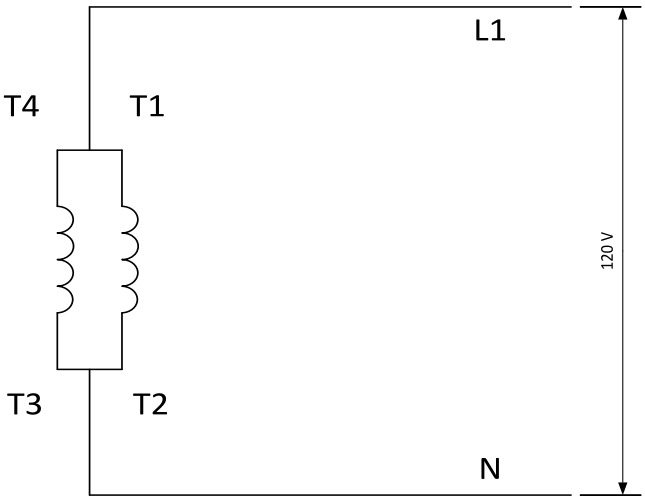



Image 4.13 Typical Mono Phase generator wiring

## Voltage measurement wiring - MINT

There are 4 voltage measurement Connection Type (setpoint **Connection type (page 259)** [3Ph4Wire / High Leg D / 3Ph3Wire / Split Ph / Mono Ph]) options, every type matches to corresponding generator connection type.

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

The generator protections are evaluated from different voltages based on **Connection type (page 259)** setting:

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

## ConnectionType: 3 Phase 4 Wires

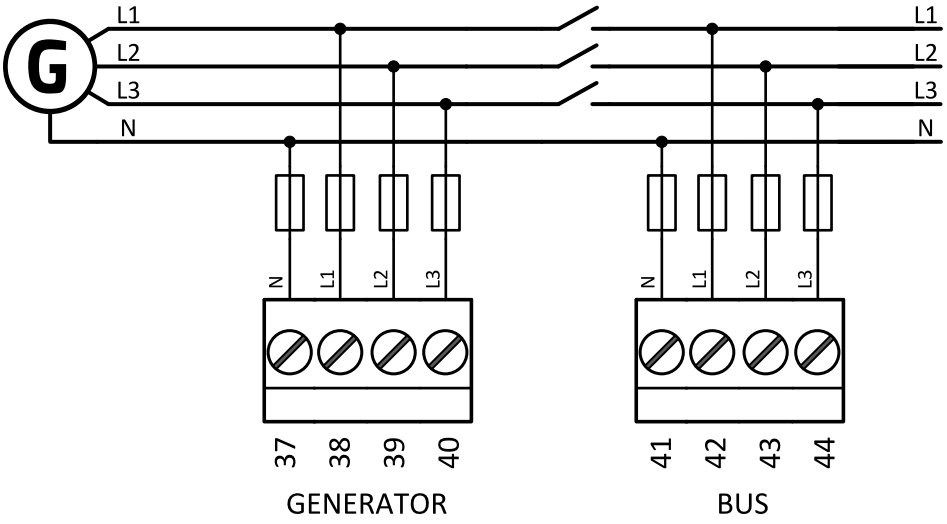



Image 4.14 3 phase application with neutral

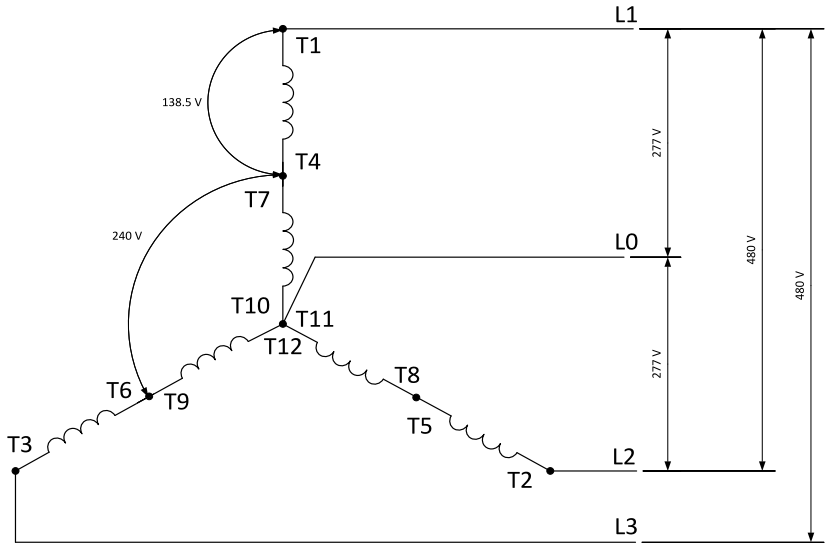



Image 4.15 Typical 3 Phase 4 Wires generator wiring

## ConnectionType: High Leg D

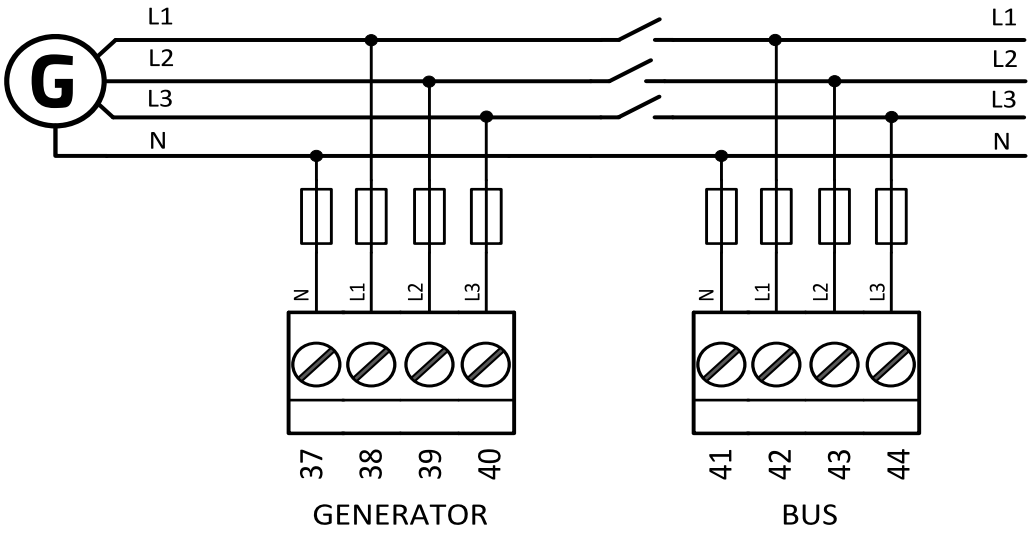



Image 4.16 High Leg Delta application

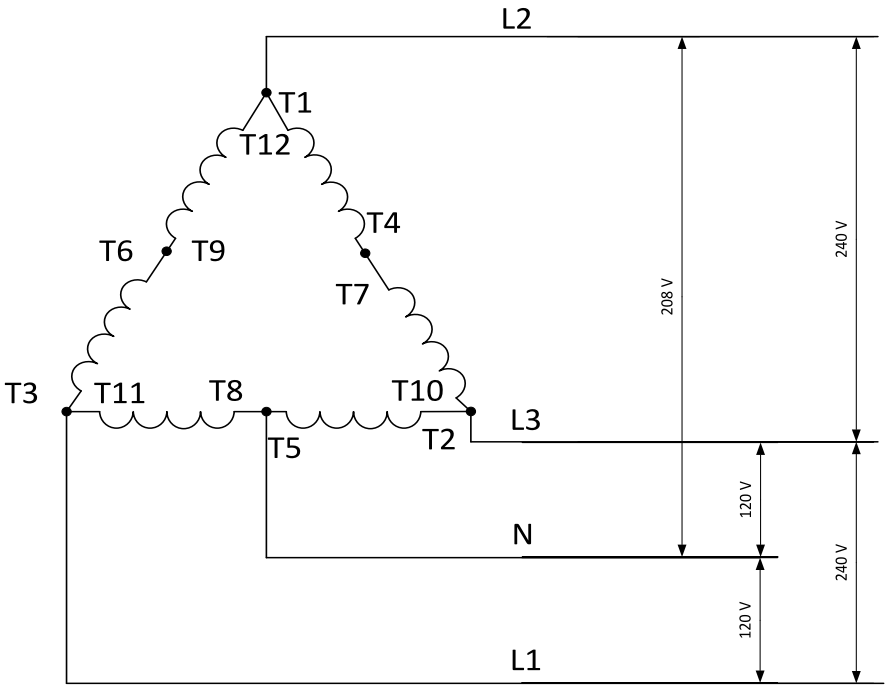



Image 4.17 Typical High Leg D generator wiring

### ConnectionType: 3 Phase 3 Wires

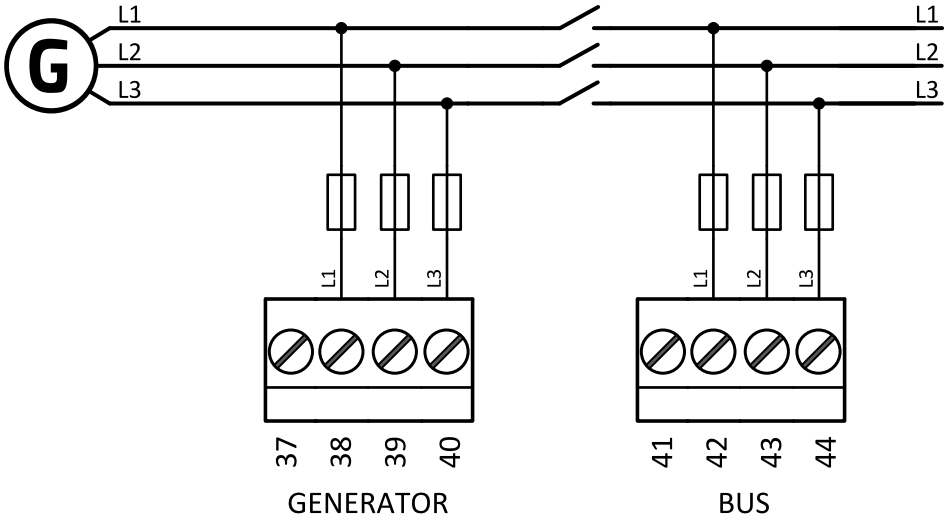



Image 4.18 3 phase application without neutral

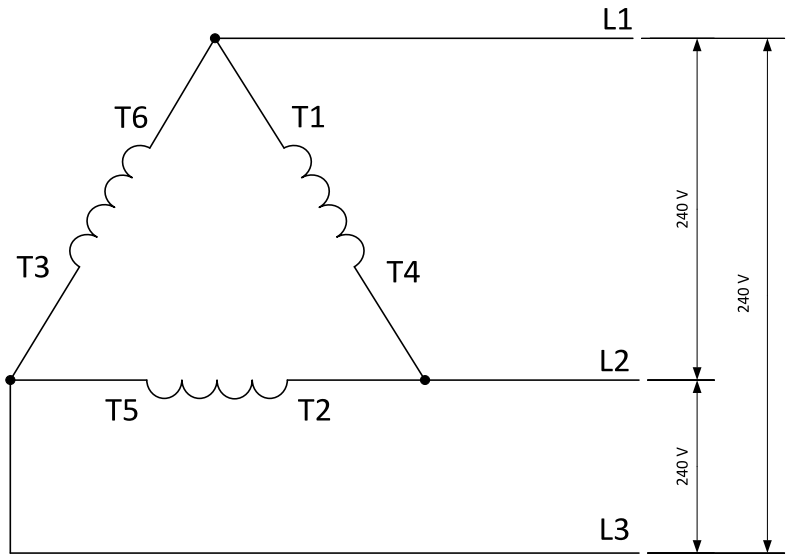



Image 4.19 Typical 3 Phase 3 Wires generator wiring

### ConnectionType: Split Phase

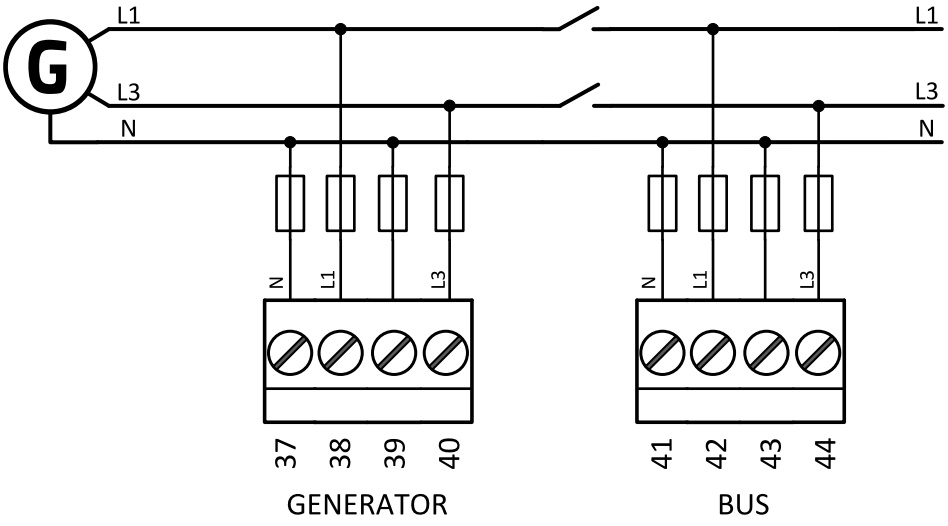
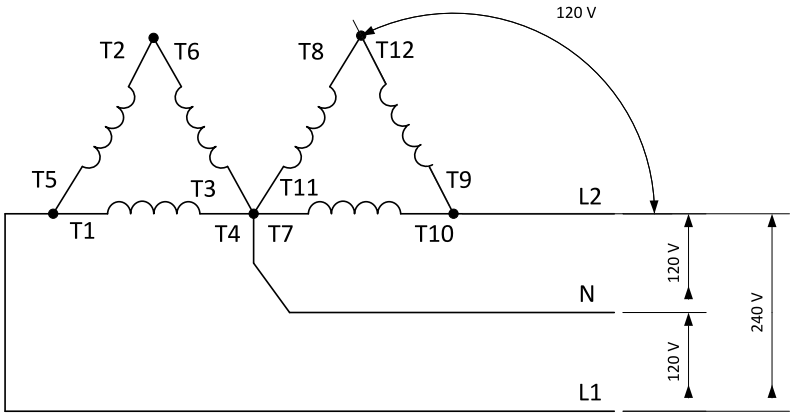



Image 4.20 Split phase application

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

DOUBLE DELTA Connection




ZIG ZAG (DOG LEG) Connection

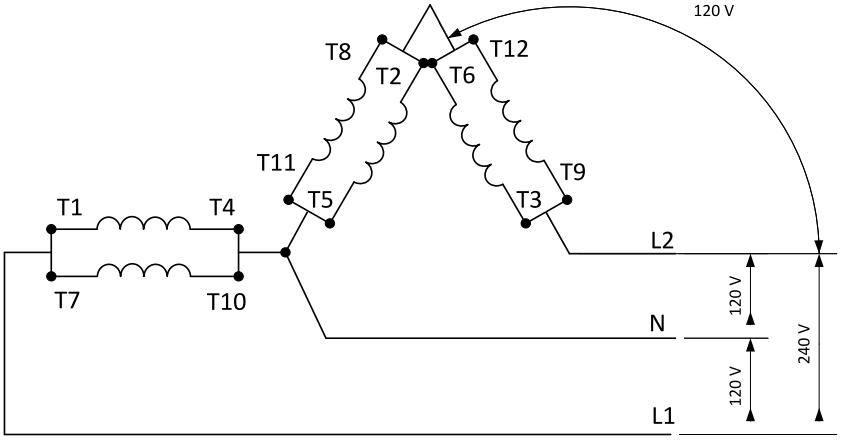



Image 4.21 Typical Split Phase generator wiring

ConnectionType: Mono Phase

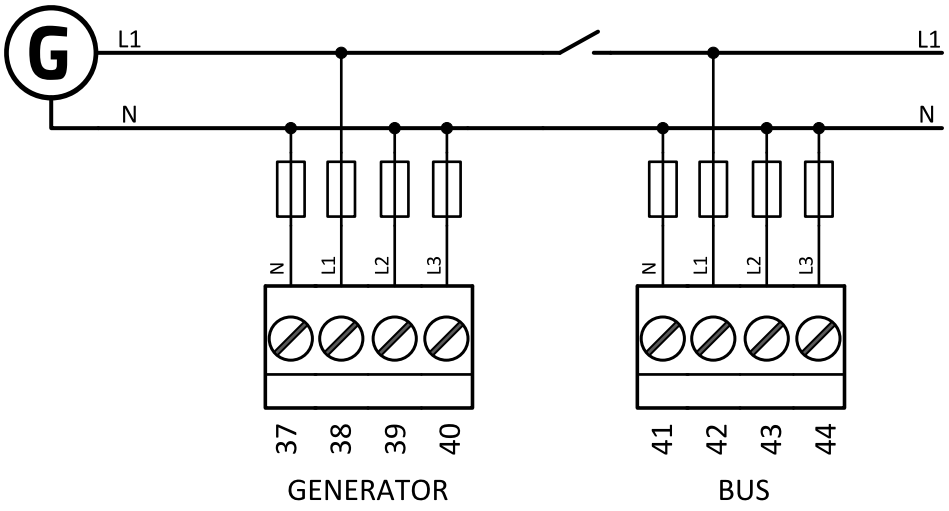



Image 4.22 Mono phase application

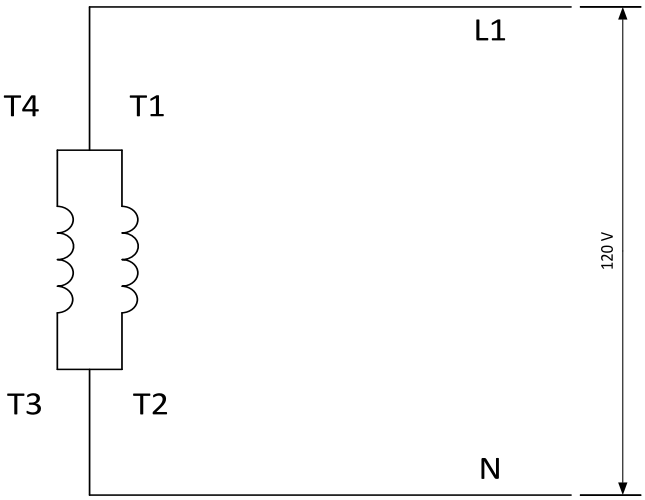


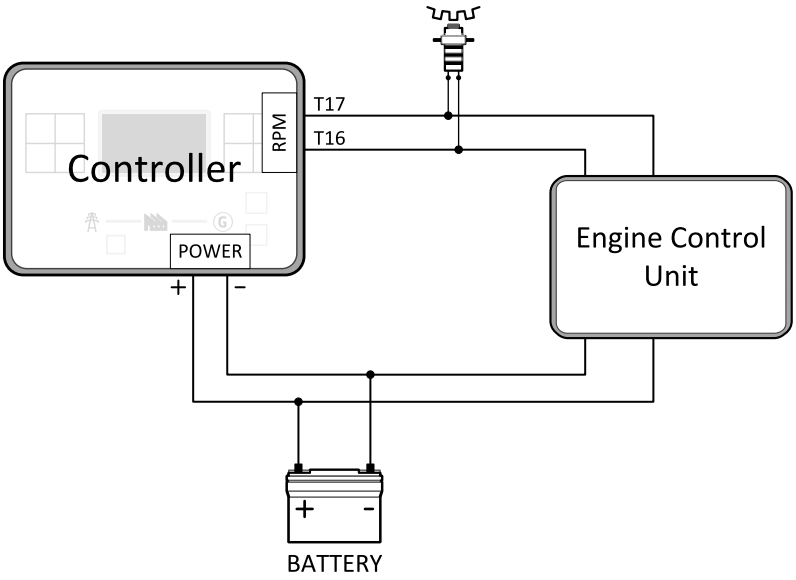

Image 4.23 Typical Mono Phase generator wiring

## 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 to the engine flywheel, connect the cable to the controller as shown on the picture below and adjust the setpoint **Gear Teeth (page 263)** according to the number of teeth on the flywheel.

For the details about the pick-up input parameters **see Technical data on page 232**

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




If engine will not start:

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

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

## 4.4.6 Binary inputs

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

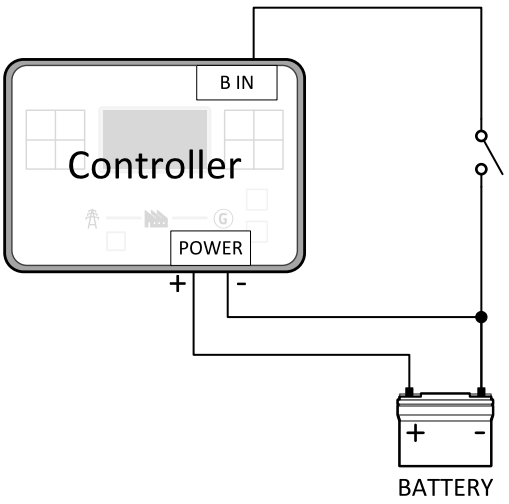


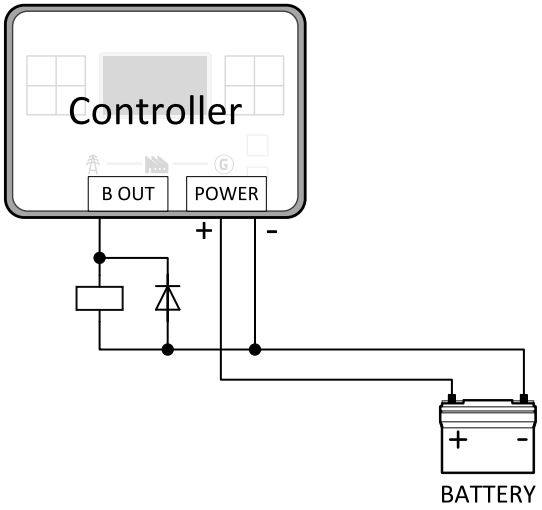

Image 4.24 Wiring binary inputs

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

## 4.4.7 Binary Outputs

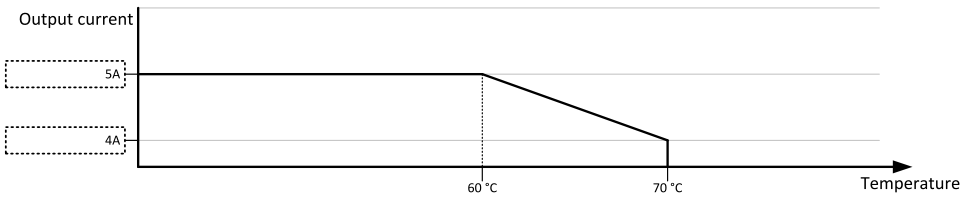
Use min. 1 $mm^2$ cables for wiring of binary outputs. Use external relays as indicated on the schematic below for all outputs except those where low-current loads are connected (signalization etc...).

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




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

**IMPORTANT: When operating temperature is higher than 60 °C it is strongly recommended to limit output current of high current binary outputs (terminal 5 and terminal 6) to 4 A (each).**



## 4.4.8 E-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 190**.

***Note:*** *This function has the same behavior as binary input* ***EMERGENCY STOP (PAGE 657)****.*

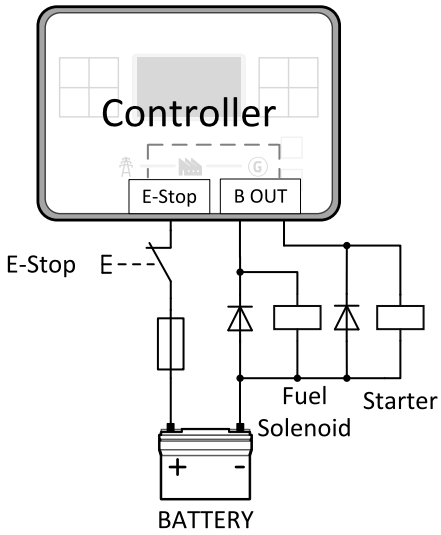



Image 4.25 E-Stop wiring

***Note:*** *Recommended fusing is 12 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+)*

**IMPORTANT: Suppression diodes are not indicated, but required.**

## 4.4.9 Emergency stop

The Emergency Stop function can be made in two ways:

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

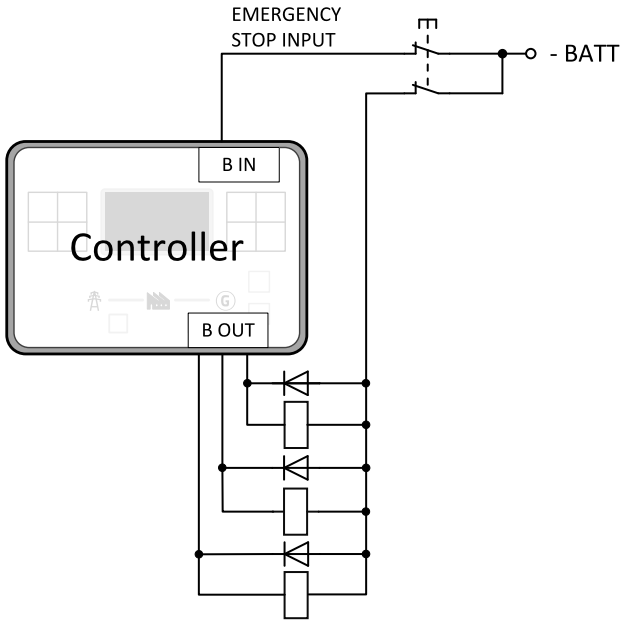



Image 4.26 Hard-wired emergency stop

**IMPORTANT: Suppression diodes are not indicated, but required.**

## 4.4.10 Analog inputs

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

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

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

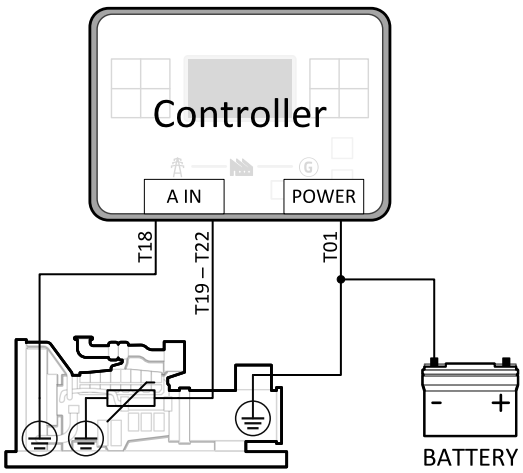



Image 4.27 Grounded sensors

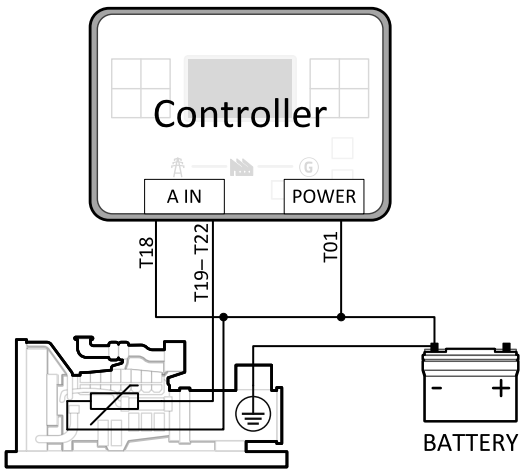



Image 4.28 Isolated sensors

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

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

## Analog inputs with voltage & current sensors

On each analog input, there is a possibility to connect voltage or current output sensor instead of resistive one. Recommended wiring connection for these measurements and recommended curves are bellow.

### Voltage sensors

| Sensor's output range (V) | R1 (Ω) | R2 (Ω) |
|---|---|---|
| 0 - 10 | 390 | 100 |
| 0 - 30 | 1500 | 100 |
| 0 - 70 | 3300 | 100 |

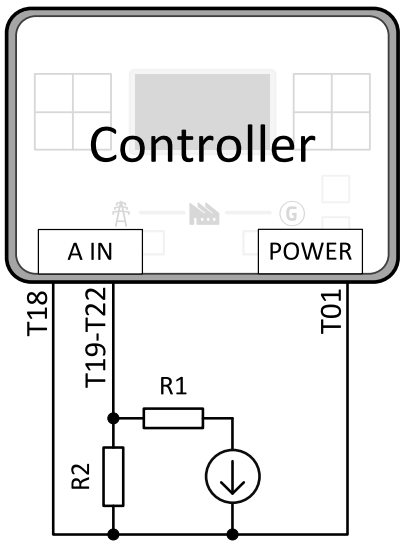



Image 4.29 Wiring of analog input with voltage sensor

| 0 - 10 V | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **V** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **Ω** | 80 | 98 | 119 | 143 | 172 | 208 | 251 | 306 | 378 | 474 | 611 |

| 0 - 30 V | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **V** | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 |
| **Ω** | 94 | 105 | 118 | 131 | 147 | 163 | 182 | 202 |
| **V** | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 |
| **Ω** | 226 | 252 | 282 | 317 | 358 | 405 | 463 | 533 |

| 0 - 70 V | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **V** | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 |
| **Ω** | 97 | 102 | 108 | 114 | 120 | 126 | 133 | 140 | 147 | 154 | 162 | 170 |
| **V** | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 |
| **Ω** | 179 | 188 | 198 | 208 | 219 | 231 | 243 | 256 | 269 | 284 | 300 | 316 |
| **V** | 48 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | 70 |
| **Ω** | 334 | 354 | 375 | 398 | 422 | 449 | 479 | 511 | 547 | 587 | 631 | 681 |

***Note:*** *This is a conversion of voltage from voltage sensor to appropriate resistance value. Use resistance values in InteliConfig to create your specific curve. These values should be used in "Ohm" column.*

## Current sensors

| Sensor's output range (mA) | R (Ω) |
|---|---|
| 0-20 | 100 |

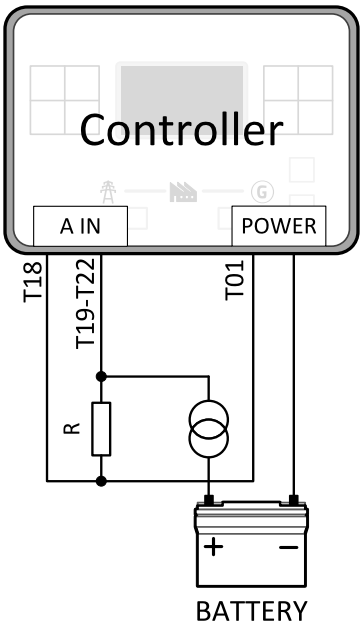



Image 4.30 Wiring of analog input with current sensor

| 0 - 22 mA | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **mA** | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| **Ω** | 100 | 110 | 120 | 130 | 141 | 154 | 168 | 182 | 198 | 216 | 235 | 256 |
| **mA** | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |
| **Ω** | 280 | 306 | 336 | 370 | 409 | 453 | 505 | 566 | 640 | 730 | 842 | |

***Note:*** *This is a conversion of current from current sensor to appropriate resistance value. Use resistance values in InteliConfig to create your specific curve. These values should be used in "Ohm" column.*

## 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).

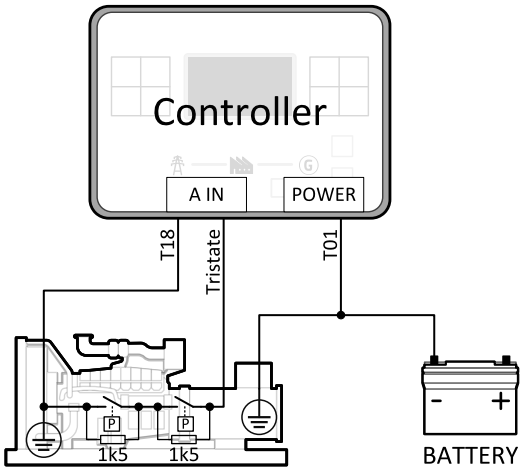



Image 4.31 Analog inputs as tristate

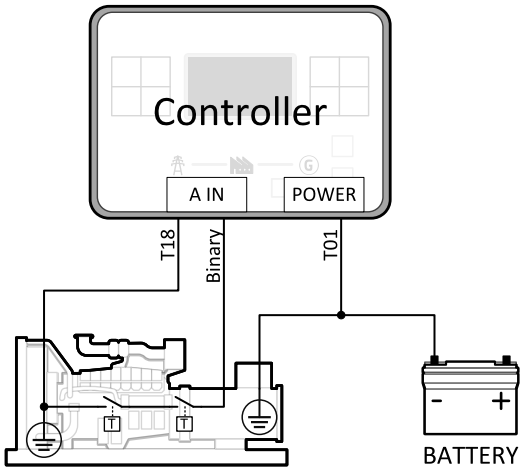



Image 4.32 Analog inputs as binary

***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.*

# 4.4.11 CAN bus and RS485 wiring

## CAN bus wiring

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

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

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

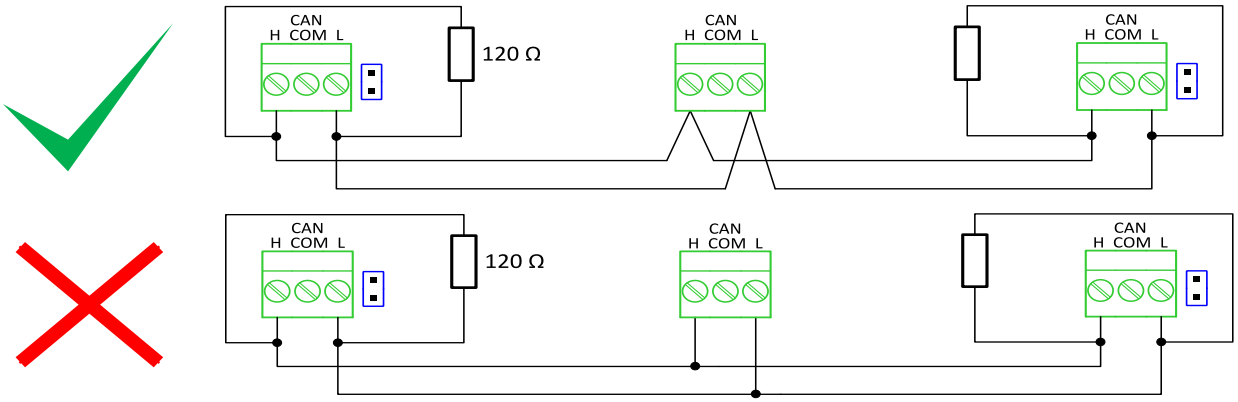



Image 4.33 CAN bus topology

- For shorter distances (connection within one building)

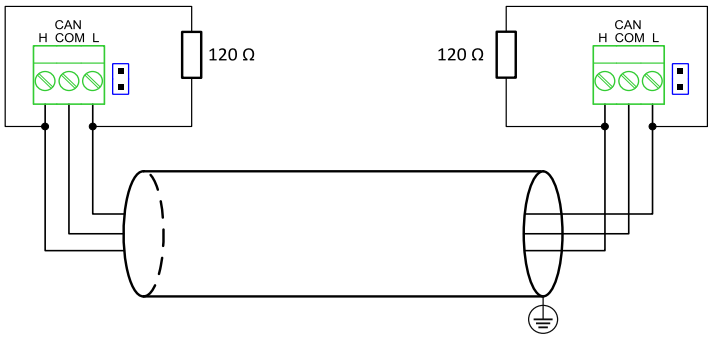



Image 4.34 CAN bus wiring for shorter distances

***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.)

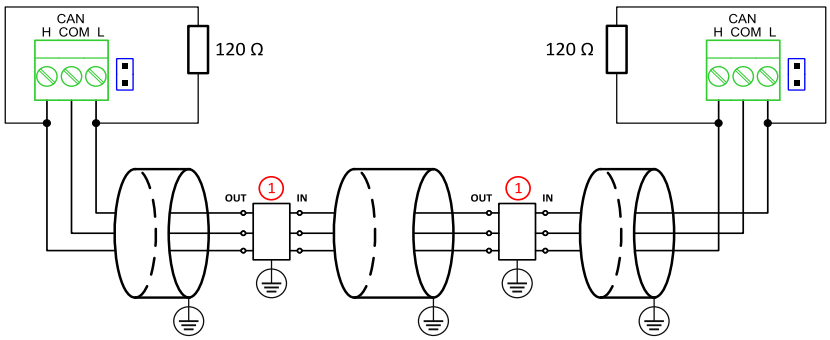



Image 4.35 CAN bus wiring for longer distances

① Recommended PT5-HF-12DC-ST[1]

## RS485 wiring

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

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

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

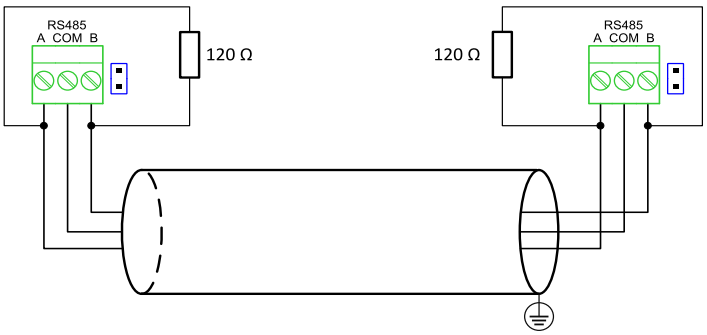



Image 4.36 RS485 wiring for shorter distances

[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.)

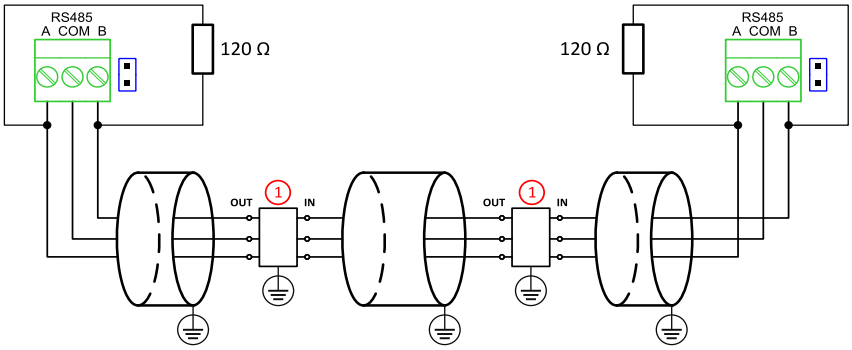



Image 4.37 RS485 wiring for longer distances

① Recommended PT5HF-5DC-ST[1]

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

## Balancing resistors

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

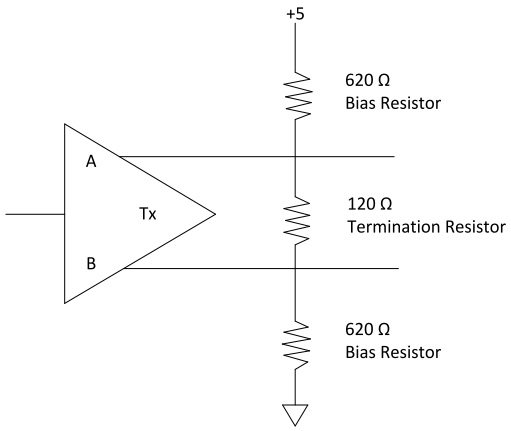



Image 4.38 Balancing resistors

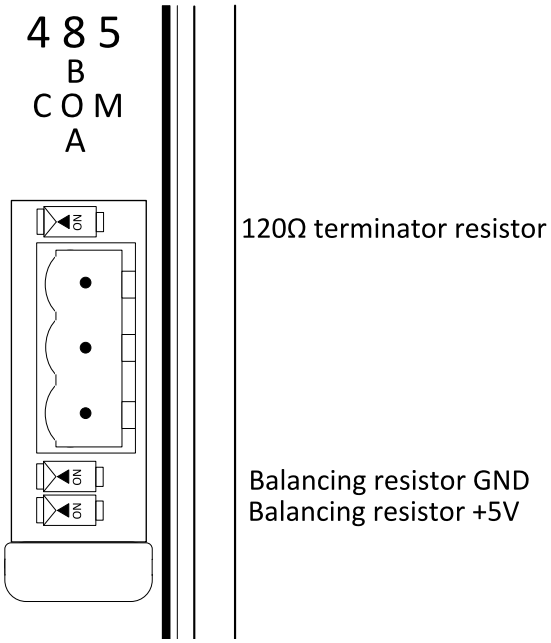



Image 4.39 RS485 on board

## 4.4.12 USB

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

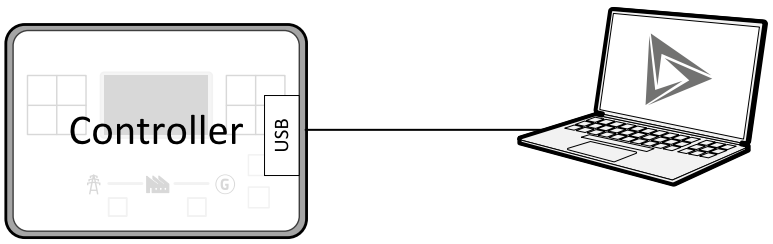



Image 4.40 USB connection

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

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

## 4.4.13 USB HOST

USB Flash Drive can be connected into USB A connector.

## 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

Pleas see chapter **Voltage control outputs (page 145)** (Analog output) for more information about set-up of controller's AVR.

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

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

## 4.4.15 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 +/-100mV.
  - Resolution/minimum step: 3 mV approx.

- Step response: less then 10 ms, measured between 10% and 90%.
- Output ripple: 30 mV max. at 50% of pwm.
- Galvanic insulation: NO

▶ 5 V PWM mode

- PWM amplitude: 5 V.
- PWM frequency: 500 to 2900 Hz defined by setpoint **Speed Governor PWM Rate (page 348)**
- Maximum load current: 20 mA both sourcing and sinking.
- PWM Resolution: 14 bit.
- Galvanic insulation: NO

Pleas see chapter **Speed control outputs (page 143)** (Analog output) for more information about set-up of controller's Speed governor.

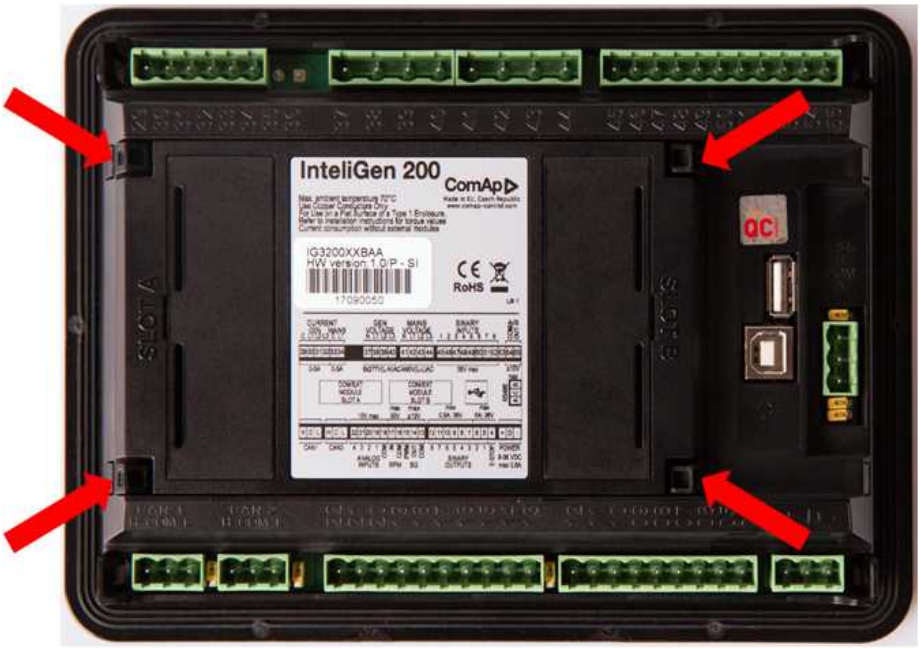
***Note:*** *For the connection of individual speed governors please refer to concrete speed governor manual.*

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

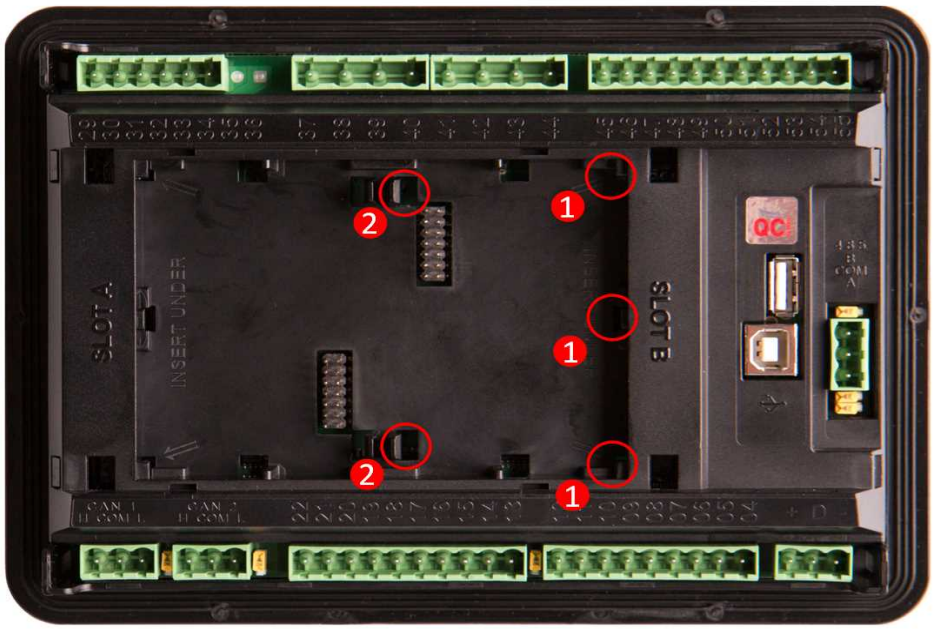
# 4.5 Plug-in module installation

## 4.5.1 Installation

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



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




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




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

# 4.6 Maintenance

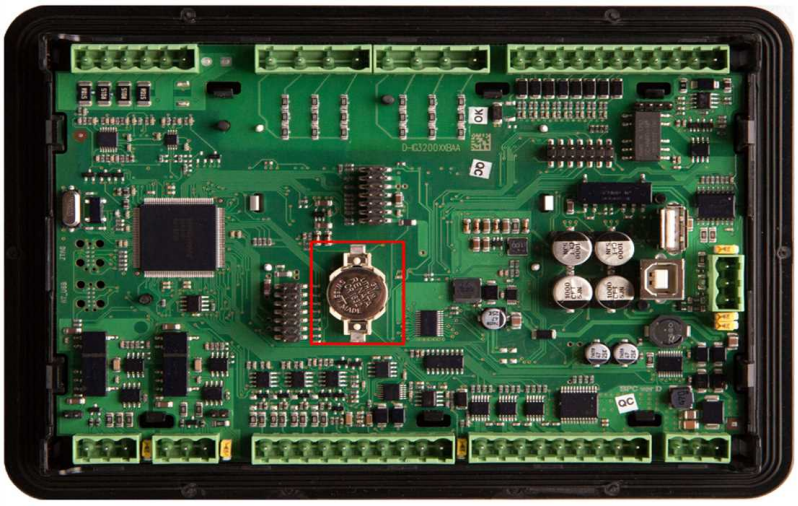
## 4.6.1 Backup battery replacement

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

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



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



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

**back to Installation and wiring**

# 5 Controller setup

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5.2 Controller configuration and PC tools connection ..... 62
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5.4 Remote Display ..... 94
5.5 Functions ..... 99

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## 5.1 Default configuration

### 5.1.1 Default configuration

#### Binary inputs

| Number | Description | Configured function |
|---|---|---|
| **BIN1** | Generator circuit breaker feedback | **GCB FEEDBACK (PAGE 660)** |
| **BIN2** | Mains circuit breaker feedback | **MCB FEEDBACK (PAGE 664)** |
| **BIN3** | Emergency stop button | **EMERGENCY STOP (PAGE 657)** |
| **BIN4** | Access lock keyswitch | **ACCESS LOCK (PAGE 634)** |
| **BIN5** | Switch controller to OFF mode | **REMOTE OFF (PAGE 668)** |
| **BIN6** | Switch controller to TEST mode | **REMOTE TEST (PAGE 670)** |
| **BIN7** | Suppression of alarms | **SD OVERRIDE (PAGE 672)** |
| **BIN8** | Free slot | **NOT USED (PAGE 665)** |

#### Binary outputs

| Number | Description | Function |
|---|---|---|
| **BOUT1** | Starter motor control | **STARTER (PAGE 735)** |
| **BOUT2** | Fuel solenoid valve | **FUEL SOLENOID (PAGE 709)** |
| **BOUT3** | Indication of breaker state | **GCB CLOSE/OPEN (PAGE 711)** |
| **BOUT4** | Indication of breaker state | **MCB CLOSE/OPEN (PAGE 722)** |
| **BOUT5** | Activation of any devices before start | **PRESTART (PAGE 729)** |
| **BOUT6** | Gen-set can be connected to load | **READY TO LOAD (PAGE 731)** |
| **BOUT7** | Indication of unconfirmed alarm | **ALARM (PAGE 688)** |
| **BOUT8** | Free slot | **NOT USED (PAGE 728)** |

### Analog inputs

| Number | Configured sensor | Function |
|---|---|---|
| **AIN1** | VDO 10 Bar | OIL PRESSURE (PAGE 772) |
| **AIN2** | VDO40-120°C | COOLANT TEMP (PAGE 769) |
| **AIN3** | VDOLevel % | FUEL LEVEL (PAGE 770) |
| **AIN4** | None | NOT USED (PAGE 771) |

# 5.2 Controller configuration and PC tools connection

5.2.1 USB ..... 62
5.2.2 RS232/RS485 ..... 63
5.2.3 Ethernet ..... 64

back to Controller setup

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

## 5.2.1 USB

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

### Connection using InteliConfig

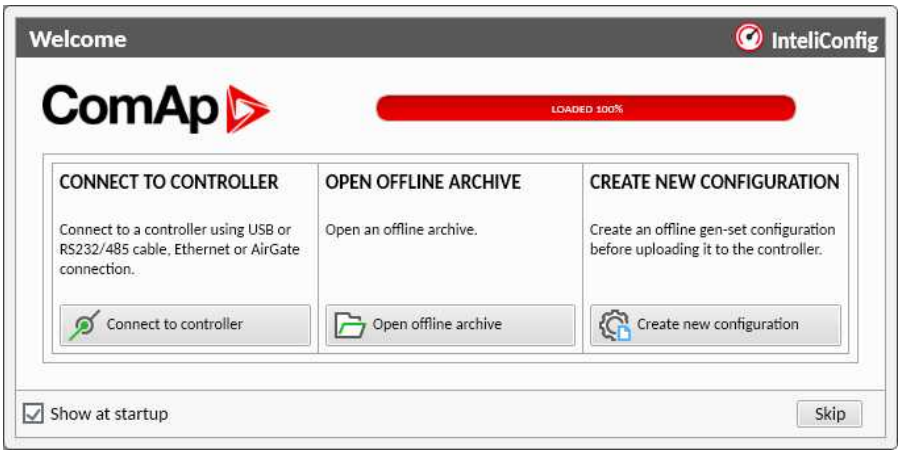



Image 5.1 First screen of InteliConfig - select connect to controller




Image 5.2 Second screen of InteliConfig - select detected controllers

## Connection using WinScope

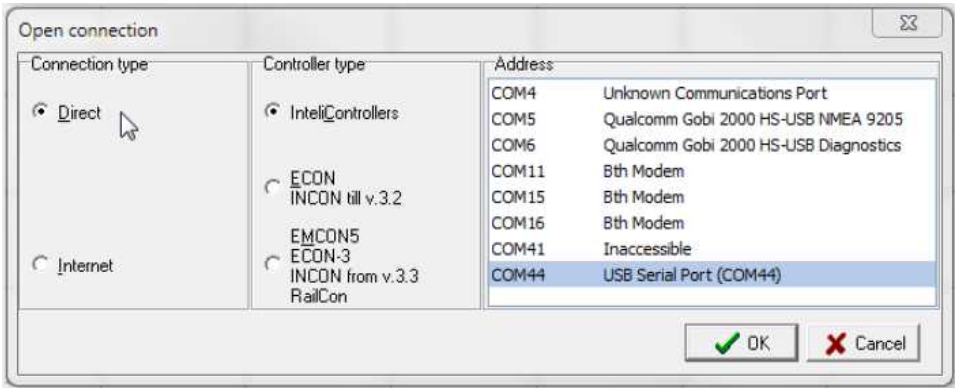



Image 5.3 WinScope screen - select direct connection

## 5.2.2 RS232/RS485

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

- **COM1 Mode (page 468)** = Direct
- **Controller Address (page 267)** has to be set to the same value as in the PC tool

## Connection using InteliConfig

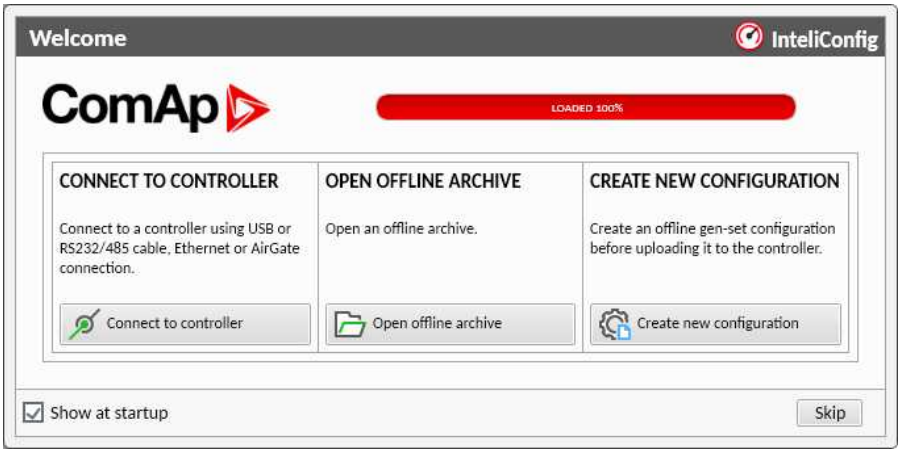



Image 5.4 First screen of InteliConfig - select connect to controller

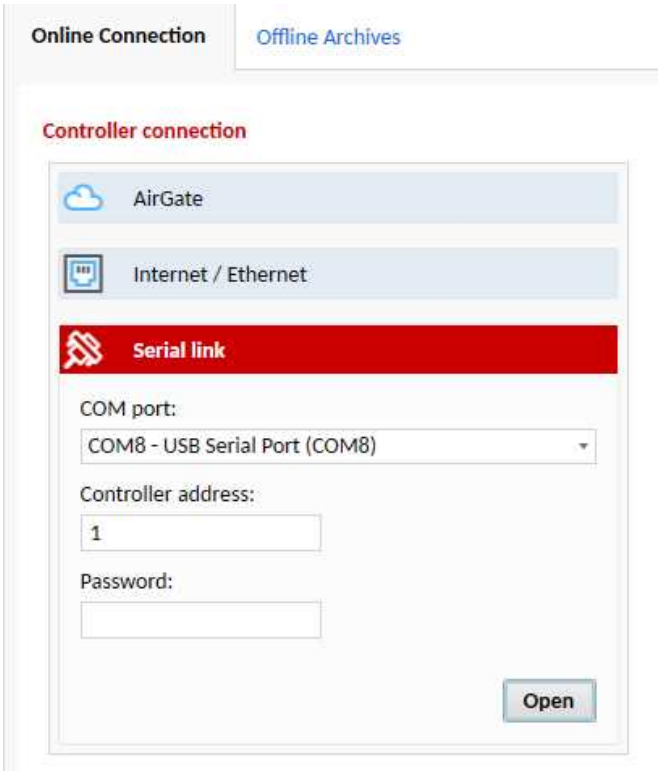



Image 5.5 Second screen of InteliConfig - select Serial link

## Connection using WinScope

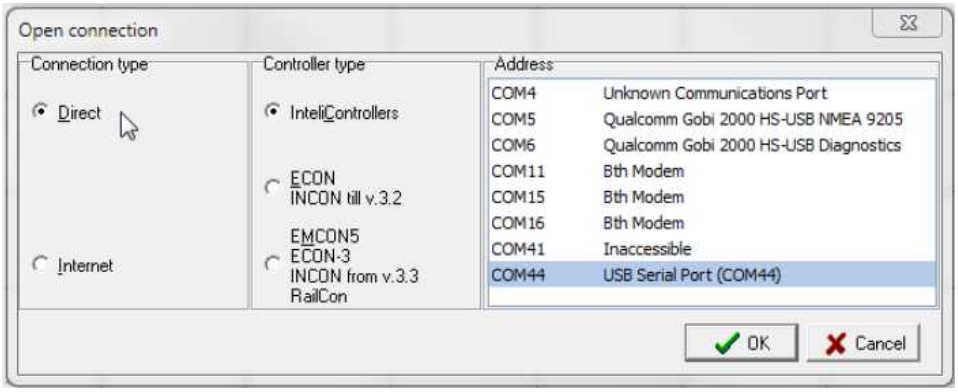



Image 5.6 WinScope screen - select direct connection

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

# 5.2.3 Ethernet

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

## Direct connection

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

- **Controller Address (page 267)** has to be set to the same value as in the PC tool.
- **IP Address Mode (page 501)** can be set to AUTOMATIC when there is DHCP service is available. Otherwise it needs to be set to FIXED.
- **IP Address (page 501)** is either set automatically or it can be adjusted to a specific requested value.
- **Subnet Mask (page 502)** is either set automatically or it can be adjusted to a specific requested.
- **Gateway IP (page 502)** can be set here when it is used.
- **ComAp TCP Port (page 507)** number is 23. Make sure that this port is open for communication in your network.

## Connection using InteliConfig

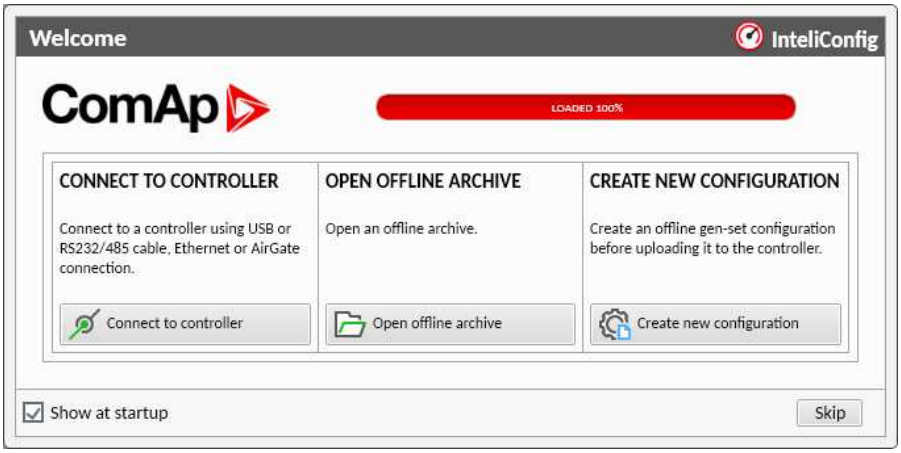



Image 5.7 First screen of InteliConfig - select connect to controller

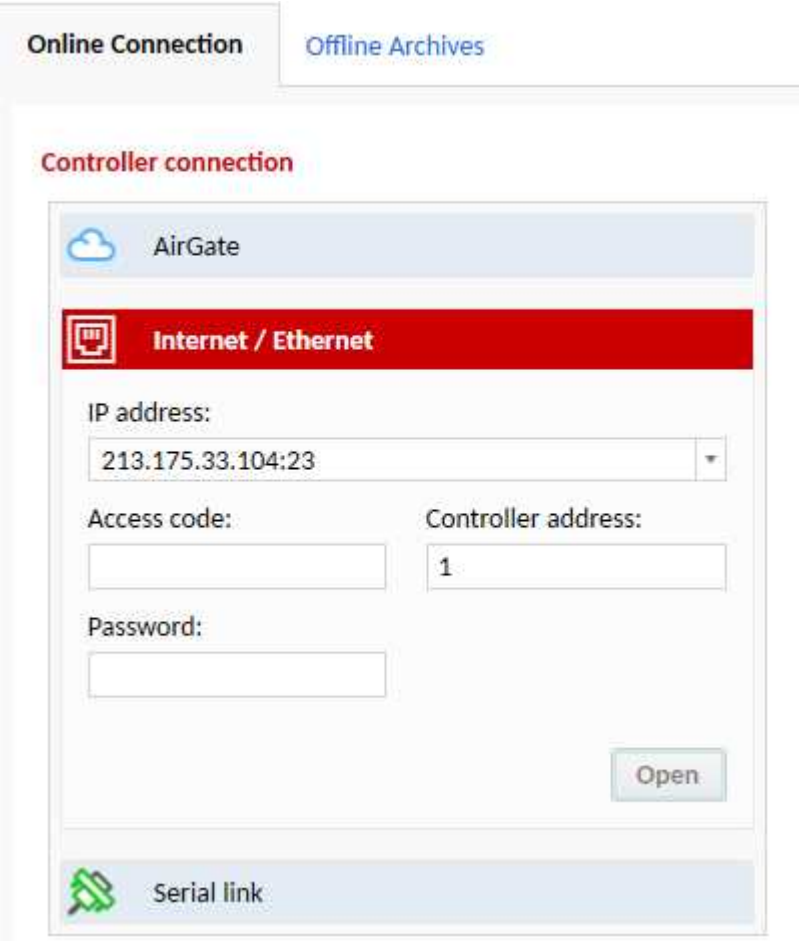



Image 5.8 Second screen of InteliConfig - select Internet/Ethernet

### Connection using WinScope

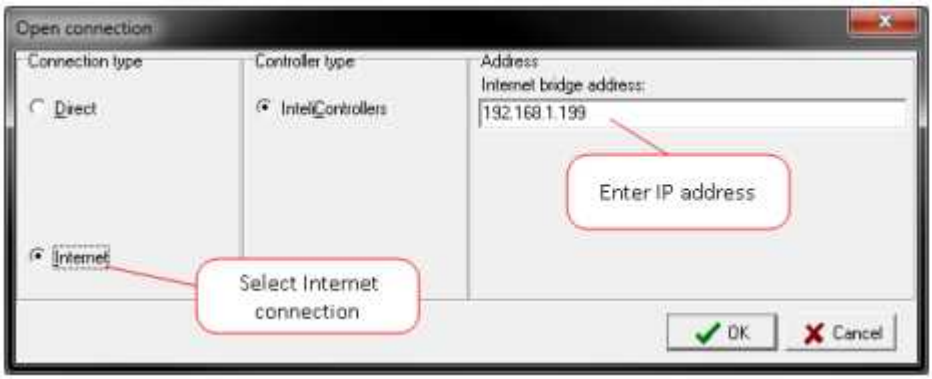



Image 5.9 WinScope screen

## AirGate connection

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

- **Controller Address (page 267)** has to be set to the same value as in the PC tool.
- **IP Address Mode (page 501)** can be set to AUTOMATIC when there is DHCP service is available. Otherwise it needs to be set to FIXED.
- **IP Address (page 501)** is either set automatically or it can be adjusted to a specific requested value.
- **Subnet Mask (page 502)** is either set automatically or it can be adjusted to a specific requested.
- **Gateway IP (page 502)** can be set here when it is used.
- **AirGate Connection (page 506)** has to be set to Enabled.
- **AirGate Address (page 507)** currently there is one AirGate server running at URL airgate.comap.cz (enter this URL into the setpoint).

## Connection using InteliConfig

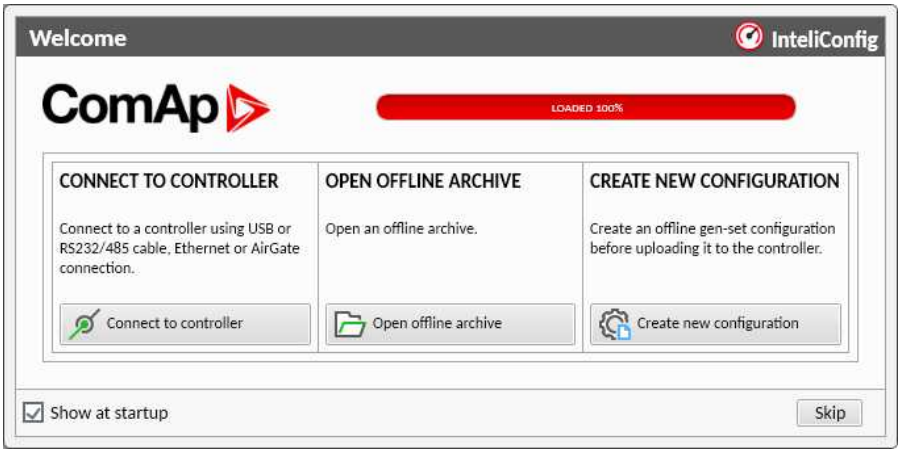



Image 5.10 First screen of InteliConfig - select connect to controller

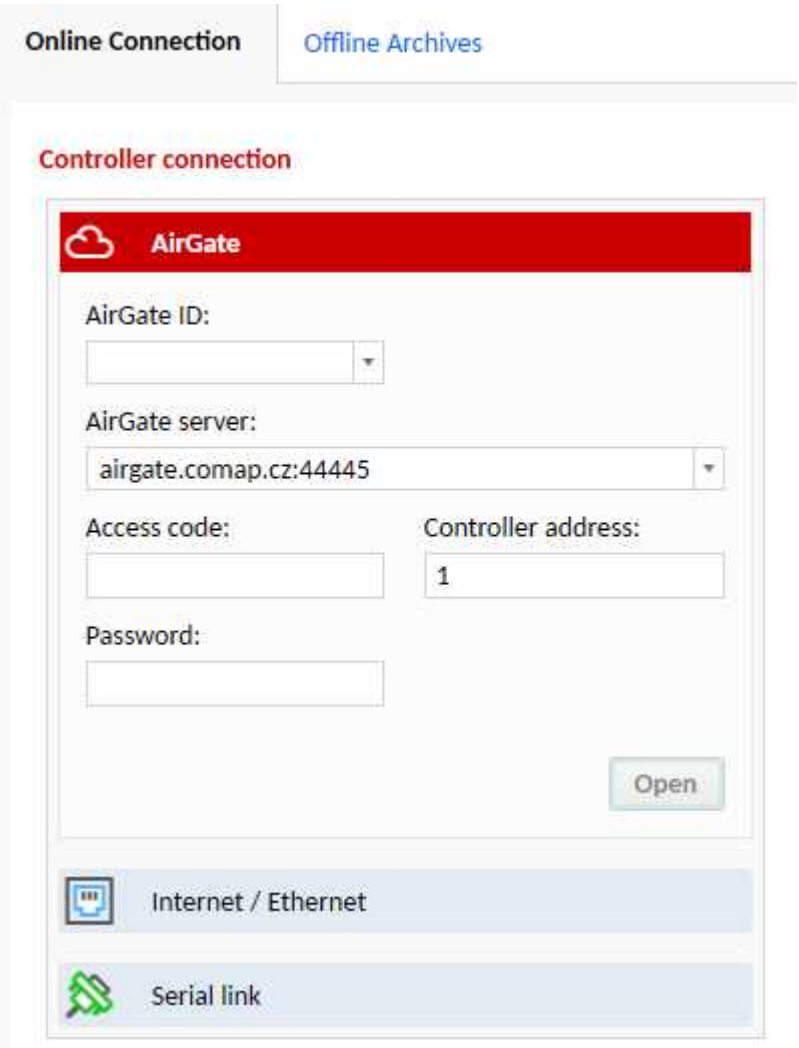



Image 5.11 Second screen of InteliConfig - select AirGate

### Connection using WinScope

WinScope doesn't support connection via AirGate.

# 5.3 Operator Guide


5.3.1 Front panel elements ..... 69
5.3.2 Display screens and pages structure ..... 71
5.3.3 Browsing alarms ..... 85
5.3.4 Password ..... 86
5.3.5 Information screen ..... 92
5.3.6 Language selection ..... 93
5.3.7 Display contrast adjustment ..... 94


## 5.3.1 Front panel elements

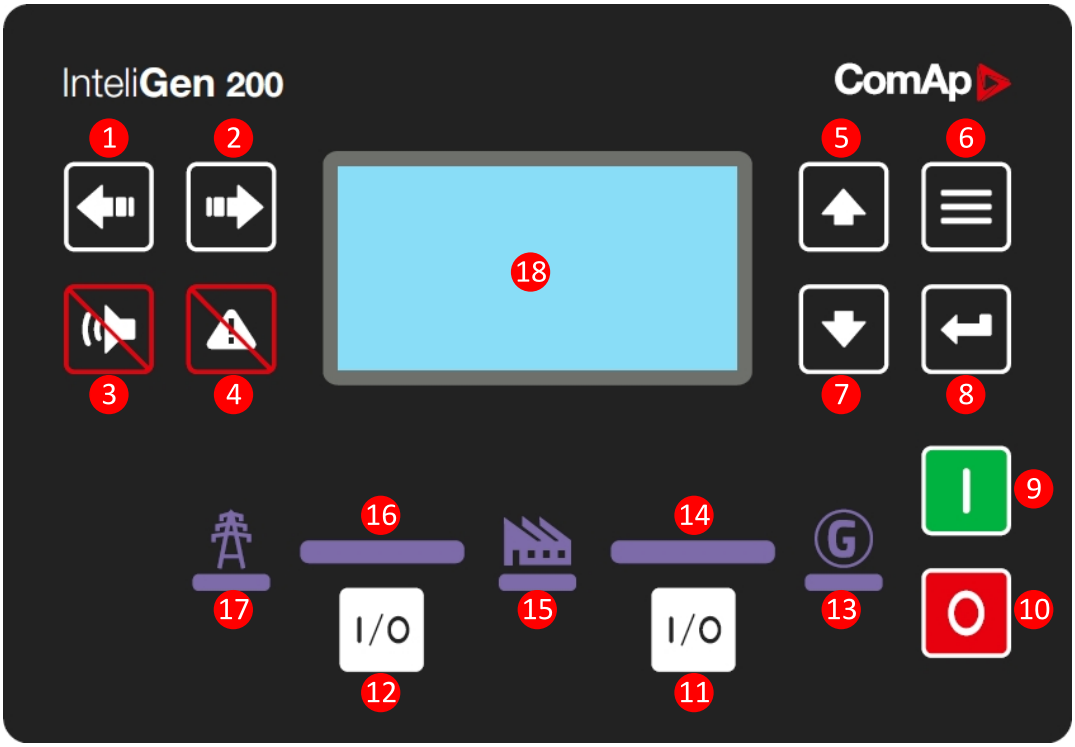



Image 5.12 Operator interface of InteliGen 200

| 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.<br>***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.<br>***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. |
| 11 |  | **GCB** button. Works in MAN and TEST modes only. Press this button to open or close the GCB or start synchronization manually. |
| 12 |  | **MCB** button. Works in MAN and TEST modes only. Press this button to open or close the MCB or start the reverse synchronization manually. |

| Indicators and others | |
|---|---|
| **Position** | **Description** |
| 13 | **GENERATOR** status indicator. There are two states - Gen-set OK (indicator is green) and Gen-set failure (indicator is red). Green LED is on if the generator voltage is present and within limits. Red LED starts flashing when gen-set failure occurs. After FAULT RESET button is pressed, goes to steady light (if an alarm is still active) or is off (if no alarm is active). |
| 14 | **GCB ON**. Green LEDs are on if GCB is closed and Gen-set is healthy. If Gen-set is not healthy and GCB is closed than middle LED is on. It is driven by GCB CLOSE/OPEN output or by GCB feedback signal. |
| 15 | **LOAD**. Green LED is ON if load is supplied by mains or by generator. It means, that Gen-set or mains is OK and proper circuit breaker is closed. |
| 16 | **MCB ON**. Green LEDs are on if MCB is closed and Mains is healthy. If Mains is not healthy and MCB is closed than middle LED is on. It is driven by MCB CLOSE/OPEN output or by MCB feedback signal. |
| 17 | **MAINS** status indicator. There are two states - Mains OK (indicator is green) and Mains failure (indicator is red). Green LED is on, if mains is present and within limits. Red LED starts blinking when the mains failure is detected and after the gen-set has started and connected to the load it lights permanently until the mains failure disappears. |
| 18 | Graphic B/W display, 132x64 pixels. |

## 5.3.2 Display screens and pages structure

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

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

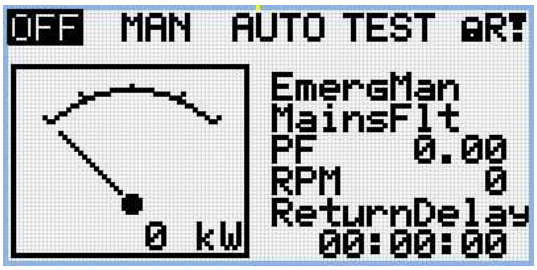
### Main Screen

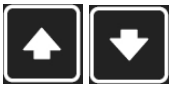


### Symbols

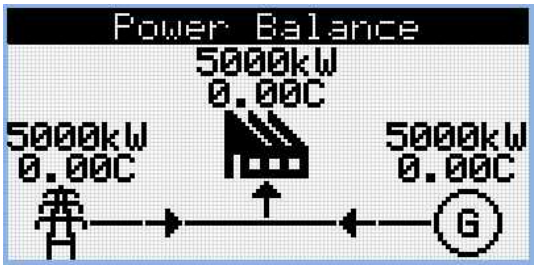
- Padlock - active when LBI ACCESS LOCK is active
- R - active when there is active remote connection to controller
- Exclamation mark - active when there is any alarm in alarmlist

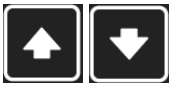
## Measurement Screens



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

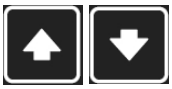


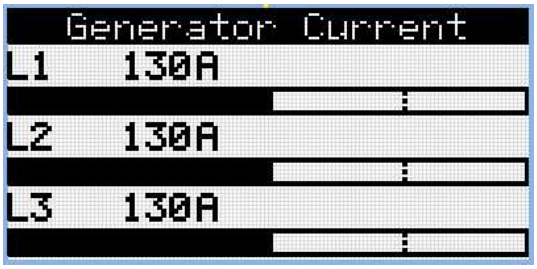
***Note:*** *Use Up and Down button to move between measurement pages.*

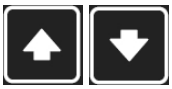
***Note:*** *Only for SPtM application*



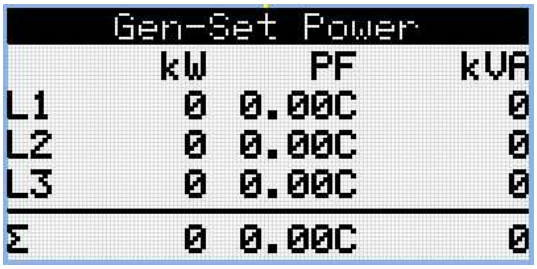



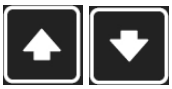
***Note:*** *Use Up and Down button to move between measurement pages.*



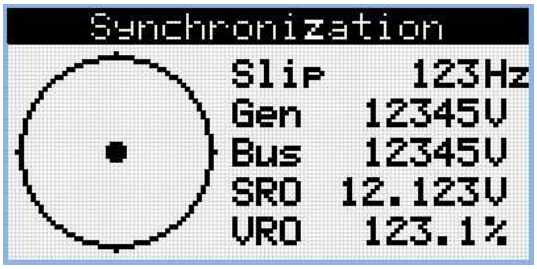



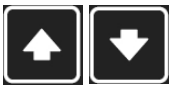
***Note:*** *Use Up and Down button to move between measurement pages.*



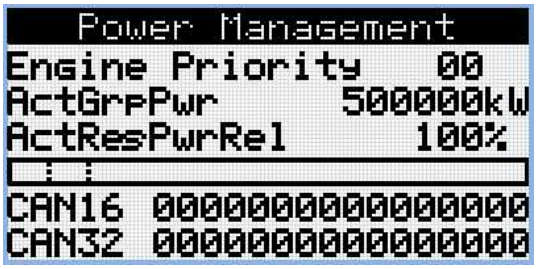



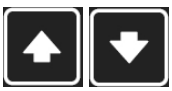
***Note:*** *Use Up and Down button to move between measurement pages.*



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

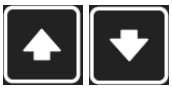


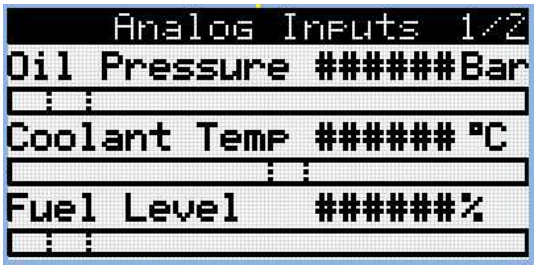
***Note:*** *Use Up and Down button to move between measurement pages.*

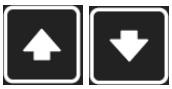
***Note:*** *Only for MINT application*



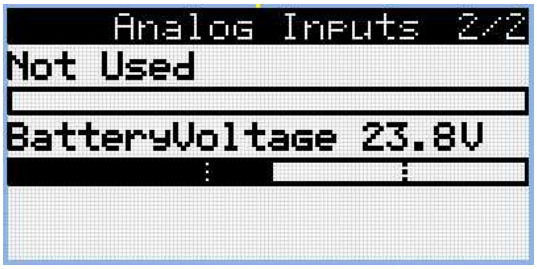



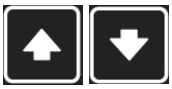
***Note:*** *Use Up and Down button to move between measurement pages.*



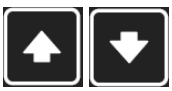
***Note:*** *Use Up and Down button to move between measurement pages.*



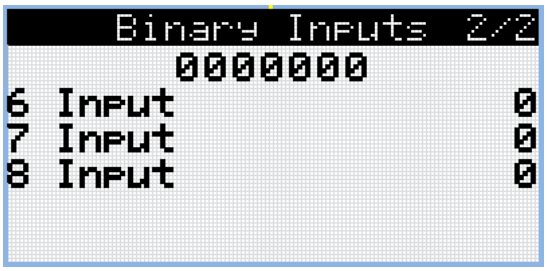



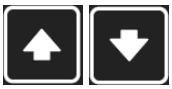
***Note:*** *Use Up and Down button to move between measurement pages.*



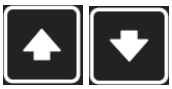
***Note:*** *Use Up and Down button to move between measurement pages.*



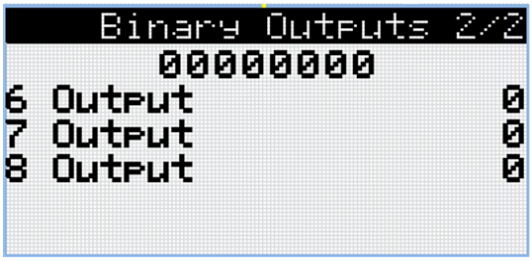



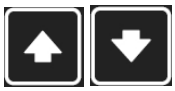
***Note:*** *Use Up and Down button to move between measurement pages.*



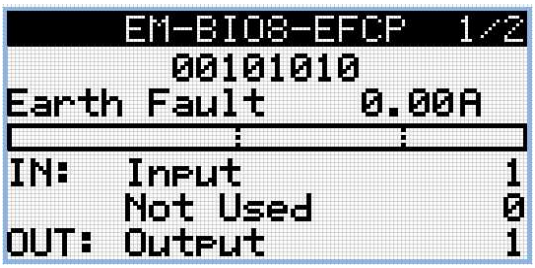



***Note:*** *Use Up and Down button to move between measurement pages.*



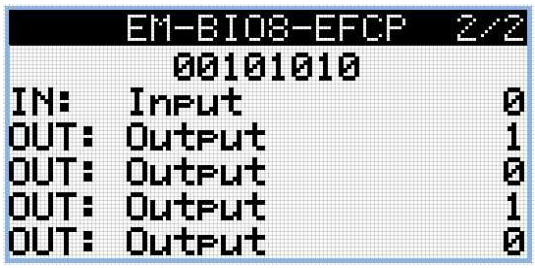
***Note:*** *Use Up and Down button to move between measurement pages.*






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

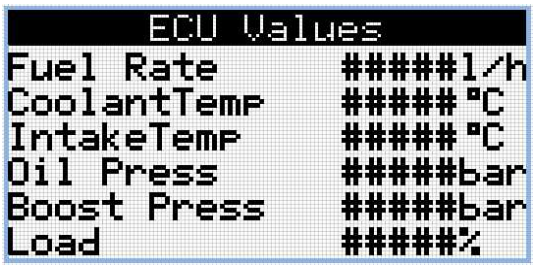
***Note:*** *Available only with plug-in module*

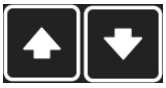




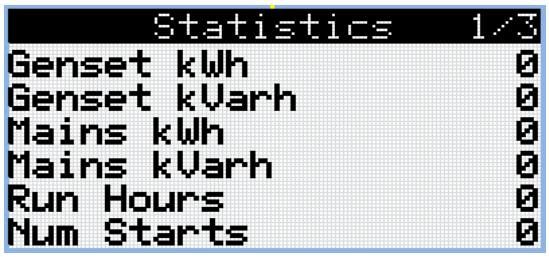

***Note:*** *Use Up and Down button to move between measurement pages.*

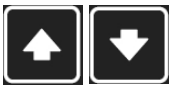
***Note:*** *Available only with plug-in module*



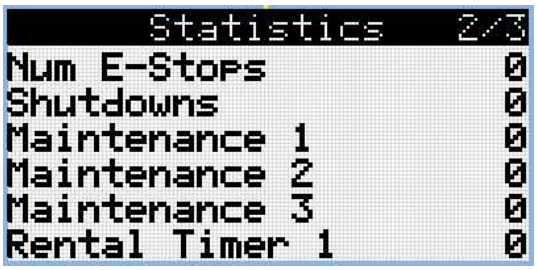



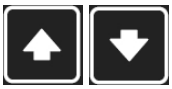
***Note:*** *Use Up and Down button to move between measurement pages.*



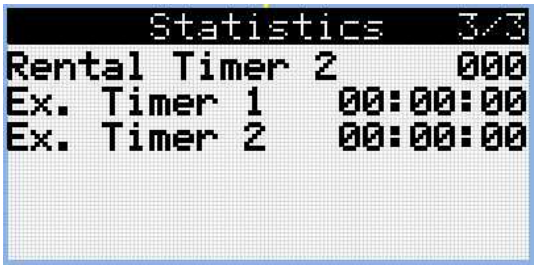



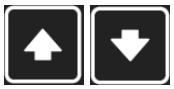
***Note:*** *Use Up and Down button to move between measurement pages.*



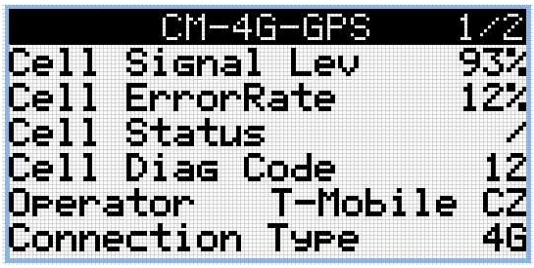



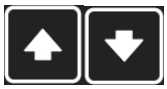
***Note:*** *Use Up and Down button to move between measurement pages.*



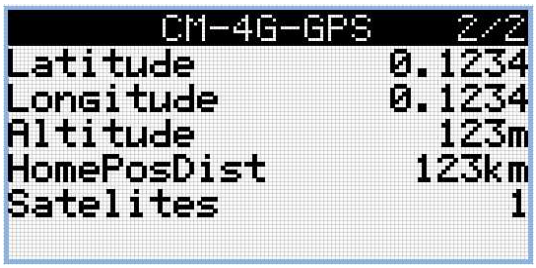
***Note:*** *Use Up and Down button to move between measurement pages.*

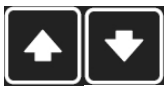


***Note:*** *Use Up and Down button to move between measurement pages.*

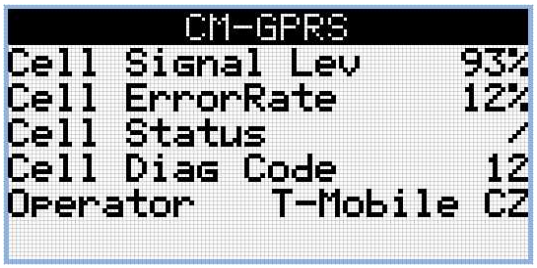
***Note:*** *Available only with plug-in module*



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

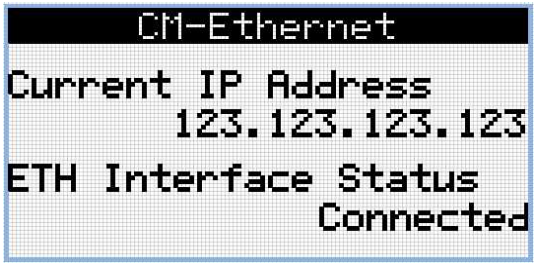
***Note:*** *Available only with plug-in module*

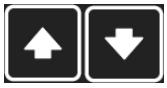





***Note:*** *Use Up and Down button to move between measurement pages.*

***Note:*** *Available only with plug-in module*

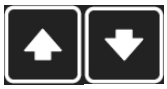


***Note:*** *Use Up and Down button to move between measurement pages.*

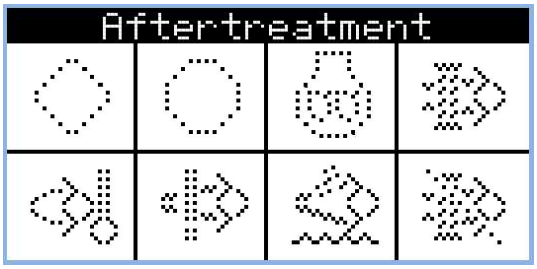
***Note:*** *Available only with plug-in module*



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

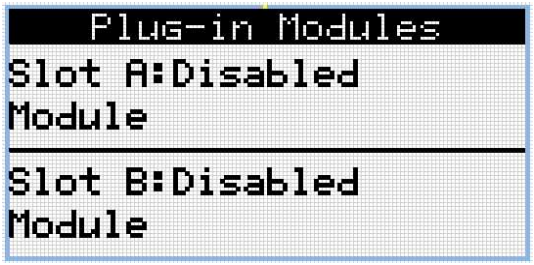
***Note:*** *Available only with plug-in module*

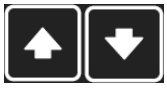





**Note:** *Use Up and Down button to move between measurement pages.*

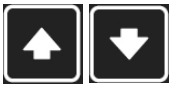
**Note:** *Available only with ECU supported by TIER4F*



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



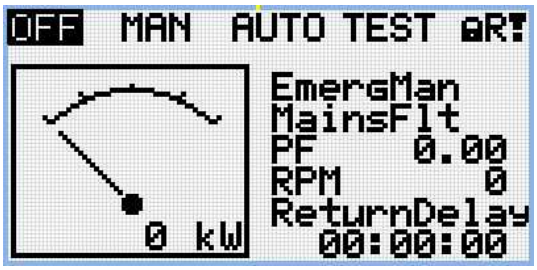



**Note:** *Use Up and Down button to move between measurement pages.*

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

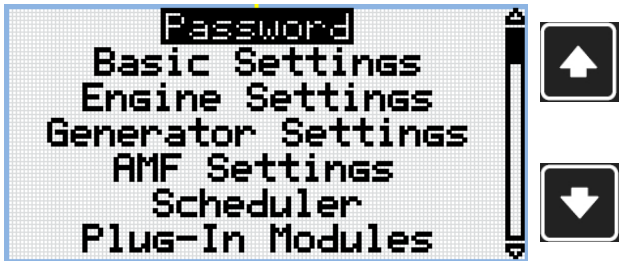
**Note:** *There can be some additional screens and also some screens can be hidden. Screen's visibility depends on actual configuration (usage of extension or communication modules, ECU, etc.).*

## Setpoint Screens





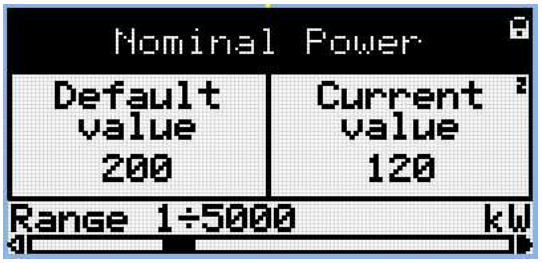

***Note:*** *From all measurement pages we can fluently go to the setpoint group page by pressing Page button.*

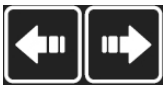



***Note:*** *Use Up and Down button to select required setpoint group.*



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

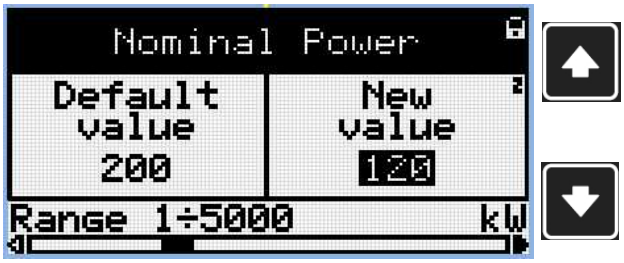


***Note:*** *Use Left and Right button to select required setpoint.*



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




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



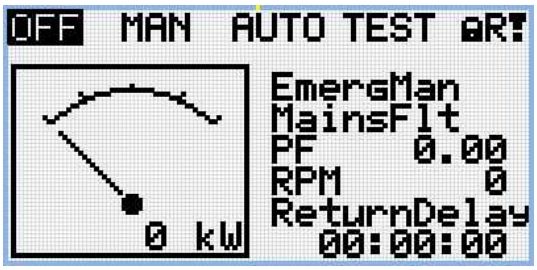
***Note:*** *Use Enter button to confirm adjusted value of setpoint.*



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

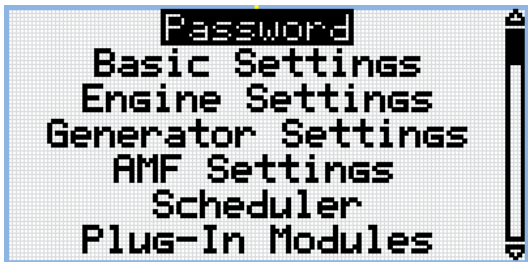
**IMPORTANT: Cannot change setpoint? Setpoints marked with an padlock are password protected. Enter password as described in the chapter** **Password (page 86)****.**

## History Log






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



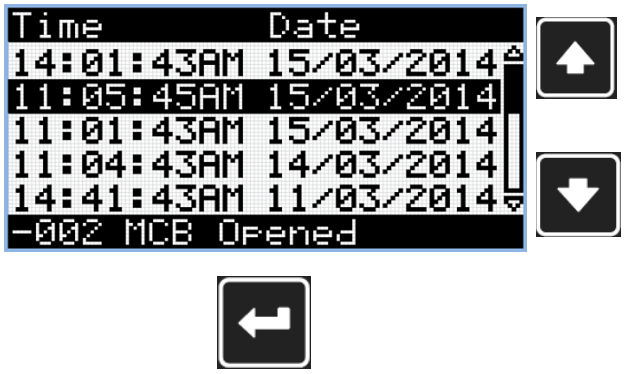



***Note:*** *From setpoint group page we can fluently go to the history log pages by pressing Page button.*




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

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




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

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



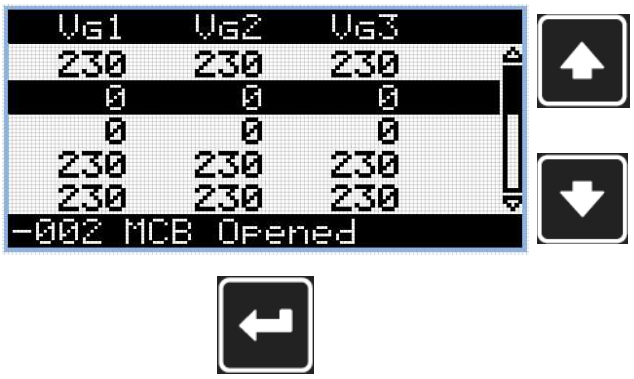

***Note:*** *Use Up and Down button to select required alarm reason.*

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



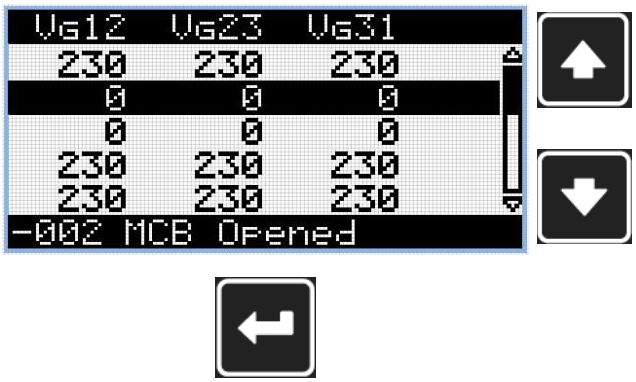

***Note:*** *Use Up and Down button to select required alarm reason.*

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



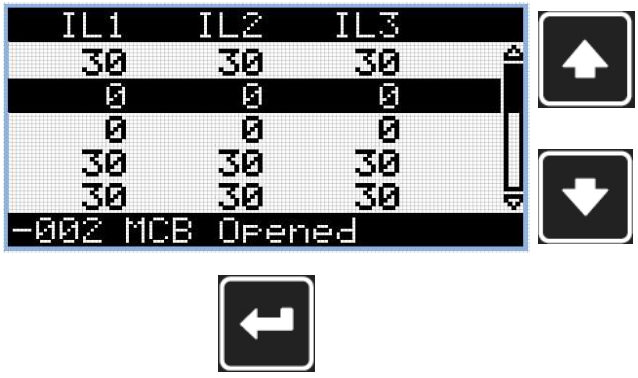

***Note:*** *Use Up and Down button to select required alarm reason.*

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



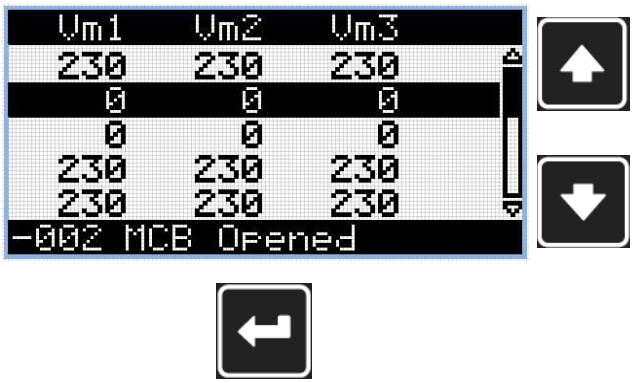

***Note:*** *Use Up and Down button to select required alarm reason.*

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



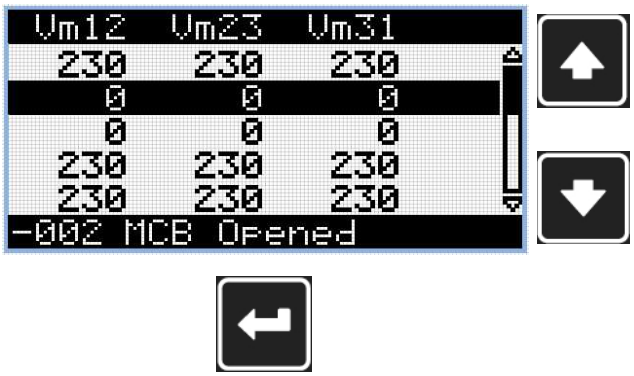

***Note:*** *Use Up and Down button to select required alarm reason.*

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



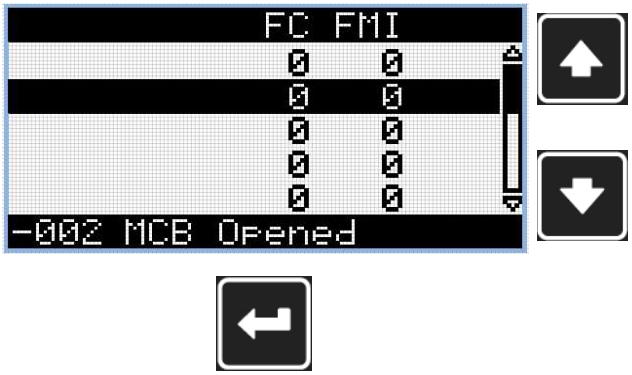

***Note:*** *Use Up and Down button to select required alarm reason.*

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



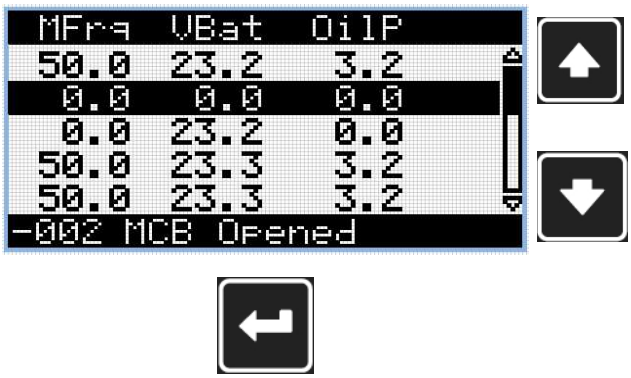

***Note:*** *Use Up and Down button to select required alarm reason.*

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



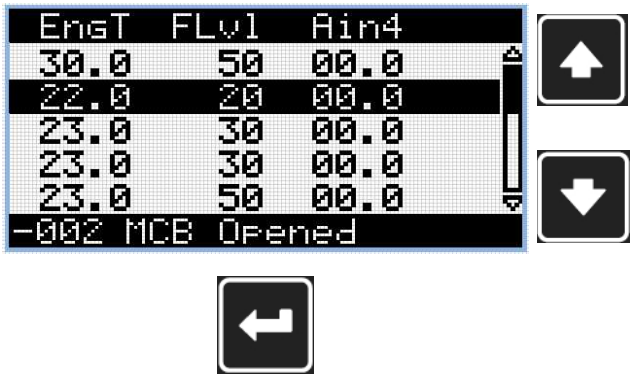

***Note:*** *Use Up and Down button to select required alarm reason.*

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



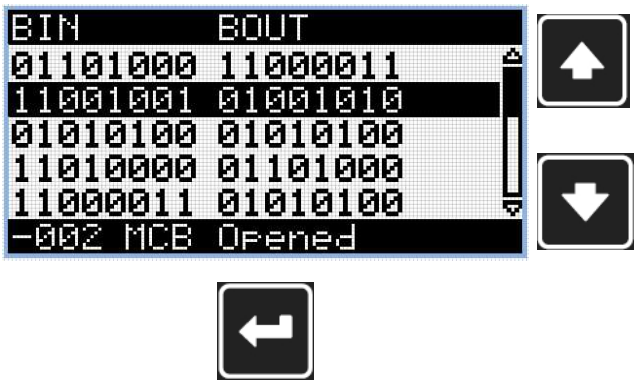

***Note:*** *Use Up and Down button to select required alarm reason.*

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




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

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




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

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




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

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

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

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

## 5.3.3 Browsing alarms




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

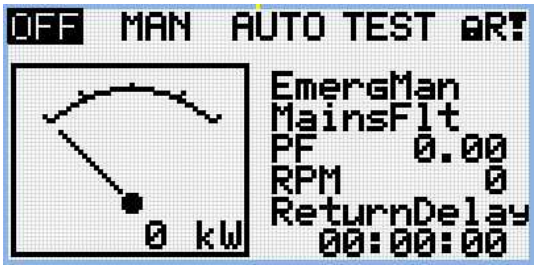



- Active alarms are displayed as white text on black background. It means the alarm is still active, i.e. the appropriate alarm conditions are still present.
- Inactive alarms are displayed as black text on white background. It means the alarm is no more active, i.e. the appropriate alarm conditions are gone.
- Not confirmed alarms are displayed with an asterisk. It means the alarm is still not acknowledged (confirmed).
- ECU alarms: SPN/FMI/OC/SC
  - SPN - Suspect parameter number
  - FMI - type of protection
  - OC - number of errors
  - SC - source of error



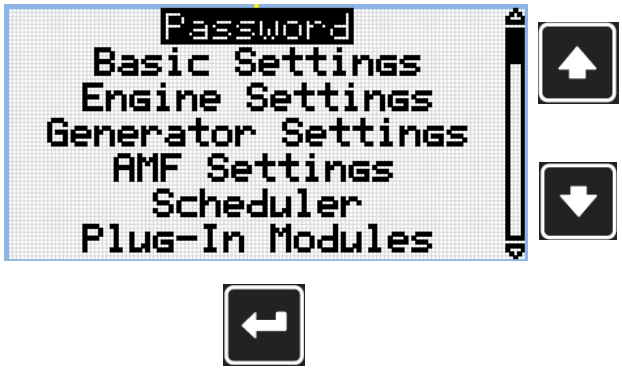

## 5.3.4 Password

### Enter password






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




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

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




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

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




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

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



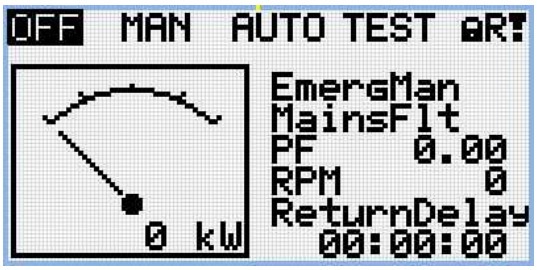

***Note:*** *Use Enter button to confirm the password or Page button to cancel entering the password.*





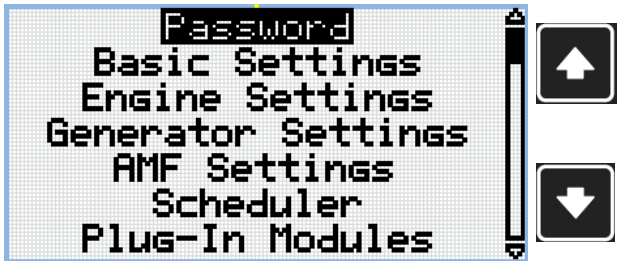

***Note:*** *In case that invalid password is entered, the controller shows Invalid password screen. Use Page button to go back to menu.*

## Change password






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




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



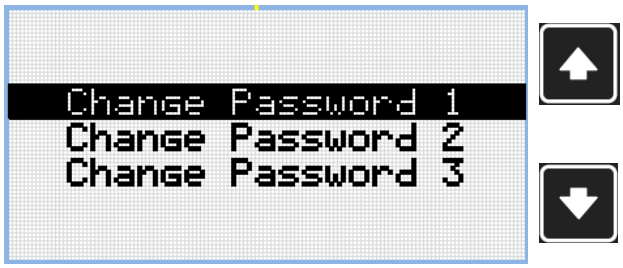
***Note:*** *Use Enter button to enter setpoint group Password.*




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



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



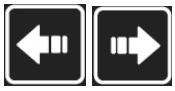

***Note:*** *Use Up and Down button to select required level of password.*



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




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



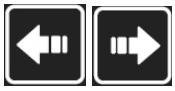
***Note:*** *Use Left and Right button to move between digits.*



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




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



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

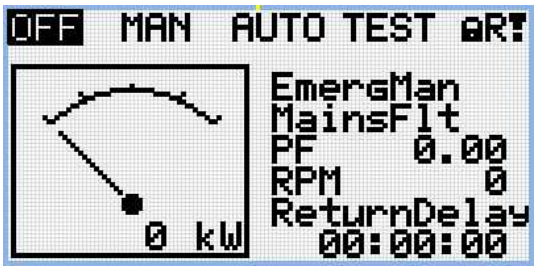


***Note:*** *After setting new password again use Enter button to confirm adjusted password or Page button to discard changes and to cancel changing password.*



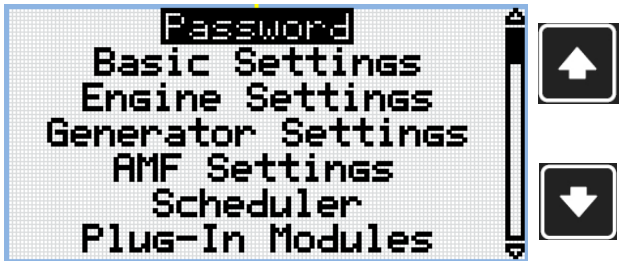

***Note:*** *Before changing the password controller has to be unlocked. In case that controller is locked, the controller shows Password required screen. In that case the password has to be entered before changing the password.*

## Log out from controller






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




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



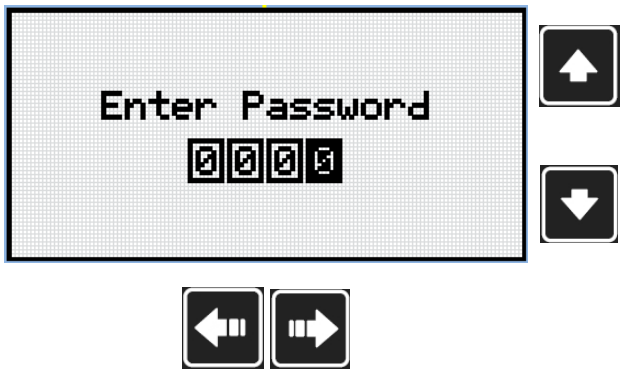
***Note:*** *Use Enter button to enter setpoint group Password.*




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



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




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

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

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




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

## Lost Password

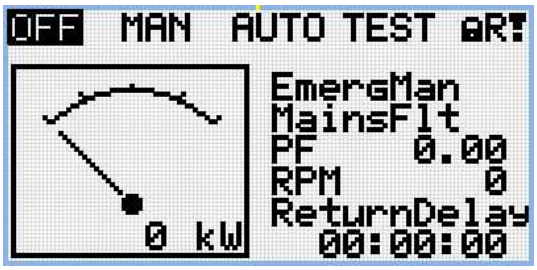
> **IMPORTANT: Display the information screen containing the serial number and password decode number as described in the chapter Information screen (page 92) and send them to your local distributor.**

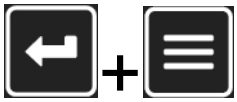
## Password break protection

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

1. When an invalid password is entered 5 times after each other, independently on the time period elapsed between the attempts, the controller will be blocked after the 5th unsuccessful attempt for 1 minute at the particular interface.
2. While the controller is blocked it refuses any further attempts to enter password.
3. When unblocked again the controller accepts one attempt to enter password. If the password is incorrect again the controller will be blocked for 2 minutes.
4. Each further attempt to enter invalid password will double the blocking time, but maximum blocking time is 20 minutes.
5. When incorrect password is entered 100-times after each other the controller is blocked forever and the password reset procedure is required to unblock it.

## 5.3.5 Information screen



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



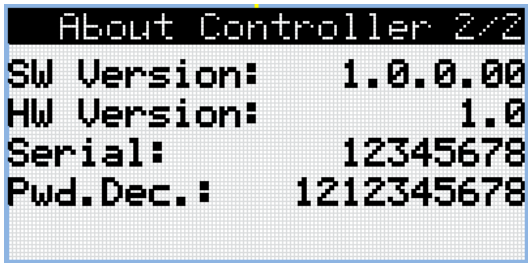



***Note:*** *Use Page button to move to the next page.*





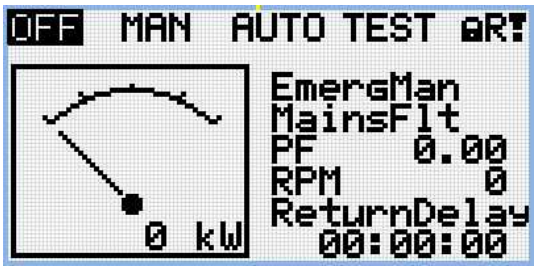

***Note:*** *Use Page button to move to the next page.*

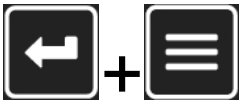





***Note:*** *Use Up button to move back to main measurement screen.*

## 5.3.6 Language selection



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



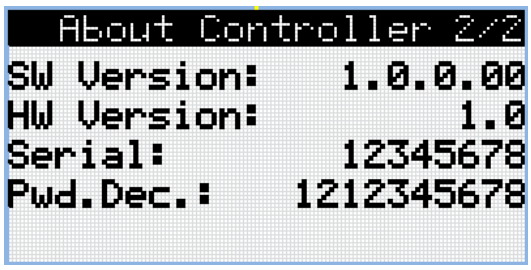



***Note:*** *Use Page button to move to the next page.*






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





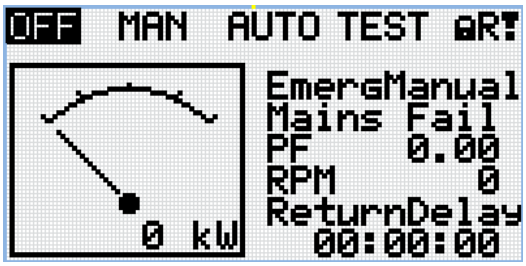

***Note:*** *Use Page button to move to the next page.*




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

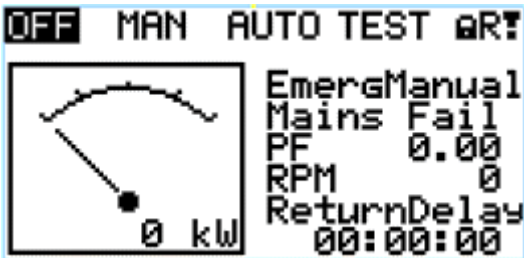
***Note:*** *Use Enter button to confirm selected language.*

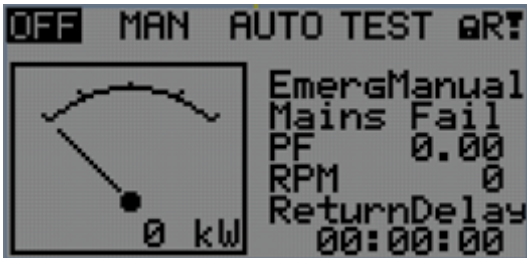
## 5.3.7 Display contrast adjustment




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

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




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

back to Controller setup

# 5.4 Remote Display

This chapter describes Remote display firmware IL3-RD, which is designed as a remote signaling and control software for InteliLite family controllers. It is the optional software which is possible to upload into controller instead of standard controller's firmware.

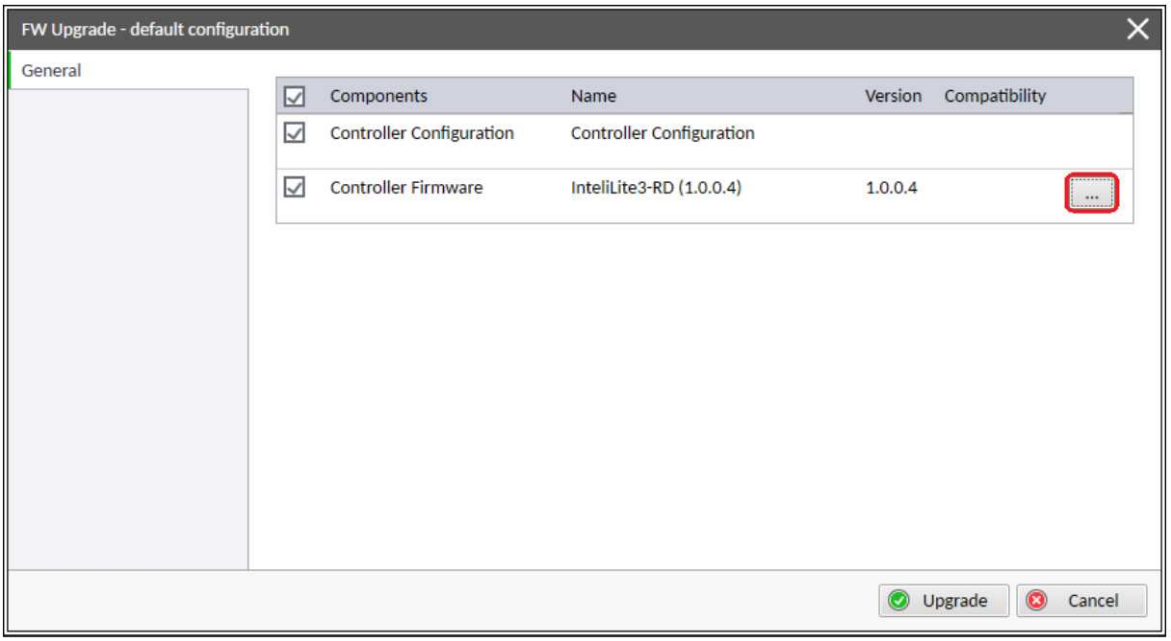
## 5.4.1 General description

Remote display software works as “remote display and control” for the Master InteliLite family controller. Gen-set can be controlled using Remote display and Master controller simultaneously and independently. All Remote display screens (Measurement screens, Setpoint screens and History Log) displays the same data as Master controller. Front panel buttons on both controllers work the same way. All remote display LEDs shows the same state as corresponding LEDs on Master controller.

## 5.4.2 IL3-RD Firmware installation

The IL3-RD Remote display firmware is installed in the same way as any other InteliLite firmware using InteliConfig PC tool. Reverting Remote display controller back to regular gen-set controller is carried out the same way.

***Note:*** *InteliConfig shows the most compatible and the most recent firmware as default option. Thus, it is necessary use “More options” (…) button to pick IL3-RD firmware for uploading to controller. (See details on picture below.)*




***Note:*** *IL3-RD consists firmware only, there is no archive included.*

***Note:*** *When IL3-RD firmware is uploaded to controller there is only possible connect InteliConfig using USB connection. InteliConfig serves only for firmware update when connected to Remote display. There is no Master controller SCADA displayed, no possibility to adjust Setpoints, display Values etc.*

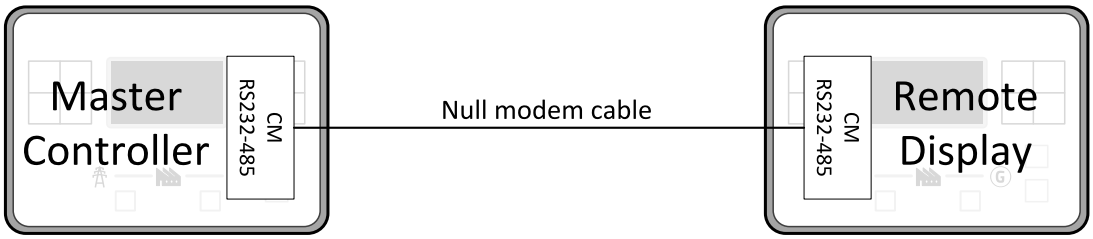
***Note:*** *Please refer to InteliConfig Global Guide for details about firmware uploading to controller.*

## 5.4.3 Wiring

IL3-RD can be connected to InteliLite family controller via external RS232 or RS485 communication line on CM-232-485 communication module or internal RS485 communication line. It is possible to connect only up to three Remote displays to one Master controller, if they are using different communication COMs. To connect two or more remote displays to one communication line (e.g. RS485) is not possible. Using one Remote display it is possible to monitor only one Master controller at the time.

## 5.4.4 Interconnection variants

### RS232

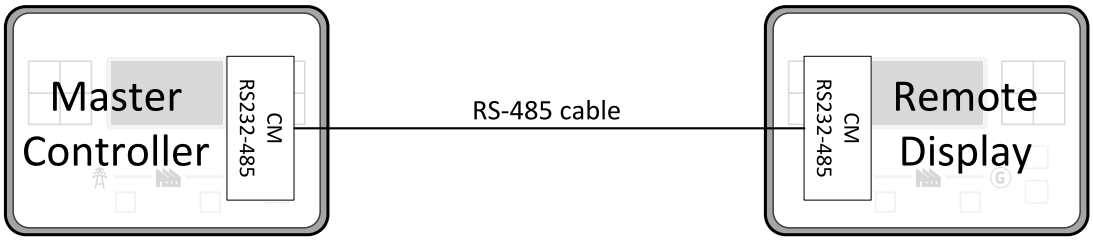



It is necessary to use CM-RS232-485 communication module on both Master controller and Remote display. COM 1 communication channel is used with these settings:

- COM 1 Mode: Direct
- COM 1 Communication Speed: 57600 or 115200 bps
- Controller Address: 1 – 32

The maximal distance between Master controller and Remote display is 10 m for RS-232 connection. It is recommended to use standard Null modem cable (crossover cable), although three wires (TxD, RxD, GND) RS-232 connection is enough for communication.

### RS485



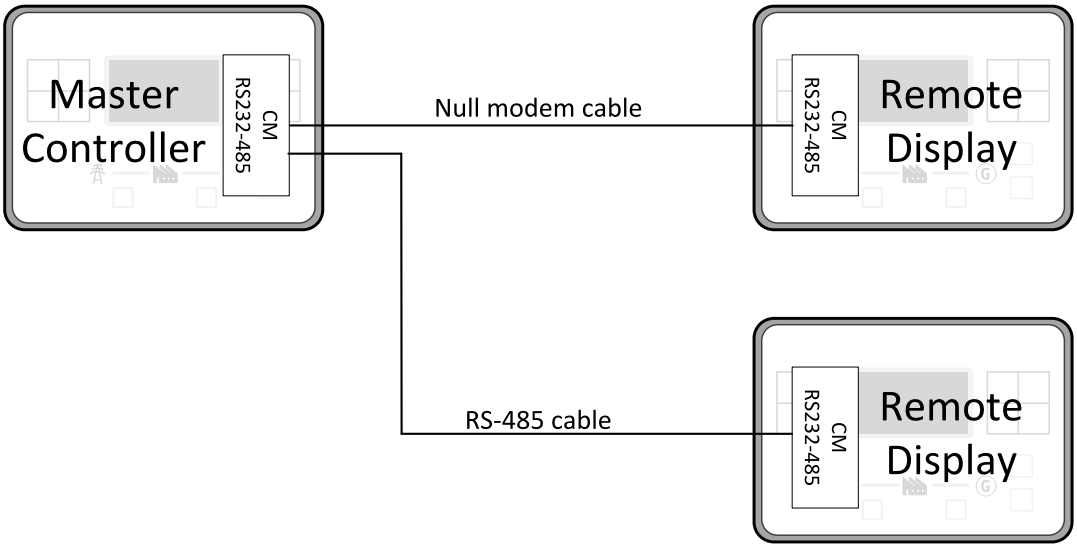

It is necessary to use CM-RS232-485 communication module on both Master controller and Remote display. COM 2 communication channel is used with these settings:

- COM 2 Mode: Direct
- COM 2 Communication Speed: 57600 or 115200 bps
- Controller Address: 1 – 32

The maximal distance between Master controller and Remote display is 1200 m for RS-485 connection. It is recommended to use shielded twisted-pair cables that comply with the EIA RS-485 standard to reduce interference and to achieve maximal distance.

### RS232 + RS485

It is possible to combine two previous ways of interconnection and connect two Remote display to one Master controller concurrently. All the parameters and settings are the same as mentioned above.




## 5.4.5 Connection process

Remote display after power on automatically tries connect to last known Master (if such configuration exist in Remote display). Otherwise Remote display starts to search for any Master controller connected. It starts to search on internal RS485 line using Master controller address 1 – 32 and continues with COM 2 (RS-485) and COM 1 (RS-232). Remote display tries two communication speeds 57600 bps and 115200 bps.

During this autodetection process the message “Trying to connect” is displayed on screen. This process takes approx. one minute.

When incompatible configuration type is found in detected controller, the message “Unknown cfg format COM x Addr yy” is displayed on screen for 5 seconds and detecting continues with next address in the range.

When detecting finishes with no compatible Master controller found, the message “No connection” is displayed on screen for 5 seconds and detecting process starts from the beginning and continues until compatible master controller is found.

Not supported types of controllers or controllers that are not properly communicating are skipped during the search.

## 5.4.6 Connection troubleshooting

There are few reasons why Remote display cannot connect to Master controller:

- Not supported type of Master controller is connected.
- Not supported firmware in Master controller.
- Configuration table error in Master controller.
- Wrong settings of setpoint COM x Mode in master controller.
- Wrong settings of setpoint COM x Communication Speed in master controller.
- Wrong connection, wiring, communication fail.

## 5.4.7 Function description

Remote display software works as “remote display and control” for the Master InteliLite family controller. Gen-set can be controlled using Remote display and Master controller simultaneously and independently. All Remote display screens (Information screens, Measurement screens, Setpoint screens and History Log) displays the same data as Master controller. Front panel buttons on both controllers work the same way. All remote display LEDs shows the same state as corresponding LEDs on Master controller. User can switch screens, enter or set password, adjust setpoints, change language, change Configuration Level, change display contrast and view history records.

***Note:*** *It is recommended to use the same type and model of controller for Master and for Remote display. Only in such case is assured the proper function of all buttons, LED diodes and display.*

> **Example:** When AMF controller HW type is used as a Master controller and MRS controller HW type is used for Remote display there is no possibility to control MCB in MAN mode as there is no MCB button on MRS controller. However, in general all this not recommended combinations works with similar to above mentioned limitation considered.

Master device is always able to work without connected Remote display. Disconnecting of the serial line between Master controller and Remote display has no effect to the Master controller.

When the serial line between Master controller and Remote display is disconnected, or communication cannot be established, Remote display shows it’s own Init screen and message “Trying to connect” and all LEDs are off.

Once remote display finds compatible master it shows message “Cfg processing” and downloads configuration table from master controller. After the configuration from Master controller is downloaded Remote display is reinitiated, jump to master controllers Main measurement screen and regular operation is started.

It is possible to switch to Remote display’s own Init screen to check IL3-RD FW version and serial number of used controller and communication status by press and hold Page button for more than 3 seconds.

## 5.4.8 Firmware compatibility

### Remote Display

Remote Display FW is possible to upload into following controllers:

- InteliLite AMF25
- InteliLite AMF20
- InteliLite MRS16
- InteliLite MRS11
- InteliLite 9

### Remote Display vs. Master controller

| Remote Display | Master controller | | |
|---|---|---|---|
| **RD FW ver.** | **InteliLite (all versions)** | **InteliLite 9** | **InteliGen 200** |
| 1.0.0 | FW ver. 1.5.x | FW ver. 1.1.x | FW ver. 1.1.x |
| | FW ver. 1.6.x | | FW ver. 1.2.x |
| | FW ver. 1.7.x | | FW ver. 1.3.x |
| | FW ver. 1.8.x | | |

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## 5.5.1 Operating Modes

Selecting the operating mode is done through Left and Right buttons on the front panel or by changing the **Controller mode (page 264)** 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 668)**
- **Remote TEST (page 670)**
- **Remote MAN (page 667)**
- **Remote AUTO (page 667)**

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 326)** = GenRun) or is open or closed according to whether the mains is present or not (**MCB Opens On (page 326)** = MainsFail). No AMF or Power management function will be performed. The buttons MCB I/O, GCB I/O, Start I and Stop O 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*

### 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 tirpped 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 117)** in MINT application.

### AUTO

Gen-set is controlled based on external signal (**REMOTE START/STOP (PAGE 669)** ) 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 I, Stop O, MCB ON/OFF I/O and GCB ON/OFF I/O.

> **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 265) to the Enabled position.**

### 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 670)**.

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 351)** the GCB will be closed and the gen-set will supply the load. After the mains have recovered, the delay **Mains Return Delay (page 320)**l 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 351)** 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 353)** and **Transfer Mains To Gen (page 352)** and on binary inputs **FORCE ISLAND (PAGE 658)** and **FORCE PARALLEL (PAGE 658)**.

## 5.5.2 Engine start

### Diesel engine

The setpoint **Fuel Solenoid (page 269)** has to be switched to the Diesel position.

- After the command for start is issued (pressing Start button in MAN mode, auto start condition is fulfilled in AUTO mode or controller is switched to TEST mode), outputs **PRESTART (PAGE 729)** and **GLOW PLUGS (PAGE 715)** are energized for time period given by the setpoints **Prestart Time (page 271)** and **Glow Plugs Time (page 273)**.
- After **Prestart Time (page 271)** and **Glow Plugs Time (page 273)**, the output **FUEL SOLENOID (PAGE 709)** is energized and after **Fuel Solenoid Lead (page 274)** the starter of motor is activated by energizing the output **STARTER (PAGE 735)**.
- When one or more of following conditions are met, the starter output is de-energized:
  - The engine speed exceeds the value of **Starting RPM (page 271)**, or
  - One of **Additional running engine indications (page 170)** signals becomes active.
- The controller remains in the Starting phase until the engine speed exceeds the value of **Starting RPM (page 271)**, after that it is considered as started and the Idle period will follow.
- The maximum duration that the output **STARTER (PAGE 735)** is energized is determined by the setpoint **Maximum Cranking Time (page 270)**. If the engine does not start within this period, the output **STARTER (PAGE 735)** is de-energized and a pause with length determined by **Cranking Fail Pause (page 270)** will follow. **PRESTART (PAGE 729)** and **GLOW PLUGS (PAGE 715)** 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 270)**.
- Once the engine is started, the Idle period follows. The binary output **IDLE/NOMINAL (PAGE 718)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 275)**. When controller is in the MAN mode, it is possible to finish the **Idle Time (page 275)** count down by pushing the Start button.

- After the idle period has finished, the output **IDLE/NOMINAL (PAGE 718)** is activated and the start-up sequence is finished. The **Stabilization (page 106)** phase follows.

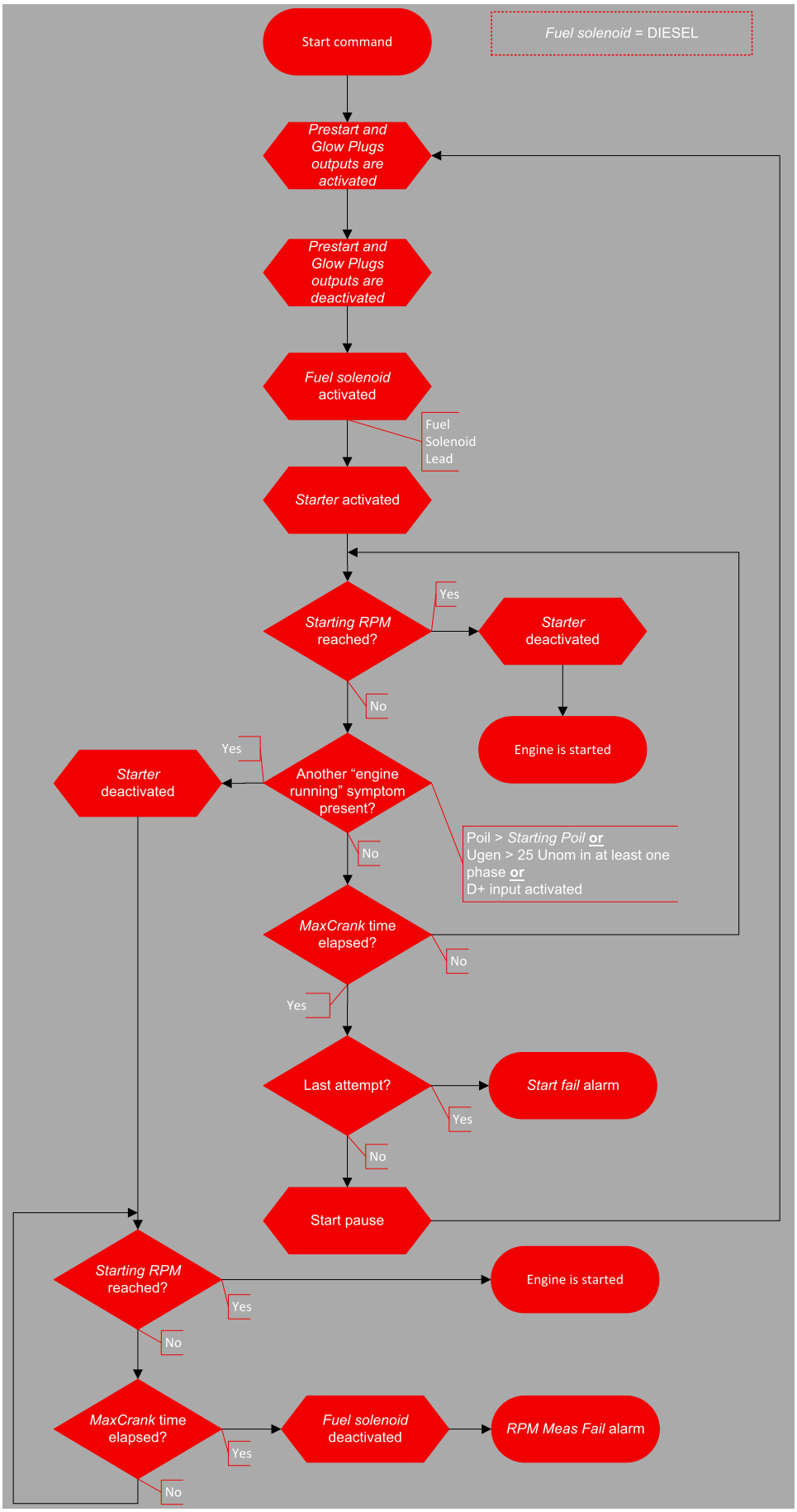



Image 5.13 Flowchart of start of diesel engine

## GAS engine

The setpoint **Fuel Solenoid (page 269)** has to be switched to the Gas position.

- After the command for start is issued (pressing Start button in MAN mode, auto start condition is fulfilled in AUTO mode or controller is switched to TEST mode), outputs **PRESTART (PAGE 729)** and **GLOW PLUGS (PAGE 715)** are energized for time period given by the setpoints **Prestart Time (page 271)** and **Glow Plugs Time (page 273)**.
- After **Prestart Time (page 271)** and **Glow Plugs Time (page 273)**, starts countdown of **Sd Ventilation Time (page 279)**
- After **Sd Ventilation Time (page 279)**, the starter of engine is activated by energizing the output **STARTER (PAGE 735)**.
- When the engine speed exceeds 30RPM, the outputs **FUEL SOLENOID (PAGE 709)** and **IGNITION (PAGE 719)** are energized.
- When the engine speed exceeds value of **Starting RPM (page 271)**, the starter of engine is de-energized, the engine is considered as started and the Idle period will follow.

**IMPORTANT: Additional running engine indications (page 170) 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 735)** is energized is determined by the setpoint **Maximum Cranking Time (page 270)**. If the engine does not start within this period, outputs **STARTER (PAGE 735)** and **FUEL SOLENOID (PAGE 709)** are de-energized and a pause with length determined by **Cranking Fail Pause (page 270)** will follow. **PRESTART (PAGE 729)**, **GLOW PLUGS (PAGE 715)** and **IGNITION (PAGE 719)** 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 270)**.
- Once the engine is started, the Idle period follows. The binary output **IDLE/NOMINAL (PAGE 718)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 275)**. When controller is in the MAN mode, it is possible to finish the **Idle Time (page 275)** count down by pushing the Start button.
- After the idle period has finished, the output **IDLE/NOMINAL (PAGE 718)** is activated and the start-up sequence is finished. The **Stabilization (page 106)** phase follows.

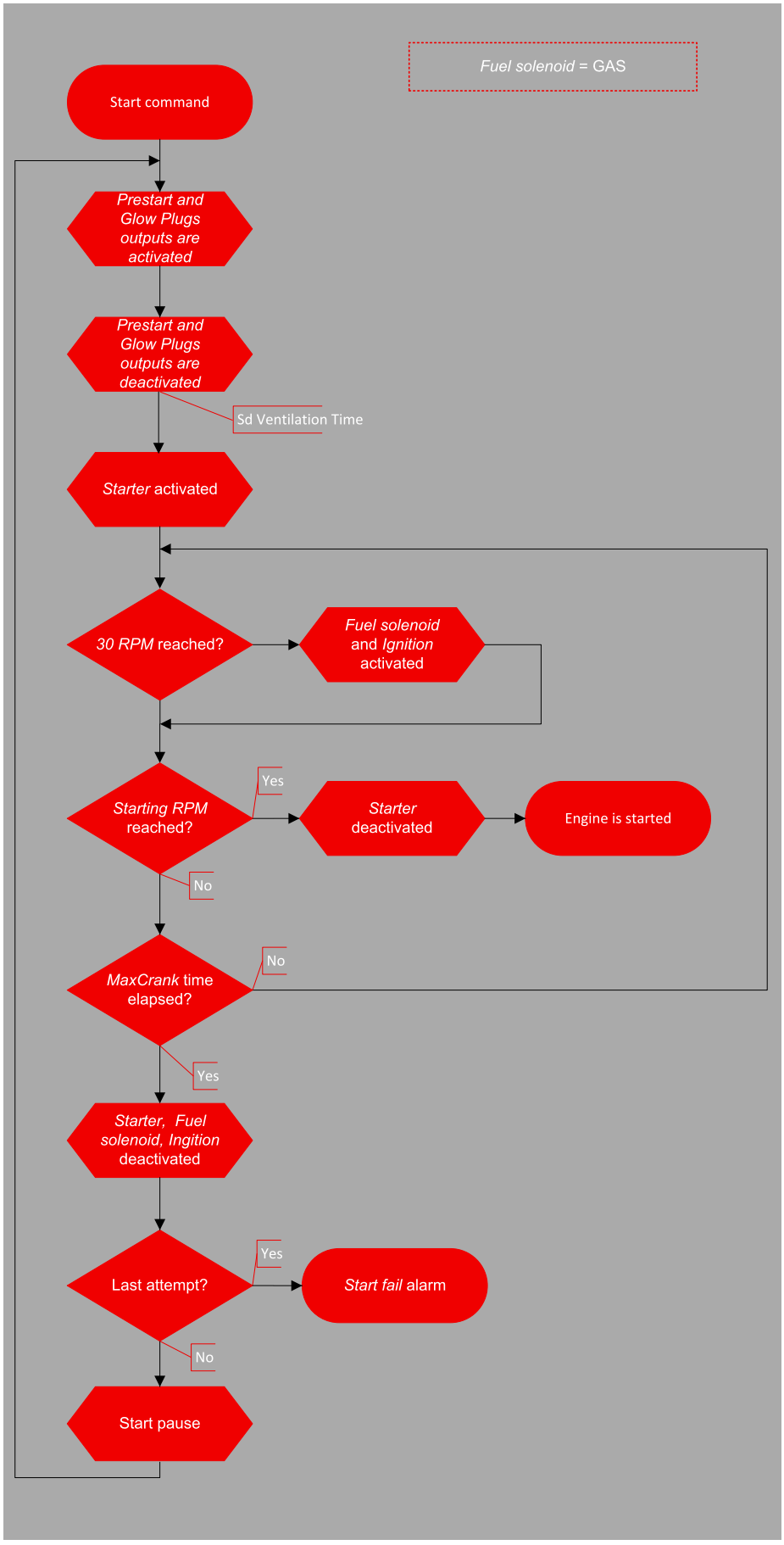



Image 5.14 Flowchart of start of gas engine

## 5.5.3 Stabilization

When the **Engine start (page 101)** sequence is finished, the gen-set goes into the stabilization phase. There are two timers (setpoints) in this phase:

- **Minimal Stabilization Time (page 277)** 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 278)** starts to count down just after the idle period has finished. Generator voltage and frequency are not checked (respective protections are not evaluated) but, opposite to the previous timer, the GCB can be closed if generator voltage and frequency are within limits.

In situations where the GCB is closed automatically (AUTO, TEST modes), the closing of GCB or starting of synchronization will occur in the first moment when the generator voltage and frequency will get into limits and the **Minimal Stabilization Time (page 277)** has already elapsed.

In the event that the generator voltage or frequency are not within limits within the **Maximal Stabilization Time (page 278)** 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 304)**.*

***Note:*** *The value of the **Minimal Stabilization Time (page 277)** setpoint has to be lower than the value of **Maximal Stabilization Time (page 278)** setpoint.*

## 5.5.4 Connecting to load

When the **Stabilization (page 106)** 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 277)** 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 355)** and **Speed Governor Bias (page 347)** setpoints.*

There are two ways to connect the gen-set to the load (bus bar). This depends on the state of **MCB FEEDBACK (PAGE 664)** and on the measured mains/bus voltage.

### Connecting to dead bus

#### SPtM

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

#### MINT

The measured bus voltage is also taken in account and it must be below 2% of the nominal bus voltage together with the open MCB (evaluated by **MCB Feedback (page 664)**) and also others GCB have to be open to close the GCB without synchronization.

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

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

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

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

# Synchronization

## Synchronization process

Behavior of synchronization process depends on, which breaker is used for synchronization and in which **Controller mode (page 264)** is controller switched.

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

### Synchronization via GCB in AUTO mode

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

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

### Synchronization via GCB in MAN mode

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

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

### Synchronization via MCB in AUTO mode

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

- if the mains (bus) voltage or the Mains frequency gets out of the limits during synchronization, then the synchronization process is interrupted and can continue again when mains parameters gets restored after **Mains Return Delay (page 320)**.
- 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 808)** 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 359)**.

### 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 360)**. If the synchronization is not successful within this period of time, the **STP Synchronization Fail (page 834)** alarm will be issued.

**Voltage matching**

The gen-set voltage is regulated to match the mains/bus voltage with tolerance given by the setpoint **Voltage Window (page 360)**. The regulation is adjusted by the setpoints **Voltage Gain (page 357)** and **Voltage Int (page 357)**.

**Frequency/angle matching**

The gen-set frequency is regulated to match the mains/bus frequency first. The frequency regulation loop is active (setpoints **Frequency Gain (page 348)** and **Frequency Int (page 349)**). Once the frequency is matched, the regulation loop is switched to match the angle (setpoint **Angle Gain (page 349)**). When the angle is matched with tolerance +/- **Phase Window (page 360)** for a time given by the setpoint **Dwell Time (page 361)** and the voltage is matched too, then the GCB is closed.

***Note:*** *The matching loops will continue to run even if the GCB close command has been already issued until the controller receives* ***GCB FEEDBACK (PAGE 660)*** *or a GCB 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 360)**. 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 361)** value and the window is set by setpoint **Slip Frequency Window (page 361)**. 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 361)** the controller will allow GCB closing. The controller calculates periodically so called preclosing angle (based on the actual value **Slip Frequency (page 589)** 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).

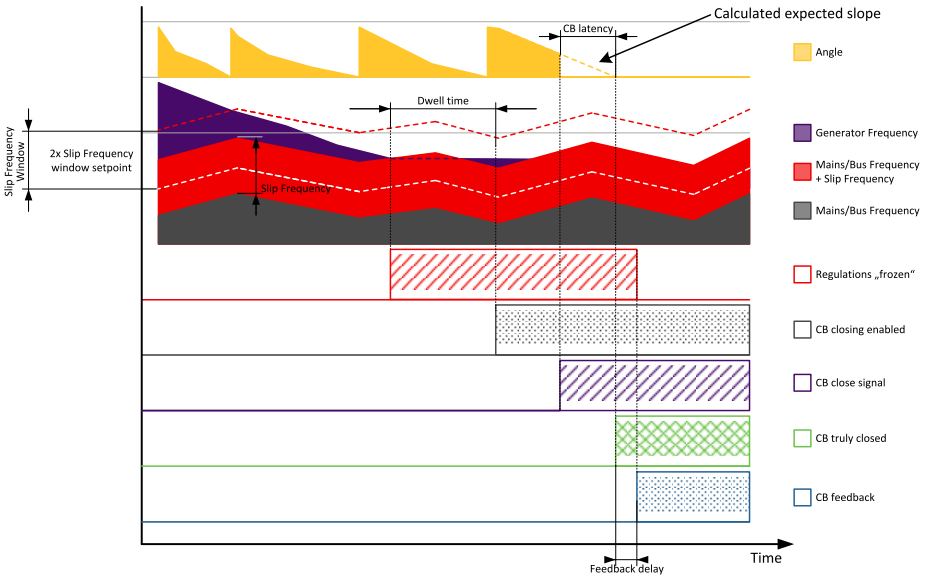



Image 5.15 Slip synchronization

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 361)** 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 361)** 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.

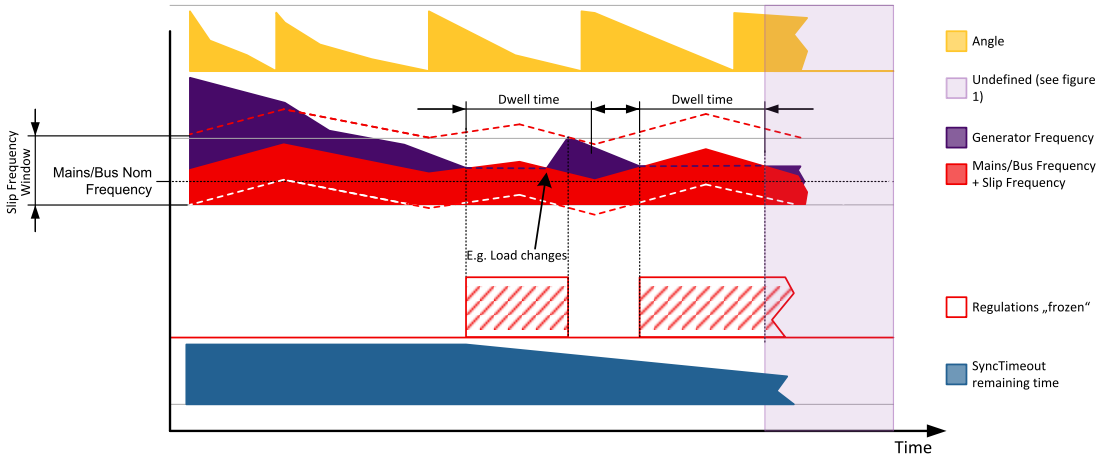



Image 5.16 Slip synchronization

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 589)** is set to 0.1Hz and setpoint **Slip Frequency Window (page 361)** is set to 0.5Hz).

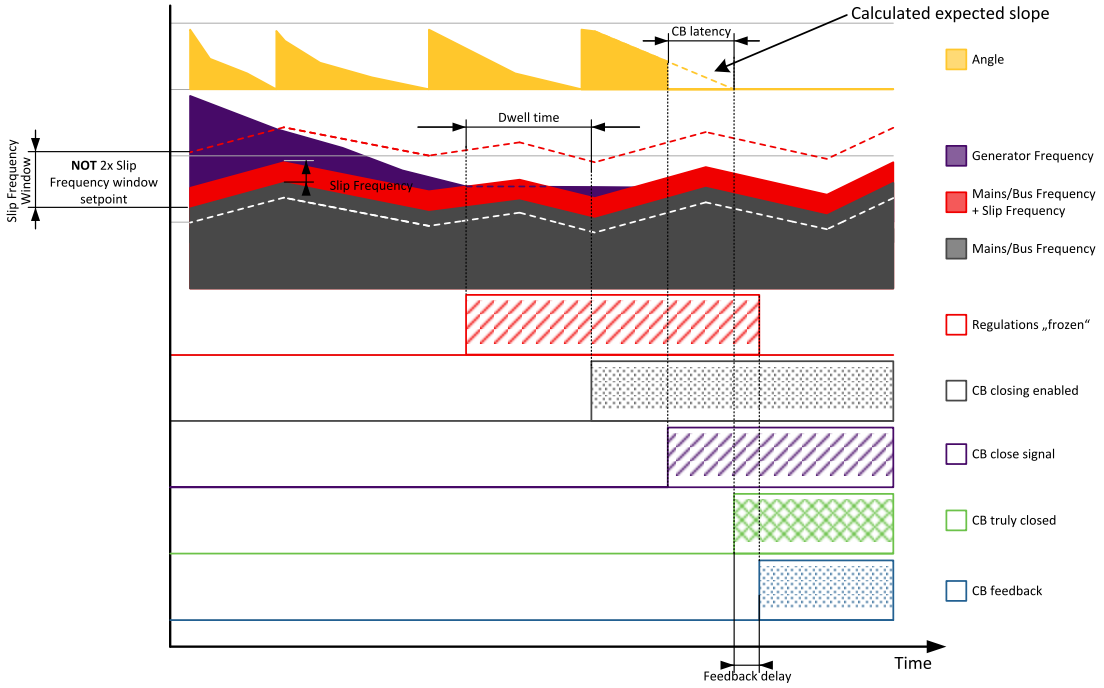



Image 5.17 Slip synchronization

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.

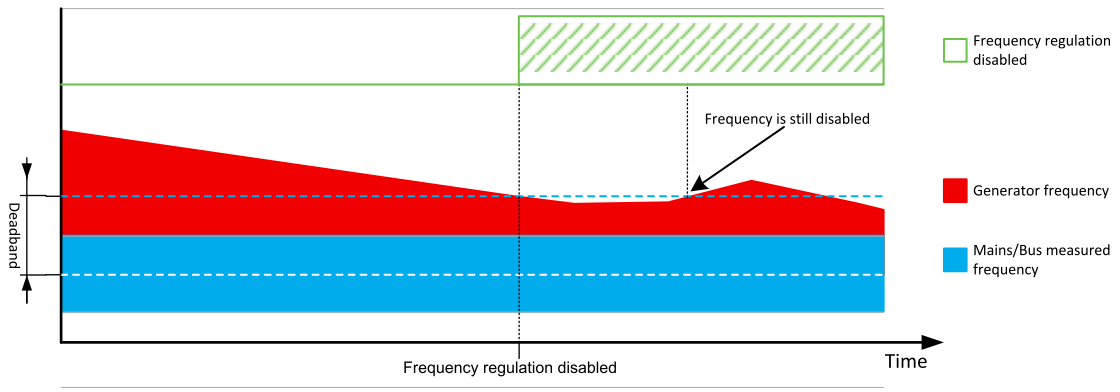
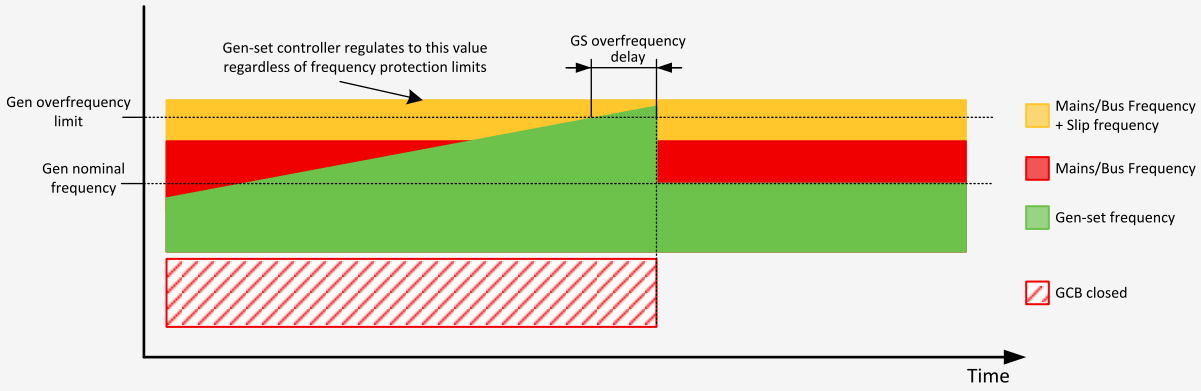



Image 5.18 Slip synchonization - deadband

***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. 50.9Hz, limit is 51Hz).* ***Slip Frequency (page 361)*** *is set to 0.5Hz. This will cause regulation loop of the gen-set controller to push the gen-set frequency to 51.4Hz and eventually the controller will issue overfrequency delay. It is recommended to set the setpoint* ***Slip Frequency (page 361)*** *as low as possible that still enables succesfull 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 361)*** *can be set to 0.1Hz and the Mains/Bus Frequency overfrequency protection limit is set to 50.9Hz instead of 51Hz. This will ensure that problematic state cannot be reached.*

***Note:***




## 5.5.5 Multiple island operation

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

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

> **IMPORTANT: The controller in MINT application does not control the MCB! Only the MCB position is evaluated from the binary input MCB FEEDBACK (PAGE 664) 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 669)** 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 117)** settings. Please see this chapter for more information.

## 5.5.6 Parallel to mains operation - SPtM application

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

### Ramping the power

#### Power up

The first phase of the parallel to mains operation is the ramping of the gen-set up to the desired power level. The speed of the ramp is given by the setpoint **Load Ramp (page 354)**. 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 354)** and the end level is given by **Generator Unload GCB Open Level (page 353)**.

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 664)** and **GCB Feedback (page 660)** = active).

There are available two modes of load control. Type of control is adjusted via setpoint **Load Control PTM (page 245)**.

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

#### Baseload

**Load Control PTM (page 245)** = Baseload. Genset produces amount of the power given by setpoint **Baseload (page 248)**. The rest of power is supplied from the mains or exported to the mains (depends on proportions of load and **Baseload (page 248)** setpoint). Even in baseload control mode can be the Import/Export limited. This function can be activated by setpoint **Import/Export Limitation (page 250)** = 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 249)**.

> **Example:** Baseload = 1000 kW, load = 700 kW, Import load = 100 kW. Then the Baseload request will be limited to 600 kW to prewent 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 prewent the Import power go below -100 kW (actually it is limitation of the export).

#### Import/Export

**Load Control PTM (page 245)** = 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 249)**. If the value of the setpoint is >0 the power is imported from the mains, if setpoint value is <0, then thepower 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 664)** and **GCB Feedback (page 660)** = active).

There are available two modes of PF control. Type of control is adjusted via setpoint **PF Control PTM (page 246)**.

## Base PF

The power factor on the gen-set is kept on the level given by the setpoint **Base Power Factor (page 248)** 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 249)**. 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 353)** and **Transfer Mains To Gen (page 352)**.

## 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 351)** 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 351)**.<br>In case of synchronization fail, MCB stays close and gen-set is stopped. |
| Close Primarily | Transfer of the load from generator to mains and vice versa with synchronization and parallel work. The time of parallel work is given by setpoint **Close Transfer Max Duration (page 351)**.<br>In case of synchronization fail, open transfer is done. |
| Soft Transfer | Transfer of the load from generator to mains and vice versa with parallel work and soft loading/unloading of the gen-set. This function is proceeded like the closed transfer, but there is time limitation of loading/unloading of the gen-set adjusted via setpoint **Load Ramp (page 354)**. 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 **Mains Unload MCB Open Window (page 354)**), level of load when gen-set is considered as unloaded is adjusted via setpoint **Generator Unload GCB Open Level (page 353)**). |

## Transfer of load in MAN mode

Behavior of transfer of load in MAN mode is adjusted via setpoint **CB Control In MAN Mode (page 253)**. 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 658)**, **Force Parallel (page 658)** and **Remote Start/Stop (page 669)**.

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

- **Force Island (page 658)** (highest priority).
- **Remote Start/Stop (page 669)**.
- **Force Parallel (page 658)** (lowest priority).

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

| Logical binary input | AUTO mode | TEST mode |
|---|---|---|
| **Force Island (page 658)** | When activated:<br>▶ starts gen-set<br>▶ the transfer of load from mains to generator is done<br>When deactivated:<br>▶ the transfer of load from generator to mains is done<br>▶ cooling and stopping of the gen-set | The gen-set is started anyway due to the TEST mode.<br>When activated:<br>▶ the transfer of load from mains to generator is done<br>When deactivated:<br>▶ the transfer of load from generator to mains is done |
| **Remote Start/Stop (page 669)** | When activated:<br>▶ starts gen-set<br>▶ if mains parameters ok - synchronize, run in parallel<br>▶ if mains parameters not ok - run in island<br>When deactivated:<br>▶ unloading (if gen-set was in parallel), cooling and stopping of the gen-set | The gen-set is started anyway due to the TEST mode.<br>When activated:<br>▶ if mains parameters ok - synchronize, run in parallel<br>When deactivated:<br>▶ unloading, of the gen-set, opening GCB |
| **Force Parallel (page 658)** | When activated:<br>▶ check mains parameters - if not ok no action, if ok the procedure follows<br>▶ starts the gen-set, synchronize, parallel operation<br>▶ in case of mains fail - gen-set is stopped (if AMF function is disabled, otherwise it goes to island operation)<br>When deactivated: | The gen-set is started anyway due to the TEST mode.<br>When activated:<br>▶ check mains parameters - if not ok no action, if ok the procedure follows<br>▶ synchronize, parallel operation<br>When deactivated:<br>▶ unloading, of the gen-set, opening GCB |

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

Type of transfer of load between mains and gen-set and vice versa is adjusted via setpoints **Transfer Gen To Mains (page 353)** and **Transfer Mains To Gen (page 352)**.

## 5.5.7 Parallel to mains operation - MINT application

If the MCB is closed (**MCB FEEDBACK (PAGE 664)** 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 250)** 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 354)**. 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 354)** and the end level is given by **Generator Unload GCB Open Level (page 353)**.

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 664)** 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 250)**. Each loaded gen-set takes equal part (relative to their nominal power) from **#System BaseLoad (page 250)** 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 250)** is also used for determining which gen-sets have to run or not. Control is adjusted via setpoints **Load Gain (page 349)** and **Load Int (page 350)**.

### PF control

If **MCB FEEDBACK (PAGE 664)** 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 251)**. 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 357)** and **PF Int (page 358)**.

## 5.5.8 AMF operation

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

(PAGE 634) or MAINS FAIL BLOCK (PAGE 663).

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

## Mains failure detection

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

- The mains voltage is out of the limits given by the setpoints **Mains Undervoltage (page 322)** and **Mains Overvoltage (page 321)** for a time period longer than **Mains < > Voltage Delay (page 322)**.
- The mains voltage unbalance is out of limit given by setpoint **Mains Voltage Unbalance (page 322)** for a time period longer than **Mains Voltage Unbalance Delay (page 323)**.
- The mains frequency is out of the limits given by the setpoints **Mains Underfrequency (page 323)** and **Mains Overfrequency (page 323)** for a time period longer than **Mains < > Frequency Delay (page 324)**.
- The MCB close command was not successful and the alarm **Wrn MCB Fail (page 806)** was not reset.
- Phase rotation is incorrect.

## Healthy mains detection

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

- The mains voltage is within the limits given by the setpoints **Mains Undervoltage (page 322)** and **Mains Overvoltage (page 321)**.
- The mains voltage unbalance is within the limits given by the setpoint **Mains Voltage Unbalance (page 322)**.
- The mains frequency is within the limits given by the setpoints **Mains Underfrequency (page 323)** and **Mains Overfrequency (page 323)**.
- The alarm **Wrn MCB Fail (page 806)** 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 326)** is set to Mains Fail, the MCB is opened.
- The timer for automatic start of the gen-set **Emergency Start Delay (page 320)** 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 634) or MAINS FAIL BLOCK (PAGE 663).*

- If the setpoint **MCB Opens On (page 326)** is set to Gen Run, the MCB is opened once the generator voltage is within limits (after **Minimal Stabilization Time (page 277)** elapses).

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

- After **Open Transfer Min Break (page 351)** elapses, the GCB is closed and the gen-set begins to supply the load.
- After the mains restored to normal, the timer **Mains Return Delay (page 320)** begins to count down.

- Transition of load back to mains is adjusted via setpoint **Transfer Gen To Mains (page 353)**. Behavior of transition is also is affected by binary inputs **FORCE ISLAND (PAGE 658)**, **FORCE PARALLEL (PAGE 658)** and **REMOTE START/STOP (PAGE 669)**. See more in **Transfer of load in AUTO mode (page 114)** chapter.

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

## 5.5.9 Engine cool down and stop

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

- Duration of the cool down phase is determined by the setpoint **Cooling Time (page 280)**.
- 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 279)**.
- The cool down can be finished manually in MAN mode by pressing the STOP button.
- If a new start request comes, the cool down will be interrupted and the gen-set will go back to the stabilization phase. If the cooling was at nominal speed, the stabilization timers will not count down again so the GCB is ready to be closed (after 2 seconds delay).

When the cool down is finished, the output **FUEL SOLENOID (PAGE 709)** is de-energized and **STOP SOLENOID (PAGE 736)** is energized. The engine will stop within the time period determined by the setpoint **Stop Time (page 280)**. If the engine does not stop within this time, the alarm **Wrn Stop Fail (page 808)** will be issued.

The output **STOP SOLENOID (PAGE 736)** is energized until the engine is stopped, but at least for the duration of **Stop Time (page 280)**. If the **Stop Time (page 280)** has elapsed and the engine has still not stopped, the **STOP SOLENOID (PAGE 736)** is de-energized for 5 s and then energized again for **Stop Time (page 280)** and this repeats until the engine is stopped.

The output **Ignition (page 719)** 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 **Additional running engine indications (page 170)** signals is active.

## 5.5.10 Power management

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

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

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

can be switched off without influencing the whole system. Except the situation the respective gen-set is not available for the power management.

The power management evaluates so called load reserve. The load reserve is calculated as difference between actual load and nominal power of running gen-sets. The reserve is calculated as absolute value (in kW / kVA) or relatively to the nominal power of gen-set(s) (in %). The setpoint **#Power Management Mode (page 334)** 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 333)** 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 669)**.

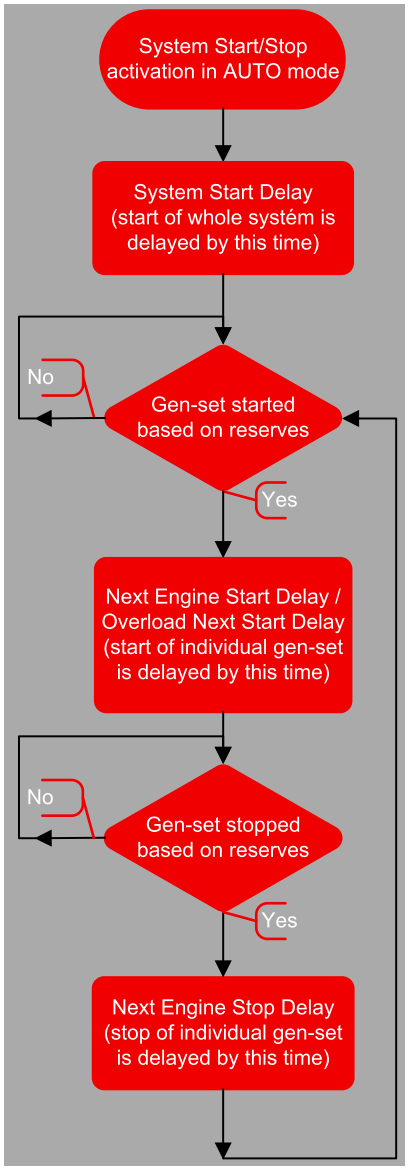
The Logical binary inputs **REMOTE START/STOP (PAGE 669)** requests the system to start or stop. If the input is not active, the system stops with delay **#System Stop Delay (page 336)** after the input has been deactivated and will not start again if in AUTO mode. If the input is activated again, the delay **#System Start Delay (page 335)** 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 669)** is activated, the option of setpoint **Power Management (page 333)** = ENABLED and the AUTO mode is selected.

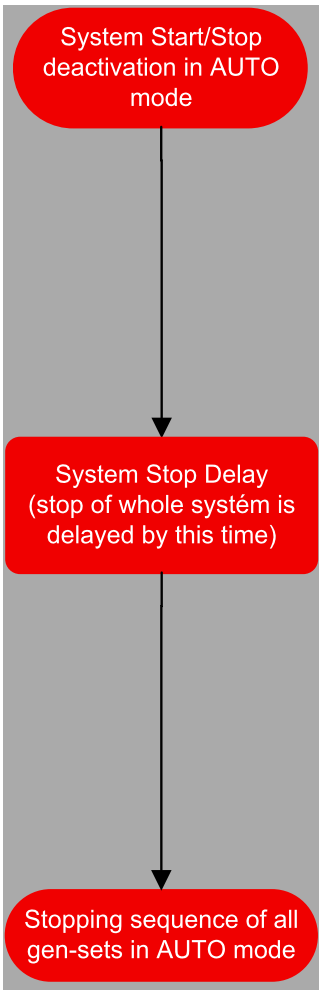
***Note:*** *The gen-set performs load and VAR sharing whenever it is connected to the bus bar i.e. it is independent on whether the controller is in AUTO or MAN mode or whether the power management is active or not.*

Function of power management can be temporarily blocked after **REMOTE START/STOP (PAGE 669)** activation a count down of **#System Start Delay (page 335)**. The delay is given by setpoint **Power Management Delay (page 333)**. 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 341)** 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 341)** is elapsed. All the time the system stop condition – i.e. the Logical binary inputs **REMOTE START/STOP (PAGE 669)** deactivated – is evaluated as well. Once the delay given by the setpoint **#System Stop Delay (page 336)** 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 342)** is used in case that **#Overload Next Start Protection (page 342)** is enabled and gen-sets are running at **#Overload Next Start Level (page 342)** 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 = $\sum Pg_{Nom} - \sum Pg_{Act}$<br>ARstp = $\sum Pg^*_{Nom} - \sum Pg_{Act}$ | ARstrt < #LoadResStrt | ARstp > #LoadResStop |
| Relative % | RRstrt = $[(\sum Pg_{Nom} - \sum Pg_{Act}) / \sum Pg_{Nom}].100\%$<br>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<br>ARstp = $\sum Pg^*_{Nom}$ - BaseLoad | ARstrt < #LoadResStrt | ARstp > #LoadResStop |
| Relative % | RRstrt = $[(\sum Pg_{Nom}$ - BaseLoad) / $\sum Pg_{Nom}].100\%$<br>RRstp = $[(\sum Pg^*_{Nom}$ - BaseLoad) / $\sum Pg^*_{Nom}].100\%$ | RRstrt < #%LdResStrt | RRstp > #%LdResStop |

List of abbreviations:

- ARstrt .. Actual Absolute reserve in kW or kVA - for engine start calculation.
- ARstp .. Actual Absolute reserves in kW or kVA - for engine stop calculation.
- RRstrt .. Actual Relative reserve in % - for engine start calculation.
- RRstp .. Actual Relative reserves in % - for engine stop calculation.
- ΣPgNom .. Sum of Nominal power of all gen-sets on the bus.
- ΣPg*Nom .. Sum of Nominal power of all gen-sets on the bus apart of the one, which is going to be stopped.
- ΣPgAct .. Sum of Actual power of all gen-sets on the bus = system load.
- BaseLd .. Baseload is given by the setpoint **#System BaseLoad (page 250)**

***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.

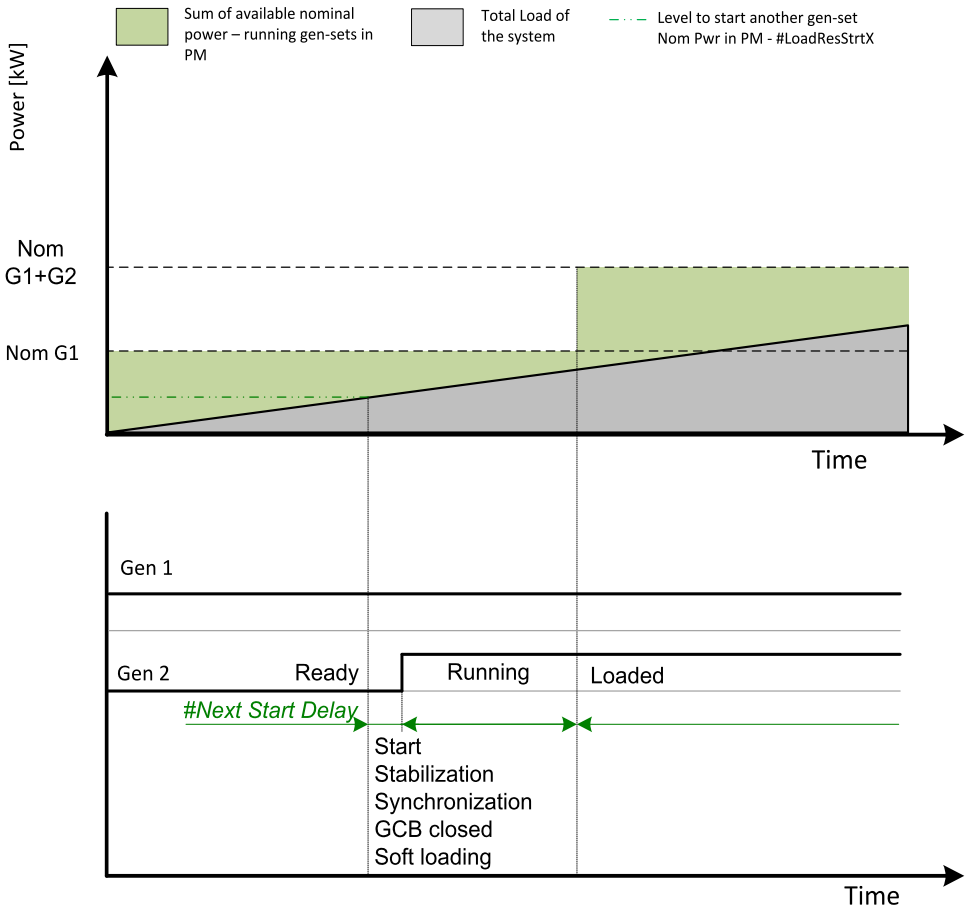



Image 5.19 Start sequence of power management

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 122)** and **Relative power management (page 125)**.

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 341)**, 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.

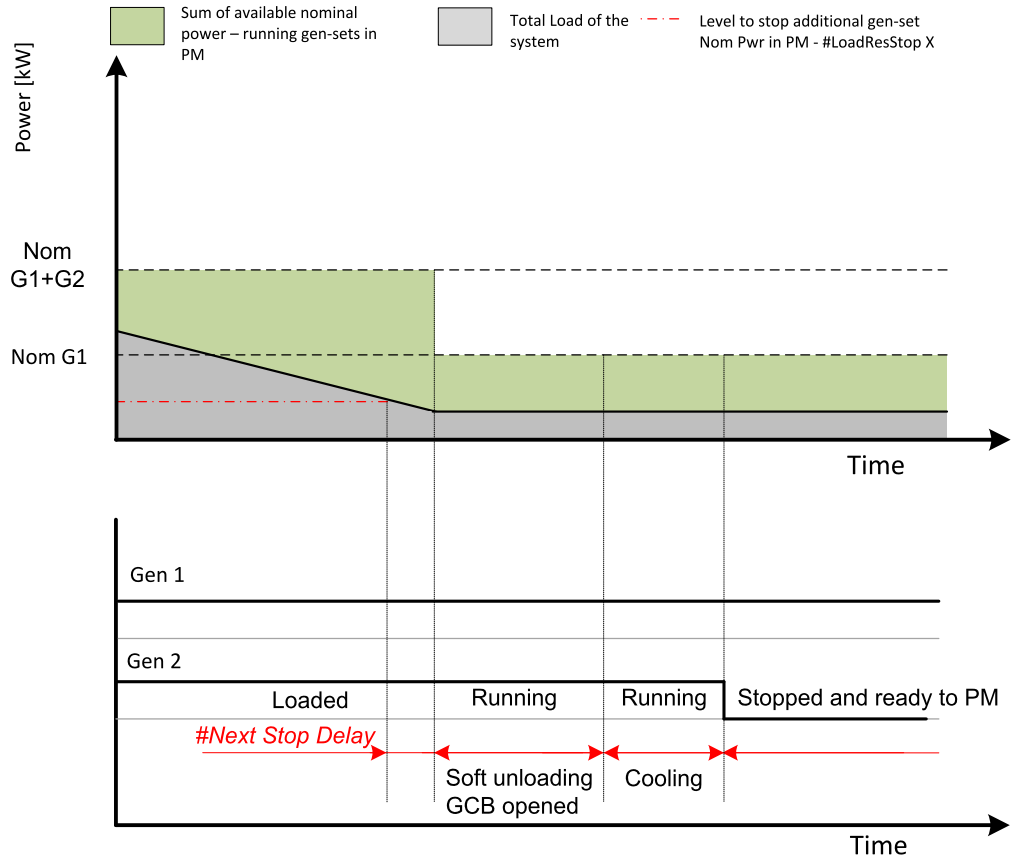



Image 5.20 Stopping sequence of power management

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 122)** and **Relative power management (page 125)**.

The level is illustrated by the red dashed line. If the load reserve keeps over this limit for longer time than defined by setpoint **#Next Engine Stop Delay (page 341)**, 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 334)** is set to ABS [kW] mode.

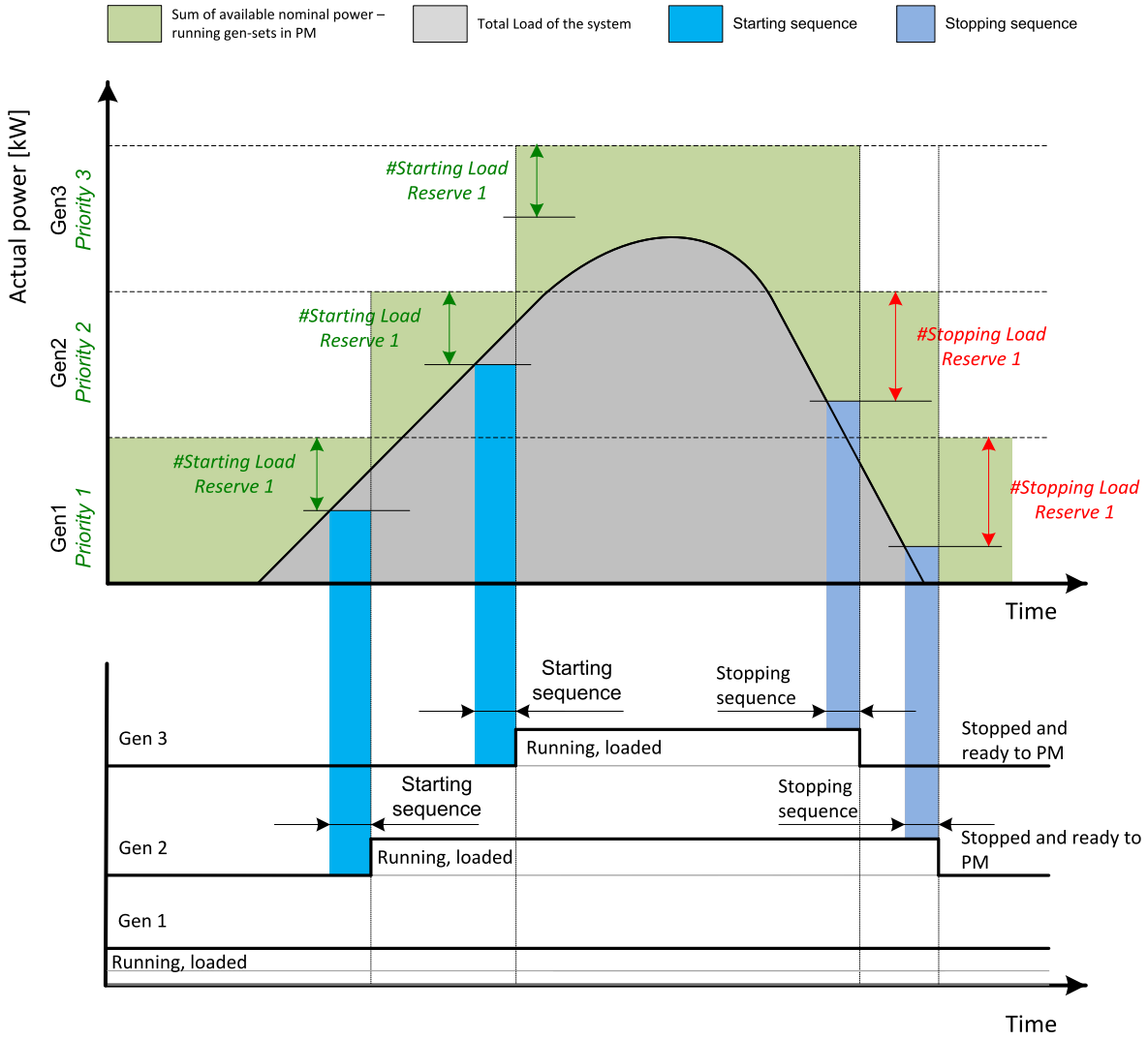



Image 5.21 Power management based on absolute load reserve

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

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

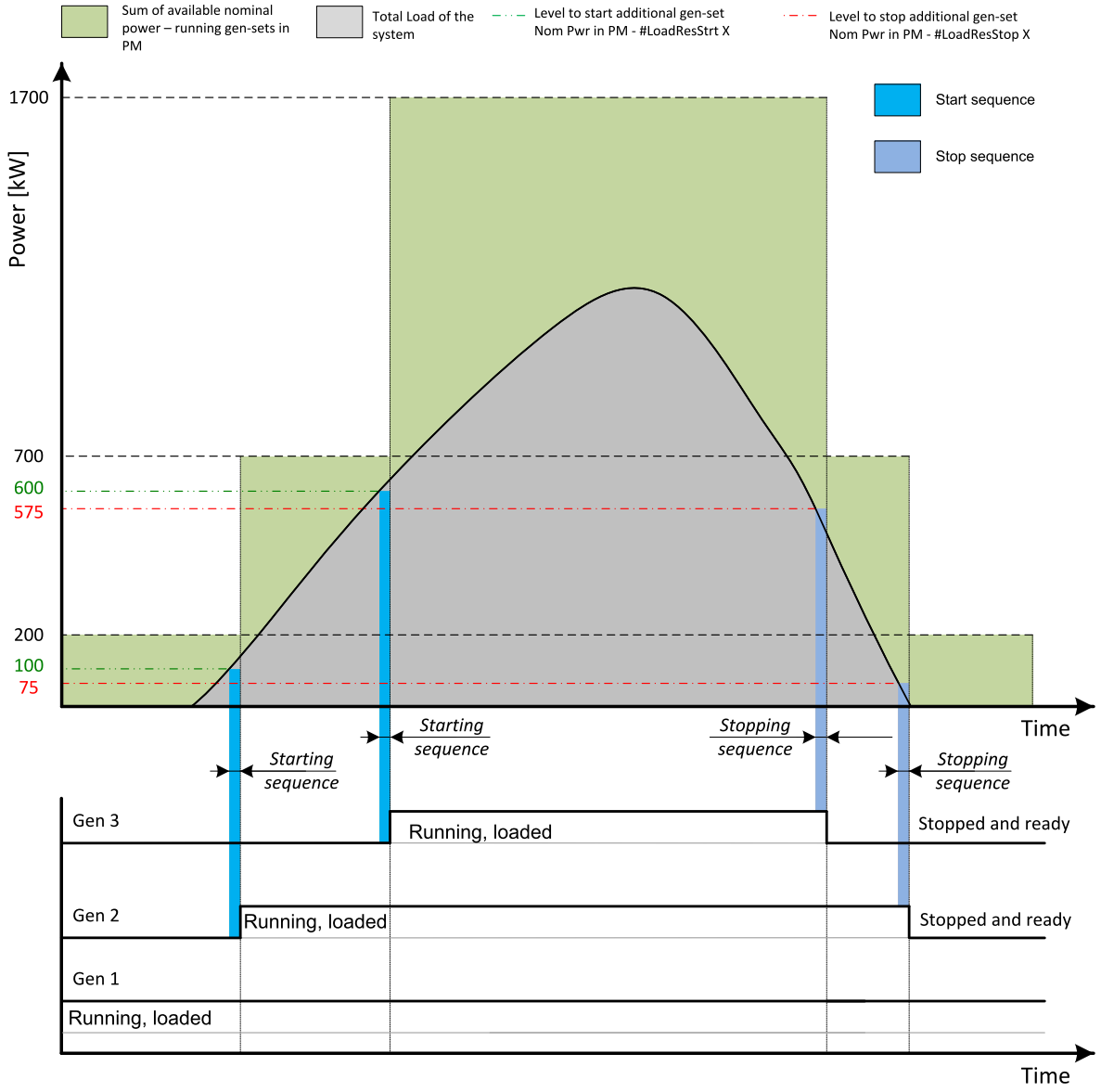



Image 5.22 Absolute power management example

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

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

Sum of nominal power for start - **#Starting Load Reserve 1 (page 336)** (or other selected reserve set) = value of load when additional gen-set requested to start (e.g.: 700 kW – 100 kW = 600 kW).

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

Sum of nominal power for stop - **#Stopping Load Reserve 1 (page 337)** (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 336)** and **#Stopping Load Reserve 1 (page 337)**
- **#Starting Load Reserve 2 (page 338)** and **#Stopping Load Reserve 2 (page 339)** considered if binary input **LOAD RES 2 ACTIVE (PAGE 662)** 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 334)** is set to REL [%] mode.

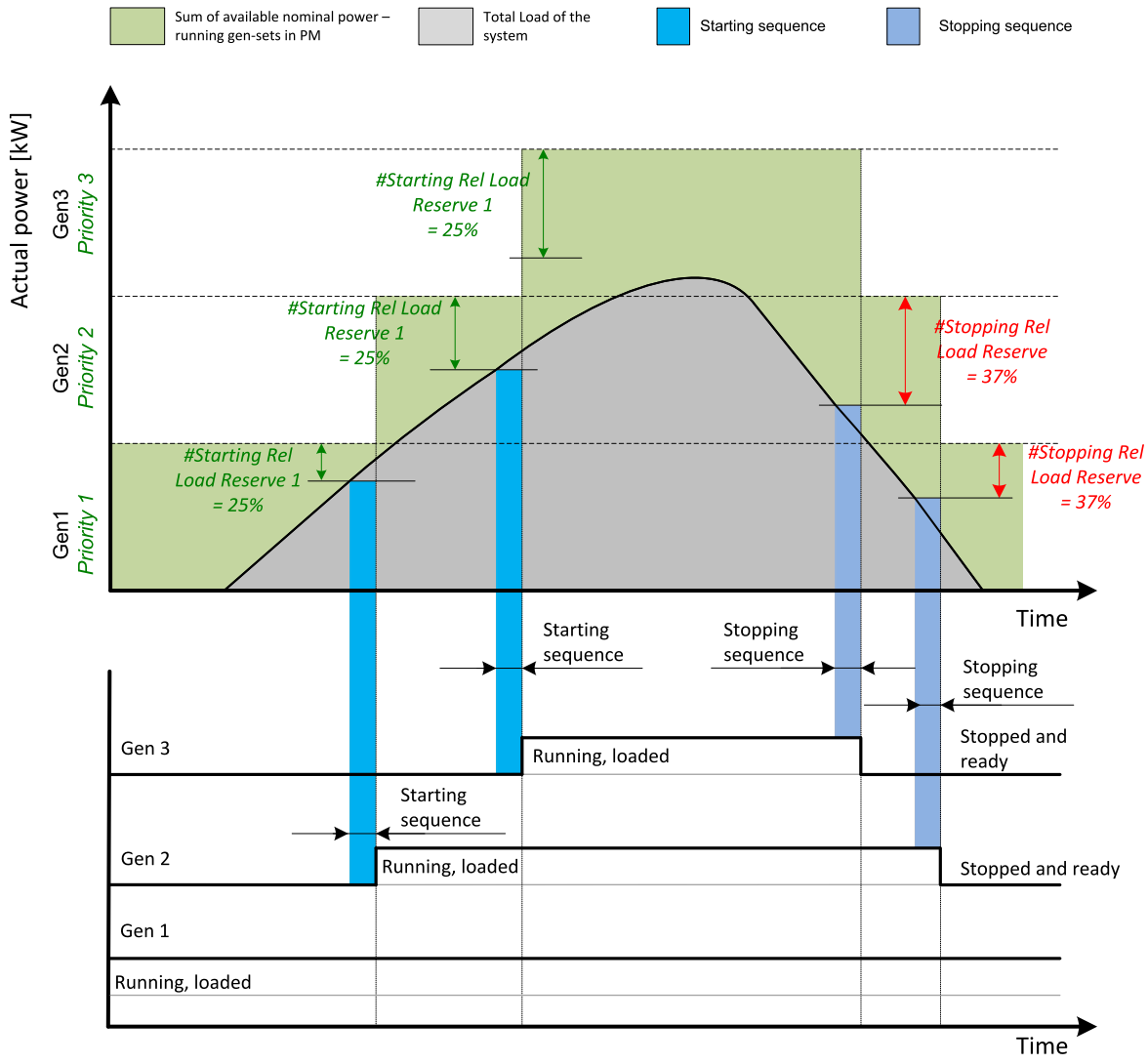



Image 5.23 Power management based on relative load reserve

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

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

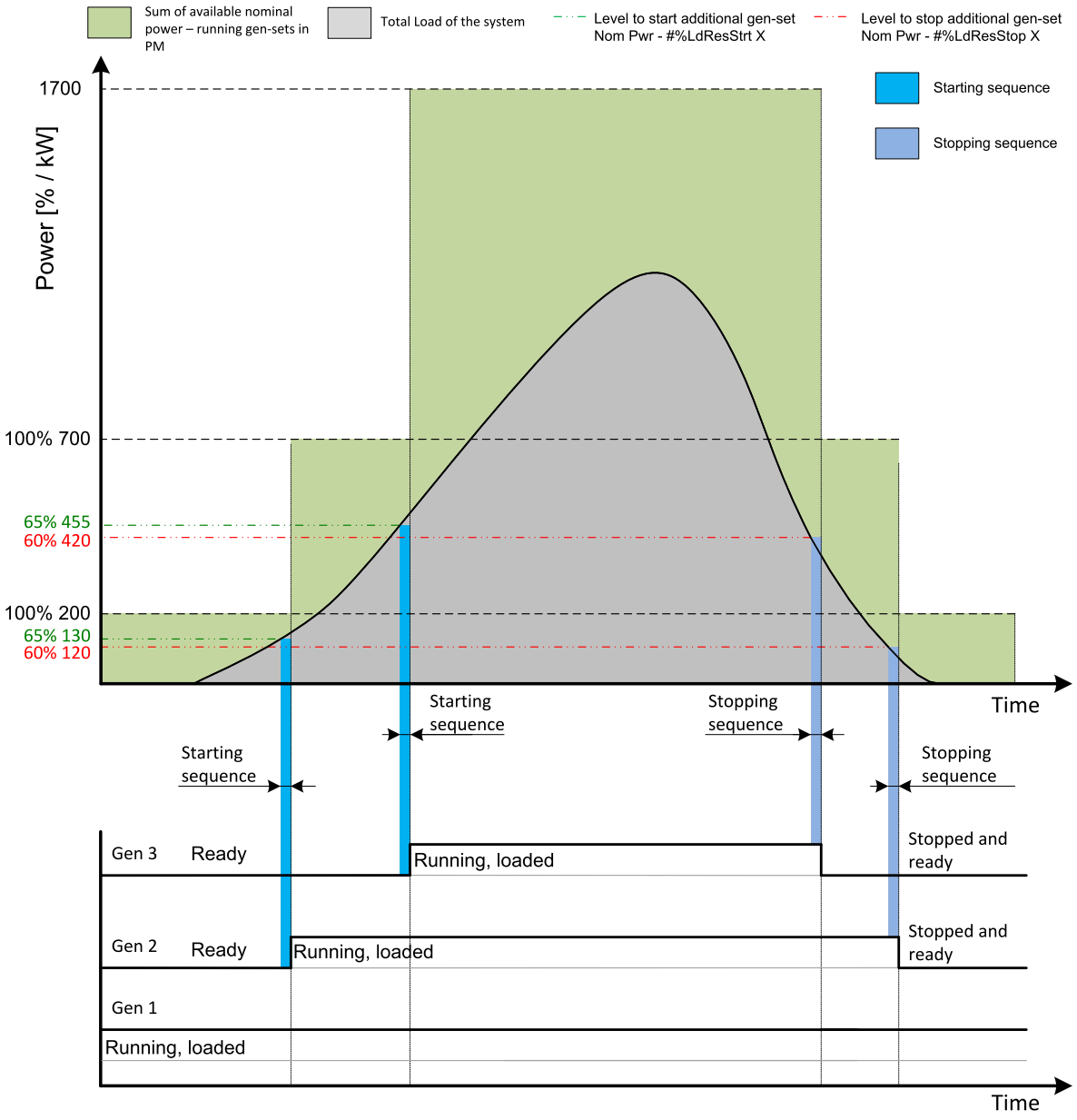



Image 5.24 Relative power management example

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

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

(100 % - **#Starting Rel Load Reserve 1 (page 337)** (or other selected reserve set)) * Sum of Nominal power = Value of load when additional gen-set requested to start in kW (in % of nominal power), e.g.: (100 % – 35 %) * 700 kW = 455 kW (65 % of nominal power).

The red dashed line depicts the value of load at which the additional gen-set is requested to stop. This value of the load value is linked with the setpoint **#Stopping Rel Load Reserve 1 (page 338)** (or other selected reserve set) in following way:

(100 % - **#Stopping Rel Load Reserve 1 (page 338)** (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 337)** and **#Stopping Rel Load Reserve 1 (page 338)**
- **#Starting Rel Load Reserve 2 (page 339)** and **#Stopping Rel Load Reserve 2 (page 340)** considered if binary input **LOAD RES 2 ACTIVE (PAGE 662)** 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 334)**. 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 334)** 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 |

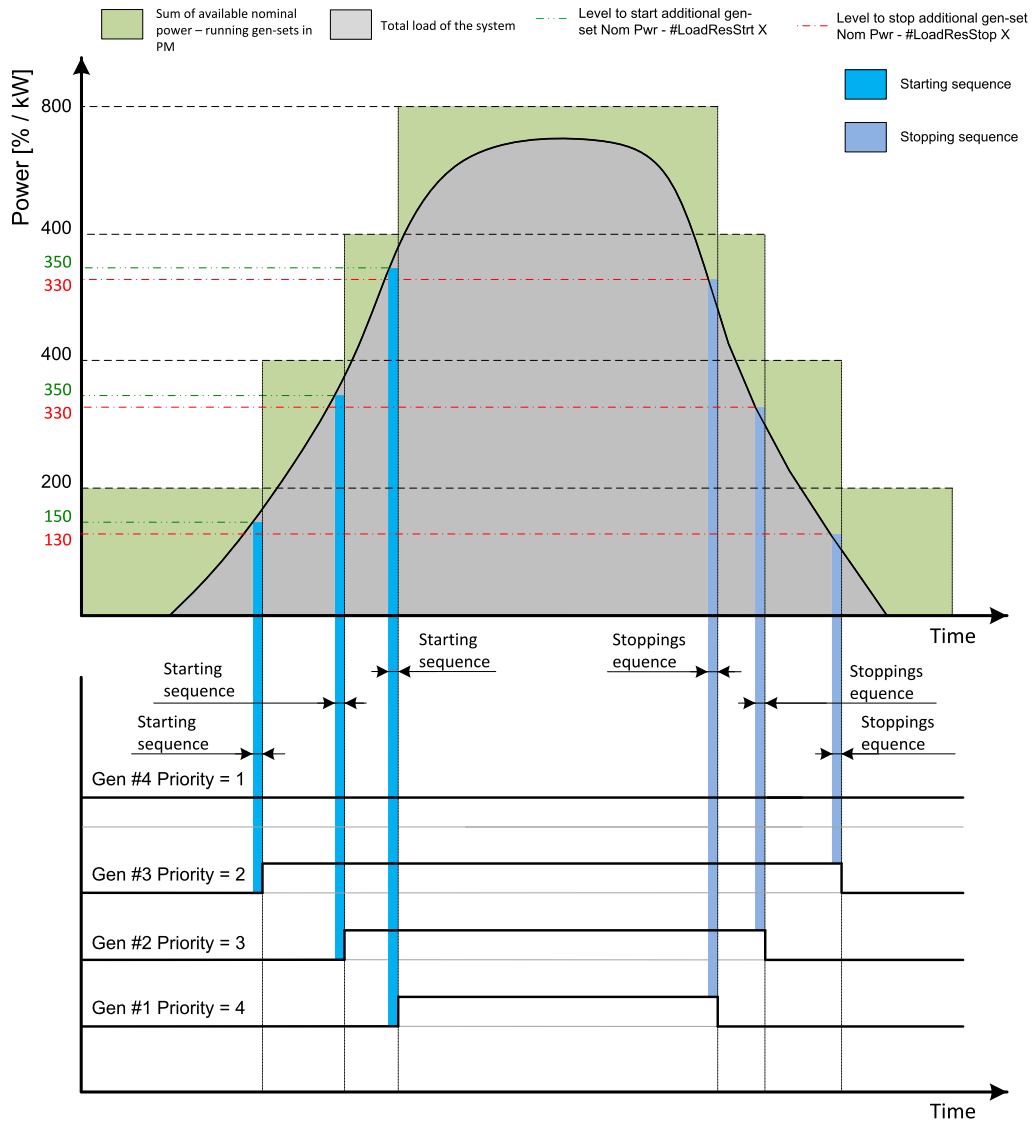



Image 5.25 Example of priorities in power management

By choosing the setpoint **Priority (page 334)** = 1, the gen-set #4 is running all the time in the example shown on the figure above (AUTO mode selected, Power management enabled and LBI **REMOTE START/STOP (PAGE 669)** activated).

The LBI **TOP PRIORITY (PAGE 672)** can be used to force priority 0 into the setpoint **Priority (page 334)**. 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 127)**, 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 334)****. 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 335)** = RUN HOURS.

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

RHE = **Running Hours (page 604)** - **Run Hours Base (page 343)**

RHE is considered value for running hours equalization, **Running Hours (page 604)** is a cumulative sum of run hours available in statistic values of the controller, **Run Hours Base (page 343)** 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 343)** (i.e. **#Run Hours Max Difference (page 343)** + 1), the gen-set(s) with the lowest RHE is/are started.

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

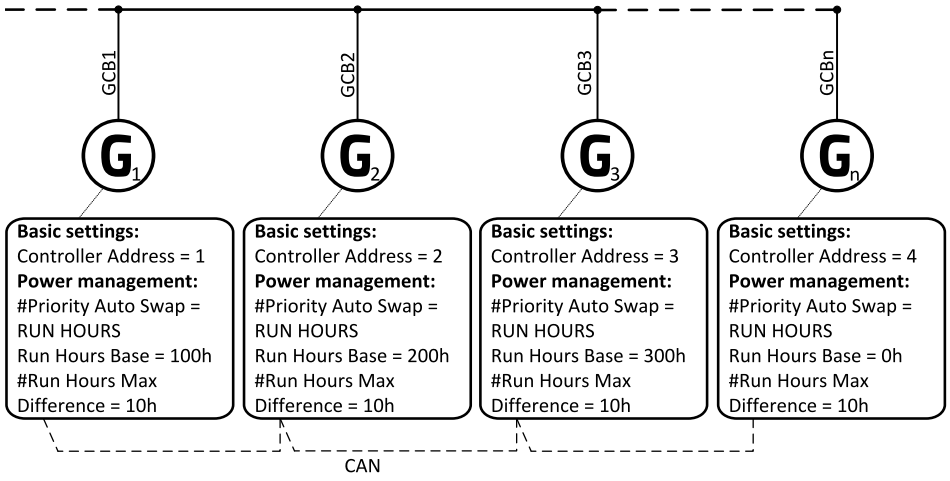



Image 5.26 Example of the system

3 cases are considered:

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

### Case #1:

- Gen-set 1 running hours = 250 -> running hours considered in RHE = 100 (150 - **Run Hours Base (page 343)**)

- Gen-set 2 running hours = 450 -> running hours considered in RHE = 200 (250 - **Run Hours Base (page 343)**)

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 343)** that is set to 10h.

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

The gen-set 1 runs for 100 hours to equalize the RHE of both gen-sets. The gen-set 1 keeps running until the difference between RHE1 and RHE2 exceeds **#Run Hours Max Difference (page 343)** (i.e. 10h). The gen-set 1 runs 100 + **#Run Hours Max Difference (page 343)** + 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 343)**. The gen-set 2 runs 11 hours to equalize the RHE of both gen-sets and then additional **#Run Hours Max Difference (page 343)** + 1 hours (i.e. 11 + 10 + 1 = 22 hours). The evolution of RHE1 and RHE2 is shown on the figure below.

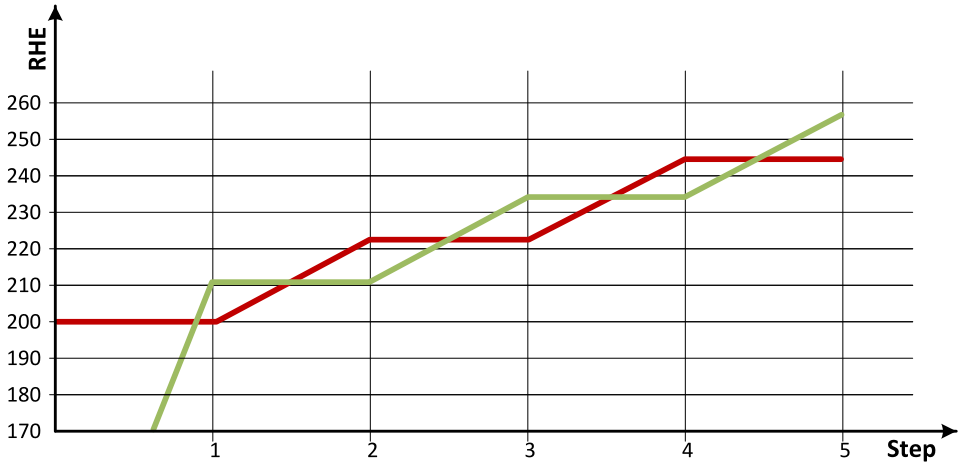



Image 5.27 Run hours equalization - case #1

| 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 343)** +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.

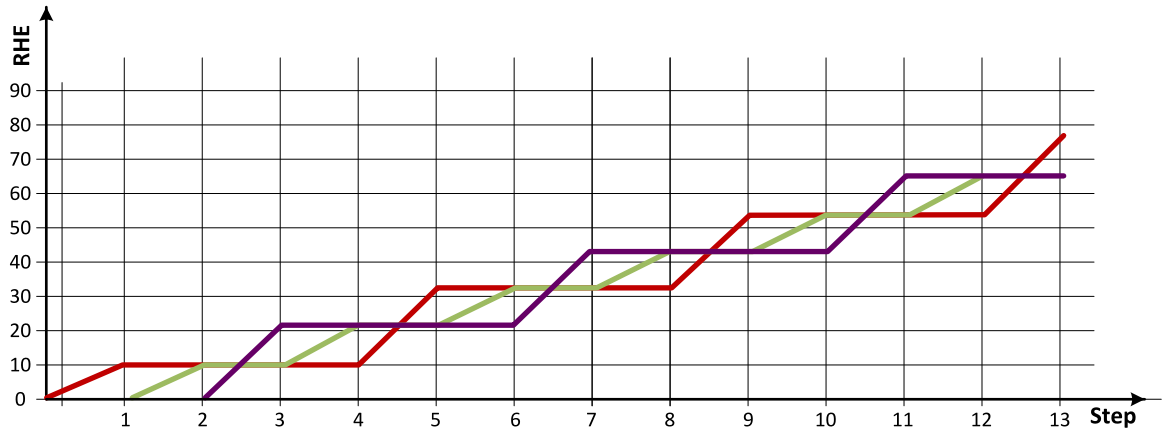



Image 5.28 Run hours equalization - case #2

| 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.

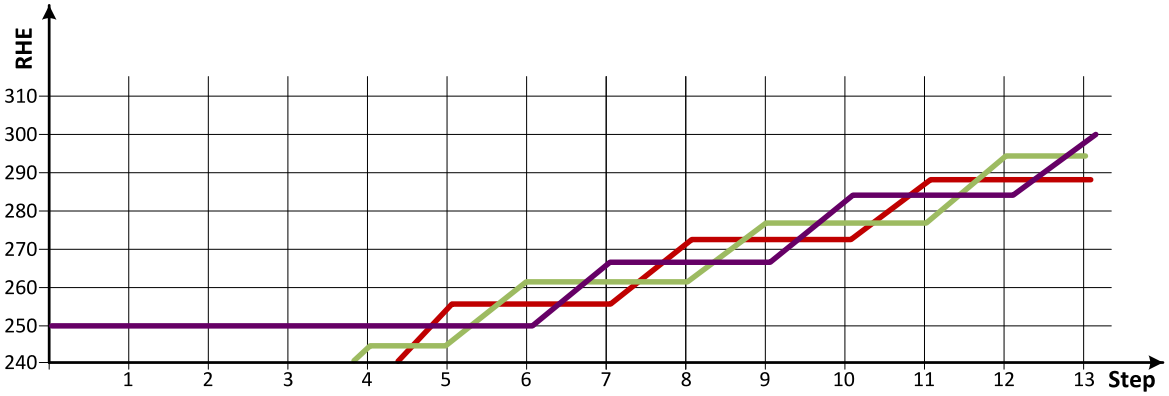



Image 5.29 Run hours equalization - case #3

| step | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RHE1 | 100 | 211 | 211 | 232 | 233 | 255 | 255 | 255 | 272 | 272 | 272 | 288 | 288 | 288 |
| RHE2 | 200 | 200 | 222 | 222 | 244 | 244 | 261 | 261 | 261 | 277 | 277 | 277 | 294 | 294 |
| RHE3 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 266 | 266 | 266 | 283 | 283 | 283 | 299 |
| Run G1 (ΔRHE1) | 0 | 111 | 0 | 22 | 0 | 22 | 0 | 0 | 17 | 0 | 0 | 16 | 0 | 0 |
| Run G2 (ΔRHE2) | 0 | 0 | 22 | 0 | 22 | 0 | 17 | 0 | 0 | 16 | 0 | 0 | 17 | 0 |
| Run G3 (ΔRHE3) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 0 | 0 | 17 | 0 | 0 | 16 |

***Note:*** *Setting **#Run Hours Max Difference (page 343)** = 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 343)** 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 335)** = 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 334)** = ABS (kW)
  - Nominal power of gen-set > actual load demand + **#Starting Load Reserve 1 (page 336)**
- **#Power Management Mode (page 334)** = REL (%)
  - Nominal power of gen-set > (actual load demand × 100)/(100 - **#Starting Rel Load Reserve 1 (page 337)**)

- If two or more gen-sets are available for taking over the load always the one with the lowest CAN address is chosen.
- If load demand is higher than nominal power of the biggest gen-set, this one is fixed and the whole process repeats from point the third bullet.

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

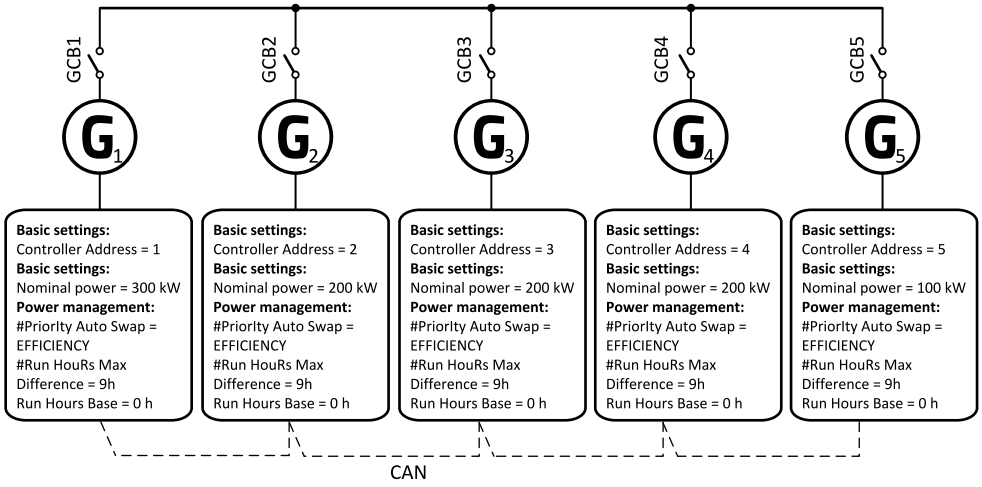



Image 5.30 Example of the system

Following table provide an example of gen-set selection in function of system load evolution. The table is an example of Efficiency priority optimization function (**#Power Management Mode (page 334)** = ABS (kW) and **#Starting Load Reserve 1 (page 336)** = 20 kW).

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

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

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

## Minimal running power

Minimum Running Power function is used to adjust a minimum value of the sum of nominal power of all running gen-sets. If the function is active, then the gen-sets would not be stopped, although the reserve for stop is fulfilled. Function is activated via logical binary input **Min Run Power Active (page 665)**.

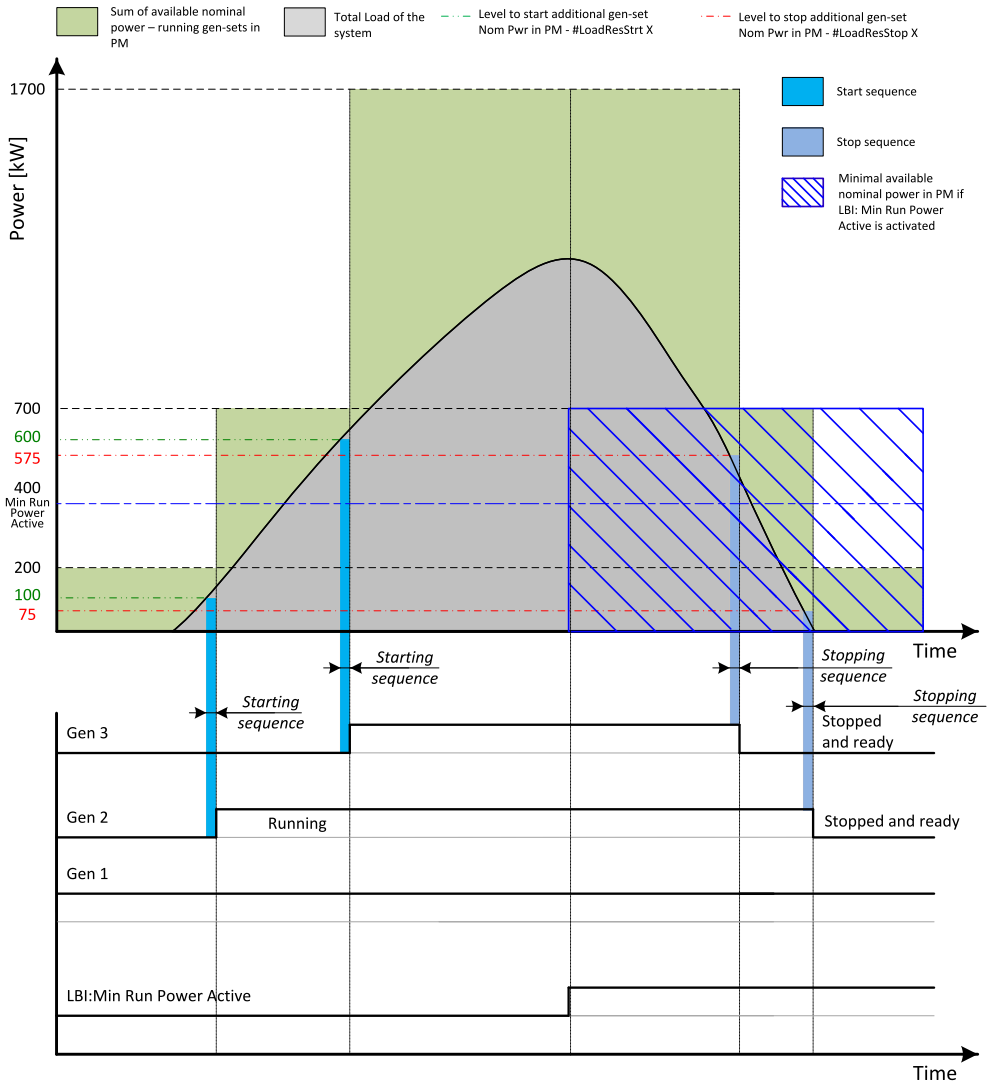



Image 5.31 Minimal running power

Setpoint **#Min Run Power (page 340)** is adjusted to 400 kW. Once the **MIN RUN POWER ACTIVE (PAGE 665)** 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.

## 5.5.11 Control groups

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

- The group which the particular controller belongs to is adjusted by the setpoint **Control Group (page 345)**. Use the defaulf setting 1 with all controllers, if there is no bus-tie breaker.
- The information which groups are currently linked together is being distributed via the CAN. Each controller can provide information about one BTB breaker. The breaker position is detected by the input function *GroupLink* (i.e. this input is to be connected to the breaker feedback).

- The two groups which are connected together by the BTB, are defined with parameters **Group Link L (page 345)** and **Group Link R (page 346)**.
- Controller sends via CAN2 bus information that controllers from groups *Group Link L* and *Group Link R* are linked together, if the *Group link* function (signal associated with the function) is active. It sends information that the groups are separated, if the *Group link* function is not active.

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

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

**Example:**

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

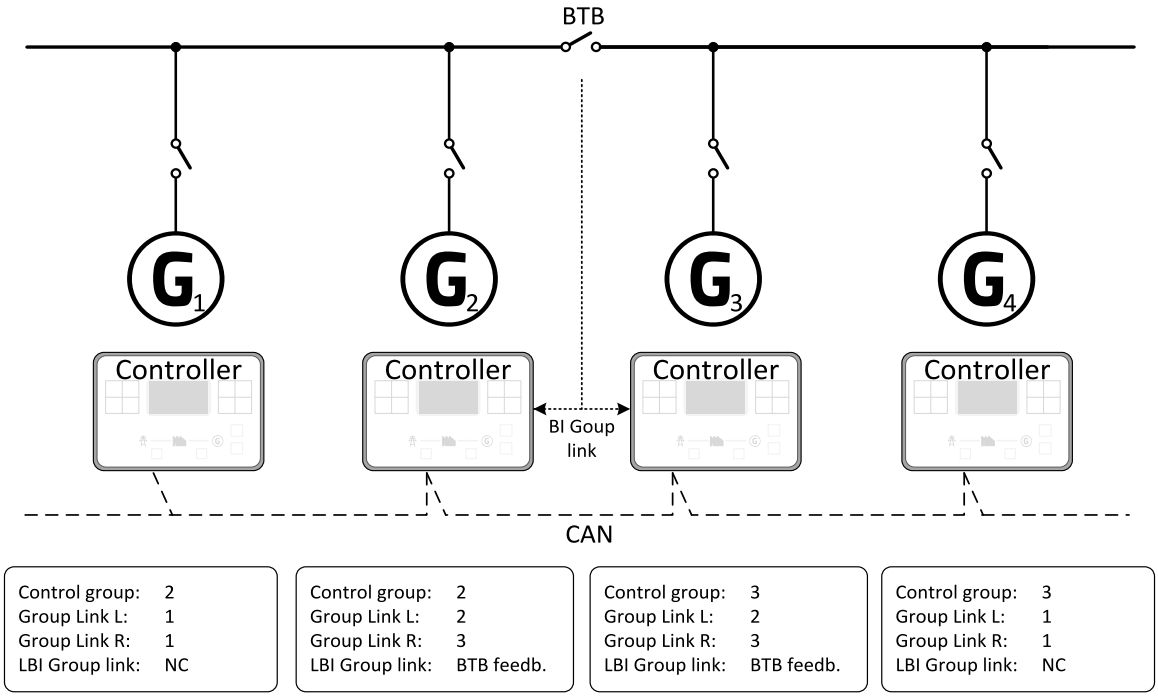



Image 5.32 Example of control groups

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

## 5.5.12 Distributed power management signals

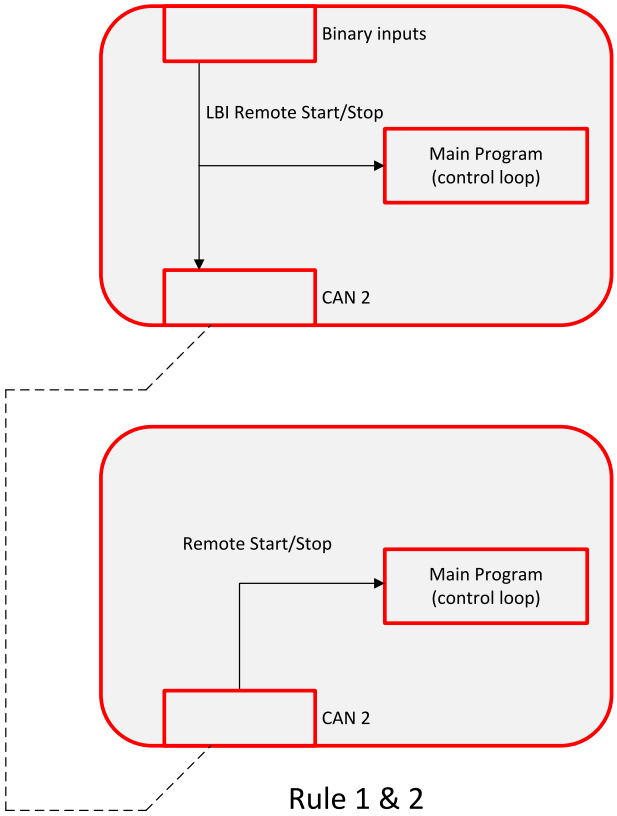
Sharing of multiple Logical Binary Input (LBI) functions is critical for power management system operation, because several power management functionality require simultaneous activation of LBI functions in controllers, which are involved in power management operation. It can be done either automatically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

These LBI functions are shared automatically:

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

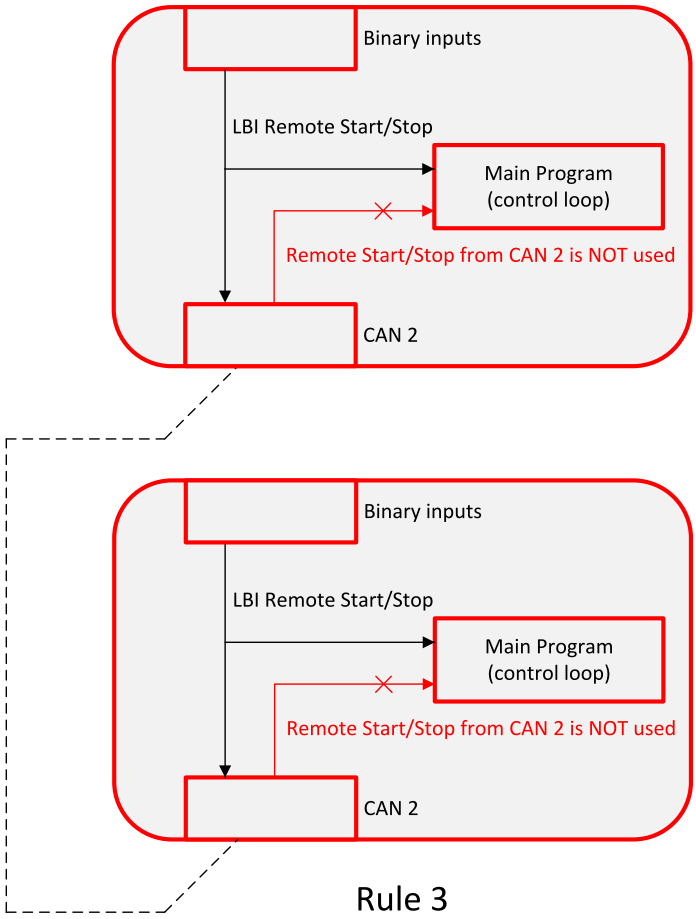
These rules applies to the automatic sharing of the selected signals:

1. LBI state is automatically shared via CAN2 bus, if corresponding LBI function is configured in a controller.
   > **Example:** Logical input Remote Start/Stop is configured with a controller. State of the signal is automatically transmitted to other controllers via CAN2 bus as System Start/Stop.
2. LBI state received from CAN2 bus is automatically used, if corresponding LBI function is not configured in a controller.
   > **Example:** LBI Remote Start/Stop is not configured with a controller, but automatically shared System Start/Stop is received from CAN2 bus. Controller follows state of the shared LBI signal then.



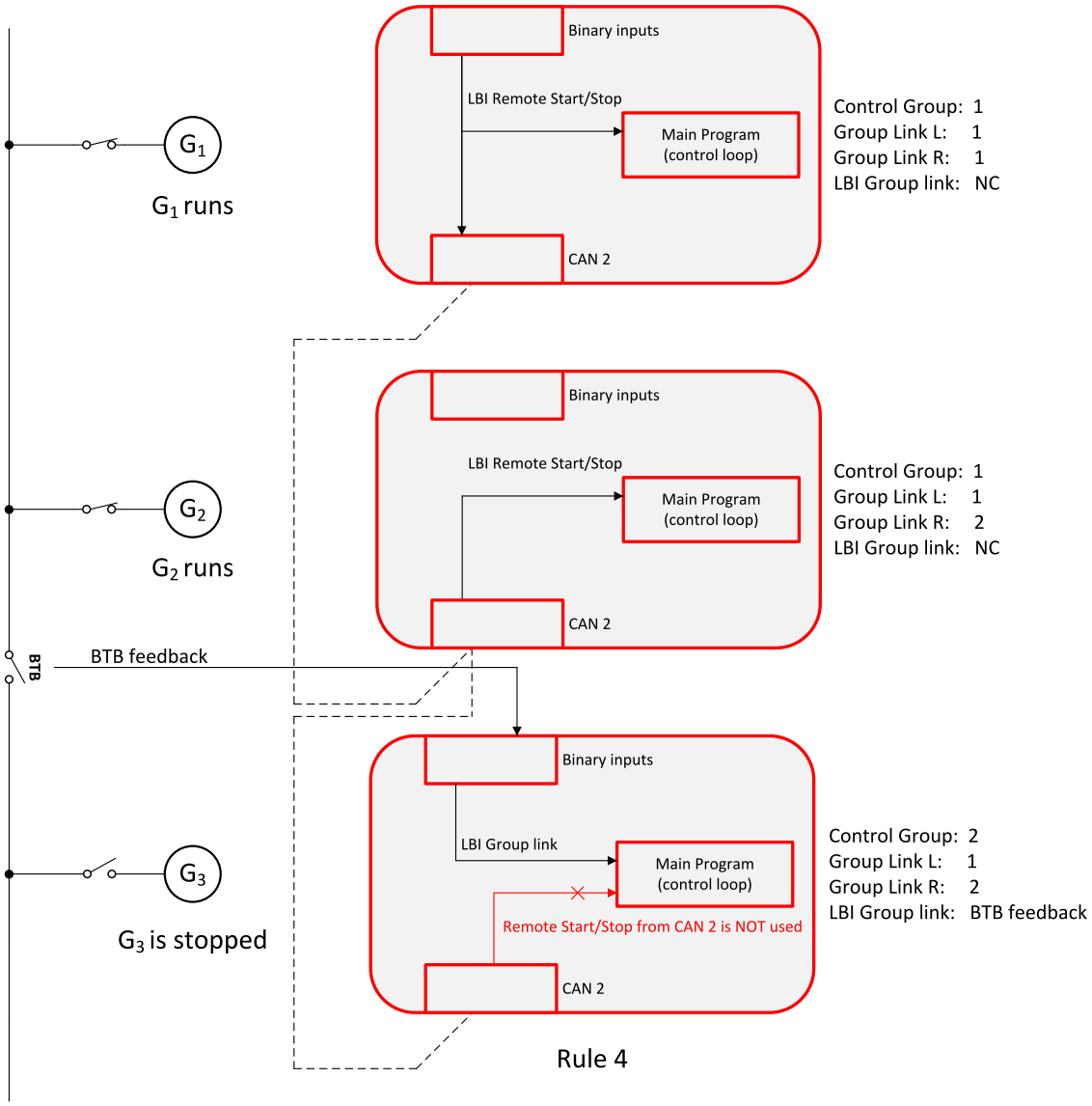

Rule 1 & 2

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).

# 5.5.13 Regulation loops

## Regulation loops overview

### Regulation loops overview

| Loop type | Related applications | Related setpoints |
|---|---|---|
| Frequency | MINT, SPtM, MCB, MGCB | **Frequency Gain (page 348)**, **Frequency Int (page 349)** |
| Load sharing | MINT | **Load Sharing Gain (page 350)**, **Load Sharing Int (page 350)** |
| Load | MINT, SPtM, MCB, MGCB | **Load Gain (page 349)**, **Load Int (page 350)** |
| Voltage | MINT, SPtM, MCB, MGCB | **Voltage Gain (page 357)**, **Voltage Int (page 357)** |

| Loop type | Related applications | Related setpoints |
|---|---|---|
| VAr sharing | MINT | **VAr Sharing Gain (page 358)**, **VAr Sharing Int (page 358)** |
| PF control | MINT, SPtM, MCB, MGCB | **PF Gain (page 357)**, **PF Int (page 358)** |
| Angle regulation | MINT, SPtM, MCB, MGCB | **Angle Gain (page 349)** |

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 347)** or **Voltage Regulator Bias (page 355)** in case of voltage regulator output.

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

### MINT regulation loops

| Loop type | Description |
|---|---|
| Frequency | The frequency loop is active in the first phase of synchronization when the generator frequency is regulated to match the mains/bus frequency. |
| Load sharing | The load sharing loop is active in multiple-island operation. |
| Load | The load regulation loop is active when single gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa. This regulation loop is also active when multiple gen-sets are running in parallel with Mains. |
| Voltage | The voltage regulation loop gets active after **Minimal Stabilization Time (page 277)**. The loop is deactivated at the beginning of cooling sequence. |
| VAr sharing | The VAr sharing loop is active in multiple-island operation. |
| PF control | The PF control loop is active when single gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa. This regulation loop is also active when multiple gen-sets are running in parallel with Mains. |
| Angle regulation | The differential angle control loop is active during the synchronization when phase match type of synchronization is used. |

### SPtM regulation loop

| Loop type | Description |
|---|---|
| Frequency | The frequency regulation loop gets active after **Minimal Stabilization Time (page 277)**. The loop is deactivated at the beginning of cooling sequence. Loop is not active in parallel operation. In parallel operation PF control loop is used. |
| Load | The load regulation loop is active when gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa. |
| Voltage | The voltage regulation loop gets active after **Minimal Stabilization Time (page 277)**. The loop is deactivated at the beginning of cooling sequence. Loop is not active in parallel operation. In parallel operation PF control loop is used. |
| PF control | The PF control loop is active when gen-set is running in parallel with mains and during |

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

## Adjustment of regulation loops

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

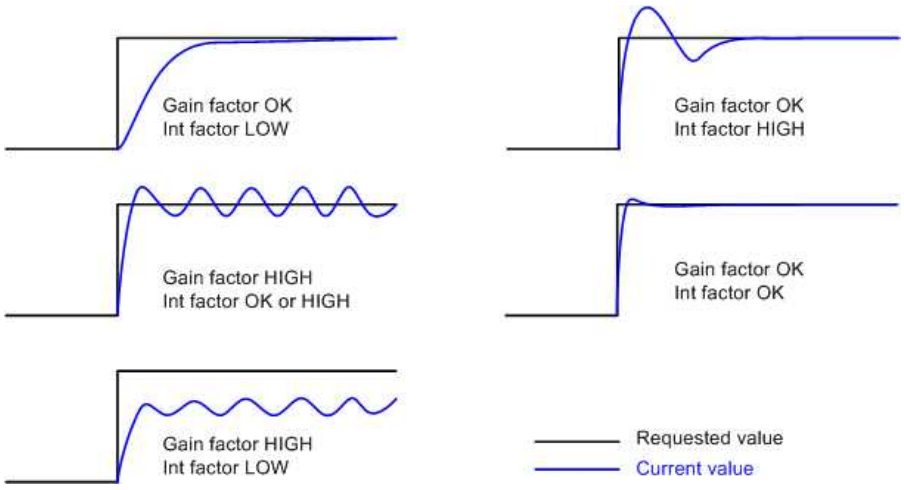



Image 5.33 Typical responses of PI regulator

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.**

# 5.5.14 Speed/Load control

The speed control output is used to control the speed or the power of the engine. The frequency regulation, load regulation and load sharing are realized through the speed control. The speed request is internal value of the regulator. This value is transformed to range -10 .. 10 V based on setpoints **Speed Governor Low Limit (page 347)** and **Speed Governor High Limit (page 347)**. 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.

The direction of speed regulation required by Speed regulator of the engine is given by the setpoint **Speed Regulator Character (page 346)**. A full range change of the speed governor output (from **Speed Governor Low Limit (page 347)** to **Speed Governor High Limit (page 347)**) should cause 5-10% change of the engine speed (**Speed Governor Low Limit (page 347)** ~ 95% **Nominal RPM (page 263)**, **Speed Governor Bias (page 347)** ~ 100% **Nominal RPM (page 263)**, **Speed Governor High Limit (page 347)** ~ 105% **Nominal RPM (page 263)**).

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

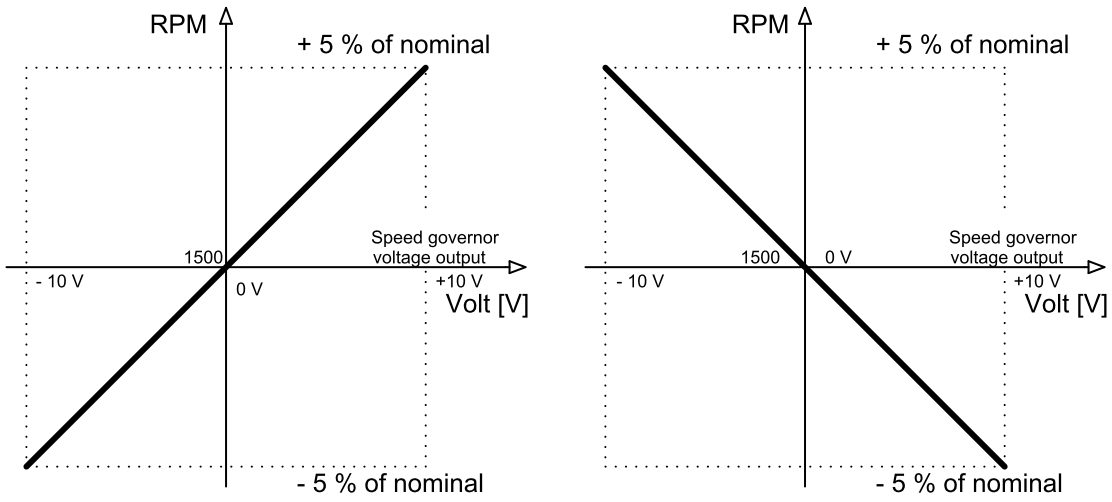



Image 5.34 Example of speed governor curve

## 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 734)** and **SPEED DOWN (PAGE 733)**. Length of pulses **SPEED UP (PAGE 734)** and **SPEED DOWN (PAGE 733)** 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 348)**. **Tau Speed Governor Actuator (page 348)** 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 347)**, **Speed Governor Low Limit (page 347)** and **Speed Governor High Limit (page 347)** to achieve frequency according to setpoint **Nominal Frequency (page 262)**.
- 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 348)** to unstable speed control and decrease value by 30 % to insure stable performance.
- Adjust **Frequency Int (page 349)** 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 349)** control is off).
- Set **Angle Gain (page 349)**. Synchroscope on the controller measure screen should move slowly and stop in “up“ position. Set **Angle Gain (page 349)** 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 250)** setpoint to 30 % of one gen-set.
2. Set **Load Gain (page 349)** to the same value as **Angle Gain (page 349)**. Set **Load Int (page 350)** 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 250)** value. Check that gen-set power is positive (CT polarity).
5. Increase **Load Int (page 350)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 350)** factor is set to zero gen-set load can differ from required **#System BaseLoad (page 250)**.
6. To adjust and optimize **Load Int (page 350)** change **#System BaseLoad (page 250)** several times between 30 and 70 % of **Nominal Power (page 257)**. Usually setting **Load Int (page 350)** 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 347)** or **Speed Governor High Limit (page 347)**)
   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 245)** = BASELOAD, set **Baseload (page 248)** setpoint to 30 % **Nominal Power (page 257)** of gen-set.

2. Set **Load Gain (page 349)** to the same value as **Angle Gain (page 349)**. Set **Load Int (page 350)** 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 248)** value. Check that gen-set power is positive (CT polarity).
5. Increase **Load Gain (page 349)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 350)** factor is set to zero gen-set load can differ from required **Baseload (page 248)**.
6. To adjust and optimize **Load Int (page 350)** change **Baseload (page 248)** several times between 30 and 70 % of **Nominal Power (page 257)**. Usually setting **Load Int (page 350)** 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 347)** or **Speed Governor High Limit (page 347)**)
   b. Speed governor actuator is not mechanically limited or operates in a small section of the throttle range.

## 5.5.15 Voltage/PF control

The voltage control output is used to control the voltage or the power factor of the engine. The voltage regulation, PF regulation and VAr sharing are realized through the voltage control. The voltage request is internal value of the regulator. This value is transformed to range -10 .. 10 V based on setpoints **Voltage Regulator Low Limit (page 356)** limit and **Voltage Regulator High Limit (page 356)**. 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 355)**. A full range change of the AVR output (from **Voltage Regulator Low Limit (page 356)** to **Voltage Regulator High Limit (page 356)**) should cause 5-10% change of the voltage (**Voltage Regulator Low Limit (page 356)** ~ 95% **Nominal Voltage Ph-N (page 261)**, **Voltage Regulator Bias (page 355)** ~ 100% **Nominal Voltage Ph-N (page 261)**, **Voltage Regulator High Limit (page 356)** ~ 105% **Nominal Voltage Ph-N (page 261)**).

#### 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 699)** and **AVR Down (page 699)**. Length of pulses **AVR Up (page 699)** and **AVR Down (page 699)** 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 356)**. **Tau Voltage Governor Actuator (page 356)** defines the pulse duration which is needed for the voltage controller to travel from minimal position to the maximal position. The Maximum length of pulses is limited to 5s, the minimal length of pulses is limited to 150 ms and minimal length between the pulses is 200 ms.

# Voltage/PF control adjustment

## Voltage adjustment

- Set **Voltage Gain (page 357)**, **Voltage Int (page 357)** to zero and **Voltage Regulator Bias (page 355)** to 50%.
- Start the gen-set in MAN Mode to without load.
- Adjust generator voltage to **Nominal Voltage Ph-N (page 261)** by change of **Voltage Regulator Bias (page 355)**.
- Change **Voltage Regulator Bias (page 355)** to 0% and 100% to check generator voltage control range (typically ± 10 % of **Nominal Voltage Ph-N (page 261)**).
- Set **Voltage Regulator Bias (page 355)** to again reach **Nominal Voltage Ph-N (page 261)** on the generator.
- When gen-set is running unloaded increase carefully **Voltage Gain (page 357)** to unstable point and then decrease value by 30 % to insure stable performance.
- Adjust **Voltage Int (page 357)** (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 357)** and **PF Int (page 358)** as in the chapter **Voltage adjustment (page 146)** for parameters **Voltage Gain (page 357)** and **Voltage Int (page 357)**.
- Set **#System BaseLoad (page 250)** = 30 % of **Nominal Power (page 257)** and **#System Power Factor (page 251)** = 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 357)** to unstable point and then decrease the value by 30 % to insure stable performance.
- Adjust **PF Int (page 358)** (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 355)** change or by **#System BaseLoad (page 250)** 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 357)** and **PF Int (page 358)** as in the chapter **Voltage adjustment (page 146)** for parameters **Voltage Gain (page 357)** and **Voltage Int (page 357)**.
- Set **Baseload (page 248)** = 30 % of **Nominal Power (page 257)** and **Base Power Factor (page 248)** = 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 357)** to unstable point and then decrease the value by 30 % to insure stable performance.
- Adjust **PF Int (page 358)** (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 355)** change or by **Baseload (page 248)** change.*

# 5.5.16 Gen-set operation states

## Engine state machine

| | |
|---|---|
| **Init** | Autotest during controller power on. |
| **Not ready** | Gen-set is not ready to start.<br>**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 729)** output is closed.<br>**Example:** Usually used for preheating or processes executed prior gen-set start. |
| **Cranking** | Engine is cranking, **STARTER (PAGE 735)** output is closed |
| **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 711)** is closed. |
| **Soft unld** | Gen-set power is ramping down |
| **Cooling** | Gen-set is cooling before stop. |
| **Stop** | Stop.<br>**Example:** Automatic or manual stop command was issued, engine is stopping. |
| **Shutdown** | Shut-down alarm activated. |
| **Ventil** | Gas engine - ventilation of unburned fuel when stop command comes during cranking with gas |
| **SDVentil** | Gas engine - ventilation of unburned fuel after unsuccessful start attempt |
| **EmergMan** | **EMERGENCY MAN (PAGE 656)** gen-set operation.<br>**Example:** Used for bypass the controller and engine manual start. |

## Engine started conditions

- Engine speed (RPM) > **Starting RPM (page 271)** or
- Oil pressure > **Starting Oil Pressure (page 272)** or
- Binary input **OIL PRESSURE (PAGE 666)** is in logical 0 or
- D+ terminal active (reached 80% of supply voltage) for minimum 1 s or
- Generator voltage > 25% of **Nominal Voltage Ph-N (page 261)** or **Nominal Voltage Ph-Ph (page 261)** (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 271)****.*

## Engine running conditions

- Engine speed (RPM) > **Starting RPM (page 271)** or
- Oil pressure > **Starting Oil Pressure (page 272)** or

- Binary input **OIL PRESSURE (PAGE 666)** is in logical 0 or
- Generator voltage > 25% of **Nominal Voltage Ph-N (page 261)**

## Still engine conditions

- Engine speed (RPM) < **Starting RPM (page 271)** or
- Oil pressure < **Starting Oil Pressure (page 272)** or
- Binary input **OIL PRESSURE (PAGE 666)** is in logical 1 or
- Generator voltage < 50 V (any phase)

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

When any engine running conditions are appeared on still engine than the **Wrn Stop Fail (page 808)** is activated with following delay:

- 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 272)**, Wrn Stop Fail has delay 1 s
- Binary input **OIL PRESSURE (PAGE 666)** 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 than the controller will wait extra 12 s before leaving the Machine state Stop and than it will release the **STOP SOLENOID (PAGE 736)** output.

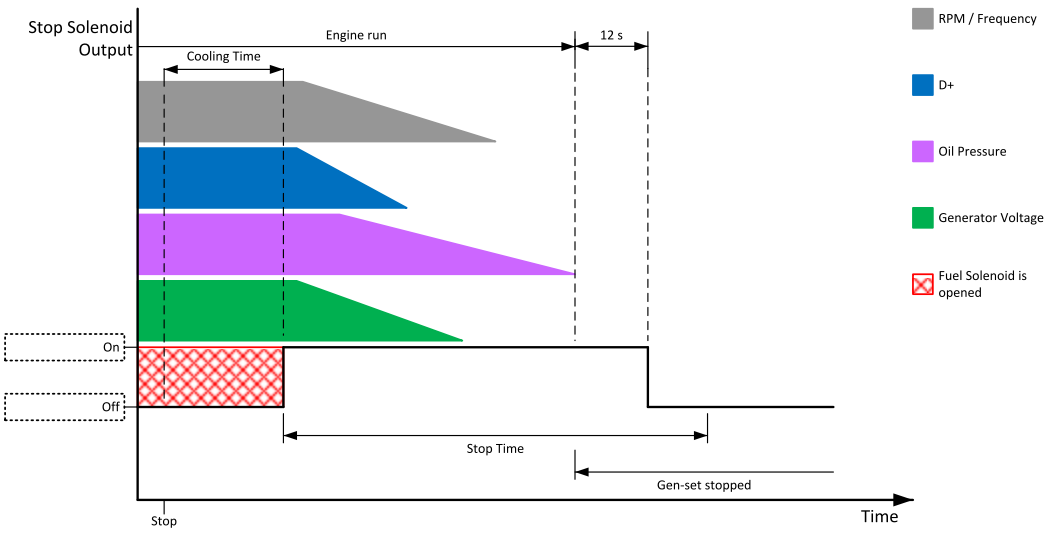



Image 5.35 Engine stops in **Stop Time (page 280)**

When the total time of stopping will exceed setpoint **Stop Time (page 280)** than the **Wrn Stop Fail (page 808)** and binary outputs are activated. The controller will continuously try to stop the engine.

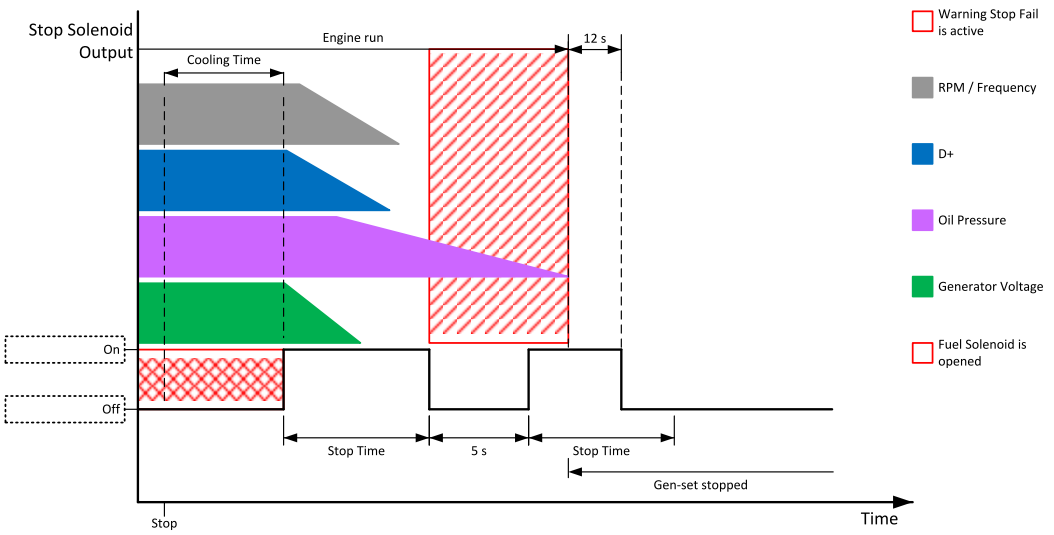



Image 5.36 Engine stops after first **Stop Time (page 280)**

## Electric state machine

| | |
|---|---|
| **MainsOper** | Mains is present and all its values are within limits.<br>**Example:** MCB is closed, GCB is opened |
| **MainsFlt** | Mains fails |
| **IslOper** | Island operation<br>**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 |

# 5.5.17 Alarm management

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

- One alarm of any type can be assigned to each binary input.
- Two alarms (one yellow and one red type) can be assigned to each analog input.
- There are also **Built-in alarms (page 154)** with fixed alarm types.
- Each alarm is written to the **Alarmlist (page 153)**.
- Each alarm causes a record to be written into the history log.
- Each alarm activates the Alarm and Horn output.
- Each alarm can cause sending of a SMS message or an email.

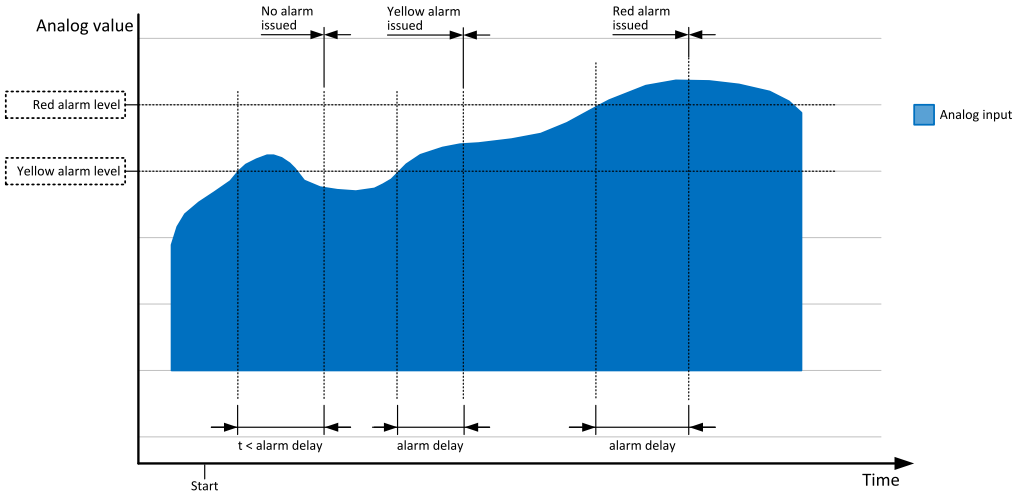



Image 5.37 Analog input alarm evaluation principle

## Alarm handling

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

- The alarm is evaluated all the time when the controller is switched on.
- The alarm is evaluated only when the engine is running. This type should be used for e.g. oil pressure. These alarms begin to be evaluated after the engine has been started with the delay given by the setpoint **Protection Hold Off (page 278)**.
- 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 278)** 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 657)**, all active alarms change to confirmed state. Confirmed alarms will disappear from the Alarmlist as soon as the respective condition dismisses. If the condition is dismissed before acknowledging the alarm, the alarm will remain in the Alarmlist as Inactive.

***Note:*** *The input **Sd Override (page 672)** can be used for temporary disabling of red alarms to shutdown the engine. This input may be used in situations where providing the power is extremely important – e.g. if the gen-set drives pumps for fire extinguishers (sprinklers).*

## Alarm states

An alarm can have following states:

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




Image 5.38 Alarm List

## Alarm types - Level 1

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

### Warning (Wrn)

The alarm appears in the Alarmlist and is recorded into the history log. Activates the output **AL COMMON WRN (PAGE 679)** as well as the standard alarm outputs (**HORN (PAGE 717)** and **ALARM (PAGE 688)**).

### Alarm indication (AL Indic)

The event is only indicated in the Alarmlist. It disappears for the alarmist automatically as soon as the cause disappears. Standard alarm outputs (**HORN (PAGE 717)** and **ALARM (PAGE 688)**) are not activated.

### History record only (HistRecOnl)

The event is recorded into the history. Standard alarm outputs (**HORN (PAGE 717)** and **ALARM (PAGE 688)**) are not activated.

## Alarm types - Level 2

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

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

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

### Shutdown (Sd)

The alarm appears in the alarmlist and is recorded into the history log. It causes immediate stop of the Gen-set without unloading and cooling phase. Also GCB breaker is open. The gen-set cannot be started again while

there is a shutdown alarm in the alarmlist. Activates the output **AL COMMON SD (PAGE 679)** as well as the standard alarm outputs (**HORN (PAGE 717)** and **ALARM (PAGE 688)**).

### Breaker open and cool down (BOC)

The event appears in the alarmlist and is recorded into the history log. It causes immediate opening of the GCB (without unloading) and then the standard stop sequence with cooling follows. The gen-set cannot be started again while there is a BOC alarm in the alarmlist. Activates the output **AL COMMON BOC (PAGE 678)** as well as the standard alarm outputs (**HORN (PAGE 717)** and **ALARM (PAGE 688)**).

### Slow stop (Stp)

The alarm appears in the alarmlist and is recorded into the history log. It causes stop of the gen-set by the standard stop sequence, i.e. including unloading and cooling phase. The gen-set cannot be started again while there is a slow stop alarm in the alarmlist. Activates the output **AL COMMON STP (PAGE 679)** as well as the standard alarm outputs (**HORN (PAGE 717)** and **ALARM (PAGE 688)**).

## Sensor fail detection (FLS)

If the measured resistance on an analog input exceeds the valid range, a sensor fail will be detected and a sensor fail message will appear in the **Alarmlist (page 153)**. The valid range is defined by the most-left (RL) and most-right (RH) points of the sensor characteristic ±12.5% from RH-RL.

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

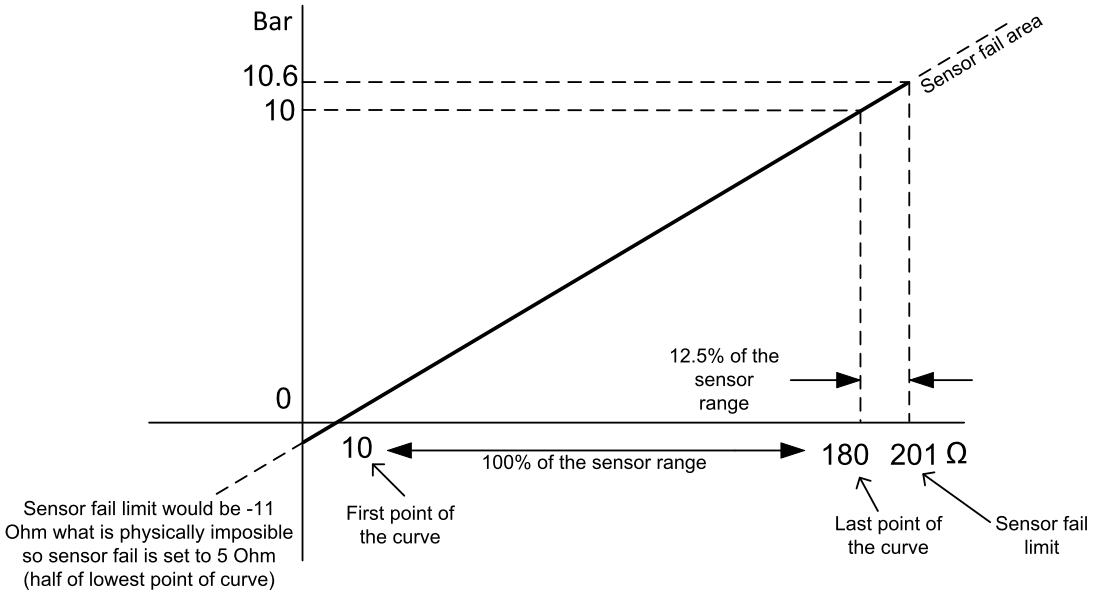



Image 5.39 Sensor fail detection principle

## Remote alarm messaging

If communication plug-in module is connected to the controller, the controller can send SMS messages and emails at the moment when a new alarm appears in the **Alarmlist (page 153)** or new event is written in **History log (page 156)**. The message will contain a copy of the **Alarmlist (page 153)** or reasons from **History log (page 156)**. To enable this function, adjust setpoints **Event Message (page 497)**, **Wrn Message (page 498)**,

**BOC Message (page 498)** and **Sd Messages (page 498)** to ON. Also enter a valid GSM phone number or email address to the setpoints **Telephone Number 1 (page 491)**, **Telephone Number 2 (page 491)**, **Telephone Number 3 (page 492)**, **Telephone Number 4 (page 492)**, **Email Address 1 (page 494)** **Email Address 2 (page 495)****Email Address 3 (page 495)**, and **Email Address 4 (page 496)**.

The list of all supported terminals shows the table below:

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

***Note:** * Only with enabled **Mode (page 482)**.*

# Alarmlist

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

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

Alarmlist contains three types of alarms:

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

## Controller built-in alarms

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

## User configured alarms

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

## ECU alarms

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

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

## Built-in alarms

| Events specification | Protection type | Description |
|---|---|---|
| Analog Input 1 Wrn | WRN | Value measured on analog input 1 is </> than **Analog Protection 1 Wrn (page 368)** setpoint. |
| Analog Input 1 Sd | SD | Value measured on analog input 1 is </> than **Analog Protection 1 Sd (page 368)** setpoint. |
| Analog Input 2 Wrn | WRN | Value measured on analog input 2 is </> than **Analog Protection 2 Wrn (page 370)** setpoint. |
| Analog Input 2 Sd | SD | Value measured on analog input 2 is </> than **Analog Protection 2 Sd (page 371)** setpoint. |
| Analog Input 3 Wrn | WRN | Value measured on analog input 3 is </> than **Analog Protection 3 Wrn (page 373)** setpoint. |
| Analog Input 3 Sd | SD | Value measured on analog input 3 is </> than **Analog Protection 3 Sd (page 374)** setpoint. |
| Analog Input 4 Wrn | WRN | Value measured on analog input 4 is </> than **Analog Protection 4 Wrn (page 376)** setpoint. |
| Analog Input 4 Sd | SD | Value measured on analog input 4 is </> than **Analog Protection 4 Sd (page 377)** setpoint. |
| Wrn Battery Voltage | WRN | Battery voltage is out of limits given by **Battery Undervoltage (page 300)** and **Battery Overvoltage (page 300)** 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 735)** output is active) it doesn't try to start again and activates this protection (controller assumes bad battery condition). |
| Sd Start Fail | SD | Gen-set start failed. All crank attempts were tried without success. |
| Parameters Fail | NONE | Wrong check-sum of parameters. Happens typically after downloading new firmware or changing of the parameter. The controller stays in INIT mode. Check all parameters, change value of at least one parameter. |
| Sd Gen Lx >V<br>BOC Gen Lx <V<br>(where x=1,2,3) | SD<br>BOC | The generator voltage is out of limits given by Gen <V BOC and Gen >V Sd setpoints. |
| BOC Gen V Unbalance | BOC | The generator voltage is unbalanced more than the value of **Voltage Unbalance BOC (page 309)** setpoint. |
| BOC Gen >, <Frequency | BOC | The generator frequency is out of limits given by **Generator Overfrequency BOC (page 310)** and **Generator Underfrequency BOC (page 311)** setpoints. |
| BOC Current Unbalance | BOC | The generator current is unbalanced more than the value of **Current Unbalance BOC (page 307)** setpoint. |
| BOC Current IDMT | BOC | Generator current exceeds the limit for IDMT protection given by **Nominal Current (page 258)** and **IDMT Overcurrent Delay (page** |

| Events specification | Protection type | Description |
|---|---|---|
| | | **306)** setpoints. |
| BOC Overload | BOC | The load is greater than the value given by **Overload BOC (page 304)** setpoint. |
| Sd Earth Fault | SD | This alarm is activated when Earth Fault value exceeds **Earth Fault Sd (page 510)** limit for at least **Earth Fault Delay (page 509)** period. |
| Sd Overspeed | SD | The protection comes active if the speed is greater than **Overspeed Sd (page 284)** setpoint. |
| Sd Underspeed | SD | During starting of the engine when the RPM reach the value of **Starting RPM (page 271)** setpoint the starter is switched off and the speed of the engine can drop under **Starting RPM (page 271)** again. Then the Underspeed protection becomes active. Protection evaluation starts 5 seconds after reaching **Starting RPM (page 271)**. |
| Emergency Stop | SD | If the input Emergency Stop is opened shutdown is immediately activated. |
| GCB Fail | SD | Failure of generator circuit breaker. |
| MCB Fail | WRN | Failure of mains circuit breaker. |
| Sd RPM Measurement Fail | SD | Failure of magnetic pick-up sensor for speed measurement. This alarm appears, if starter was disengaged for other reason than overcrossing **Starting RPM (page 271)** (like oil pressure or D+) and at the end of timer **Maximum Cranking Time (page 270)** there are no RPMs > **Starting RPM (page 271)** 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 (page 301)** setpoint. The protection comes if counter reaches zero. |
| Wrn Maintenance 2 | WRN | The period for servicing is set by the **Maintenance Timer 2 (page 302)** setpoint. The protection comes if counter reaches zero. |
| Wrn Maintenance 3 | WRN | The period for servicing is set by the **Maintenance Timer 3 (page 302)** setpoint. The protection comes if counter reaches zero. |
| Charge Alternator Fail | WRN | Failure of alternator for charging the battery. |
| Sd Override | WRN | The protection is active if the output Sd Override is closed. |
| Mains CCW Rot | WRN | Mains voltage phases are not wired correctly. MCB closing is prohibited by controller. |
| Generator CCW Rot | WRN | Genset voltage phases are not wired correctly. GCB closing is prohibited by controller. |
| Stp Synchronization Fail | STP | If the synchronization timeout gets elapsed (forward synchronization). |
| Wrn Reverse synchro Fail | WRN | If the synchronization timeout gets elapsed (reverse synchronization). |
| BOC Reverse | BOC | The reverse power is higher than limit adjusted via setpoint **Reverse** |

| Events specification | Protection type | Description |
|---|---|---|
| Power | | **Power Level (page 312)**. |
| BOC Excitation Loss | BOC | The reactive power is higher than limit adjusted via setpoint **Excitation Loss Level (page 312)**. |
| 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 controller. It is only list of the most common alarms.*

## 5.5.18 History log

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

Each record has the same structure and contains:

• The event which caused the record (e.g. "Overspeed alarm" or "GCB closed")

• The date and time when it was recorded

• All important data values like RPM, kW, voltages, etc. from the moment that the event occurred.

### Record structure

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

| | | |
|---|---|---|
| Generator Voltage | Vg31 | Generator voltage Ph31 |
| Generator Current | IL1 | Generator current Ph1 |
| Generator Current | IL2 | Generator current Ph2 |
| Generator Current | IL3 | Generator current Ph3 |
| Mains Frequency | Mfrq | Mains Frequency |
| Mains Voltage | Vm1 | Mains voltage Ph1 |
| Mains Voltage | Vm2 | Mains voltage Ph2 |
| Mains Voltage | Vm3 | Mains voltage Ph3 |
| Mains Voltage | Vm12 | Mains voltage Ph12 |
| Mains Voltage | Vm23 | Mains voltage Ph23 |
| Mains Voltage | Vm31 | Mains voltage Ph31 |
| Voltage Battery | VBat | Voltage of battery |
| Analog Input 1 | Ain1 | Analog input 1 |
| Analog Input 2 | Ain2 | Analog input 2 |
| Analog Input 3 | Ain3 | Analog input 3 |
| Analog Input 4 | Ain4 | Analog input 4 |
| Binary Inputs | BIN | Controller binary inputs |
| Binary Outputs | BOUT | Controller binary outputs |
| Speed regulator | SRO | Speed regulator output |
| Voltage regulator | VRO | Voltage regulator output |
| Running nominal power | TRPN | Nominal power of all running gen-sets |
| Available nominal power | APN | Available nominal power of all gen-sets |
| Controller Mode | Mode | Controller mode |

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

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

## 5.5.19 Breaker control

The following power switches are controlled by the controller:

- The generator circuit breaker or contactor – GCB

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

- The control outputs must be configured and wiring of the power switches must be provided in such a way, that the controller has full control over the breakers – i.e. the controller can open and close the breaker at any time.
- The breaker must respond within max. 2 seconds to a close and open command. Special attention should be paid to opening of motorized circuit breakers, as it could take more than 2 seconds on some types. In such cases it is necessary to use an undervoltage coil for fast opening.

- After opening the breaker, there is internal delay for another closing of breaker. Delay is 6 seconds - 5 seconds for OFF coil and 1 second for UV coil. After these 6 seconds, breaker can be closed again. For opening of breaker there is no delay.

## Breaker control outputs

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

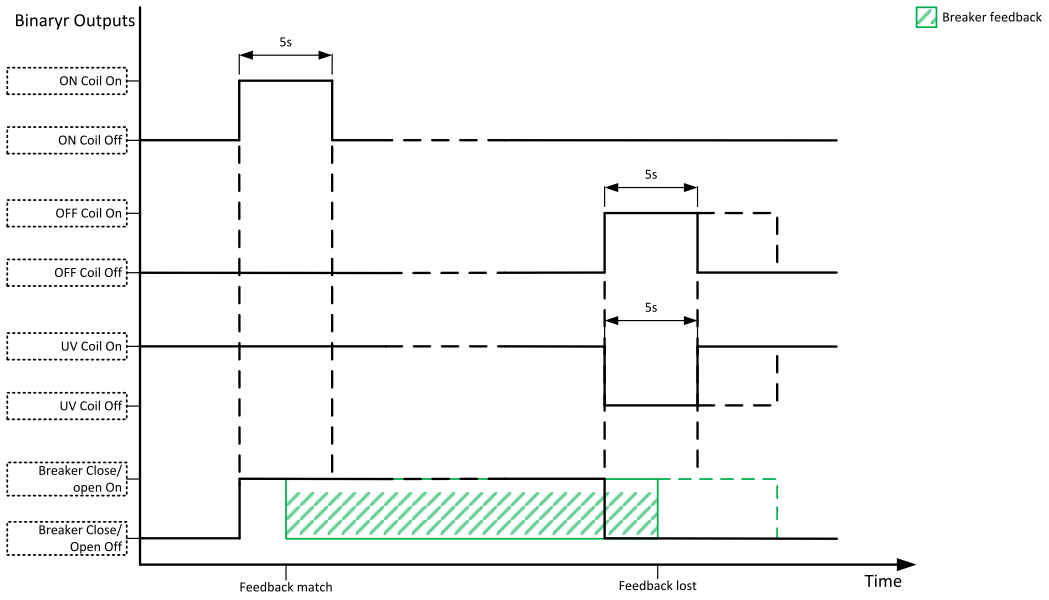



Image 5.40 Breaker control outputs

## 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 722)** closes. This behavior is called “negative logic” and can be adjusted by the setpoint **MCB Logic (page 324)**. The negative logic will prevent accidental opening of the MCB when the controller is switched off.
- If a contactor is used on the MCB position, it will open itself immediately after the mains have failed, because it will lose power for the coil. That is why the following adjustment is necessary to prevent triggering the **Wrn MCB Fail (page 806)** alarm: **MCB Opens On (page 326)** = Mains Fail, **Mains < > Voltage Delay (page 322)** ≤ 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 326)** = Gen Run will prevent triggering the **Wrn MCB Fail (page 806)** alarm.

## Breaker fail detection

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

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

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

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

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

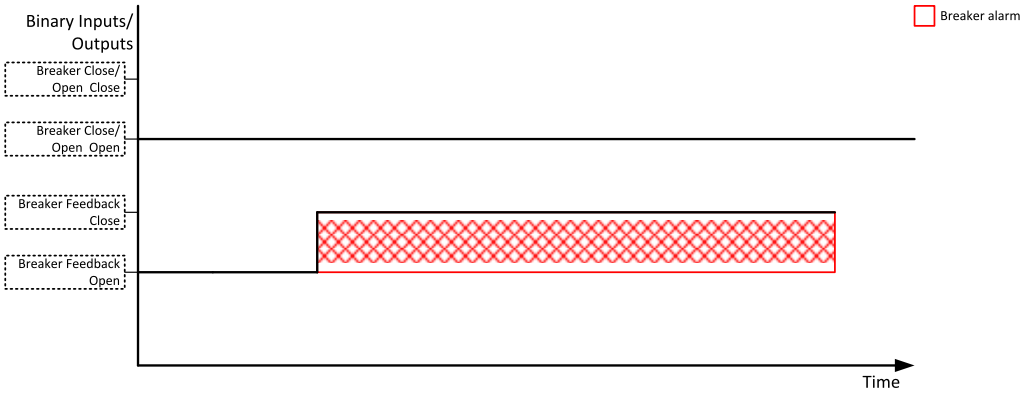



Image 5.41 Breaker fail - breaker close/open in steady position - open

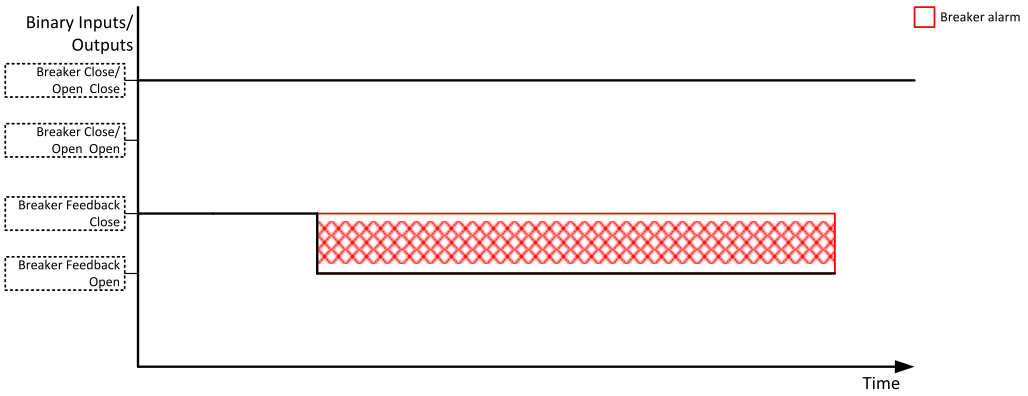



Image 5.42 Breaker fail - breaker close/open in steady position - close

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

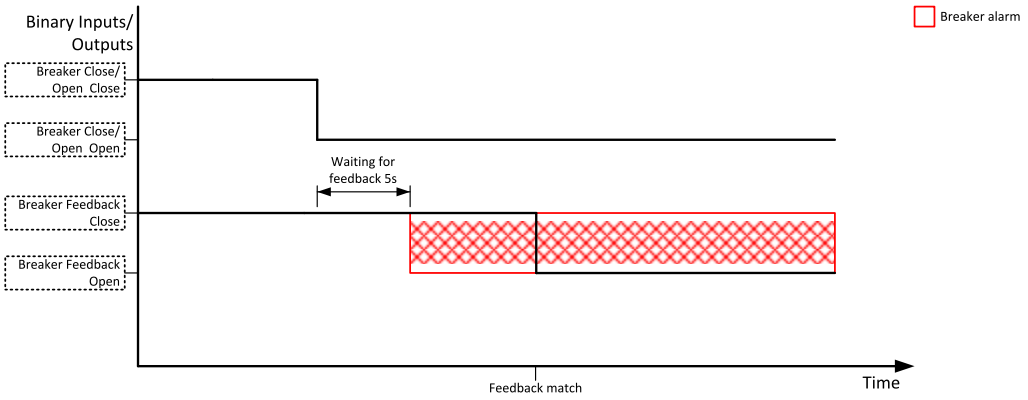



Image 5.43 Breaker fail - breaker close/open opens

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

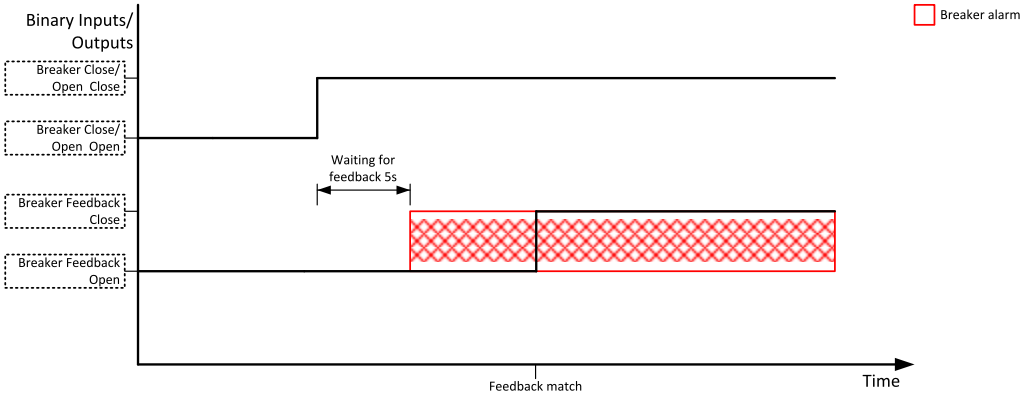



Image 5.44 Breaker fail - breaker close/open closes

## 5.5.20 Exercise timers

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

Related setpoints for timer 1 are:

- **Timer 1 Function (page 430)**
- **Timer 1 Repetition (page 431)**
- **Timer 1 First Occur. Date (page 431)**
- **Timer 1 First Occur. Time (page 431)**
- **Timer 1 Duration (page 432)**
- **Timer 1 Repeated (page 432)**
- **Timer 1 Repeat Day (page 435)**
- **Timer 1 Day (page 434)**
- **Timer 1 Repeated Day In Week (page 435)**
- **Timer 1 Repeat Day In Month (page 435)**
- **Timer 1 Repeat Week In Month (page 436)**
- **Timer 1 Refresh Period (page 433)**
- **Timer 1 Weekends (page 434)**

Related setpoints for timer 2 are:

- **Timer 2 Function (page 437)**
- **Timer 2 Repetition (page 438)**
- **Timer 2 First Occur. Date (page 438)**
- **Timer 2 First Occur. Time (page 438)**
- **Timer 2 Duration (page 439)**
- **Timer 2 Repeated (page 439)**
- **Timer 2 Repeat Day (page 442)**
- **Timer 2 Day (page 441)**
- **Timer 2 Repeated Day In Week (page 442)**
- **Timer 2 Repeat Day In Month (page 442)**
- **Timer 2 Repeat Week In Month (page 443)**
- **Timer 2 Refresh Period (page 440)**
- **Timer 2 Weekends (page 441)**

## Available modes of each timer:

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

# Once mode

### Set-up via InteliConfig

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

***Note:*** *First of all function of timer has to be adjusted via setpoint* ***Timer 1 Function (page 430)****.*

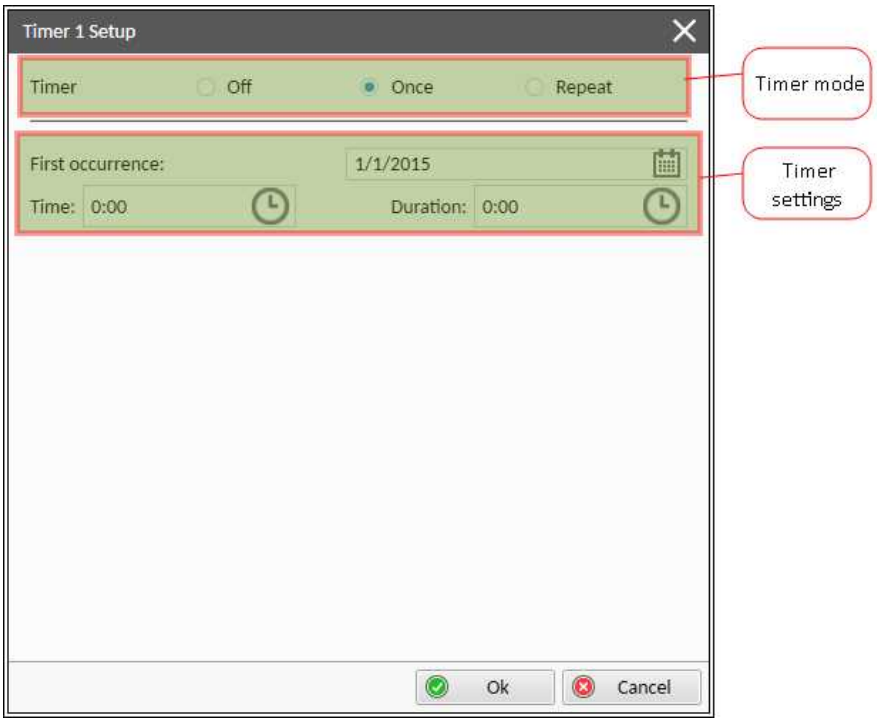



Image 5.45 Once mode - InteliConfig

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 430)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 431)** setpoint select Once mode. Than adjust **Timer 1 First Occur. Date (page 431)**, **Timer 1 First Occur. Time (page 431)** and **Timer 1 Duration (page 432)**.

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

## Daily mode

### Set-up via InteliConfig

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

***Note:*** *First of all function of timer has to be adjusted via setpoint **Timer 1 Function (page 430)**.*

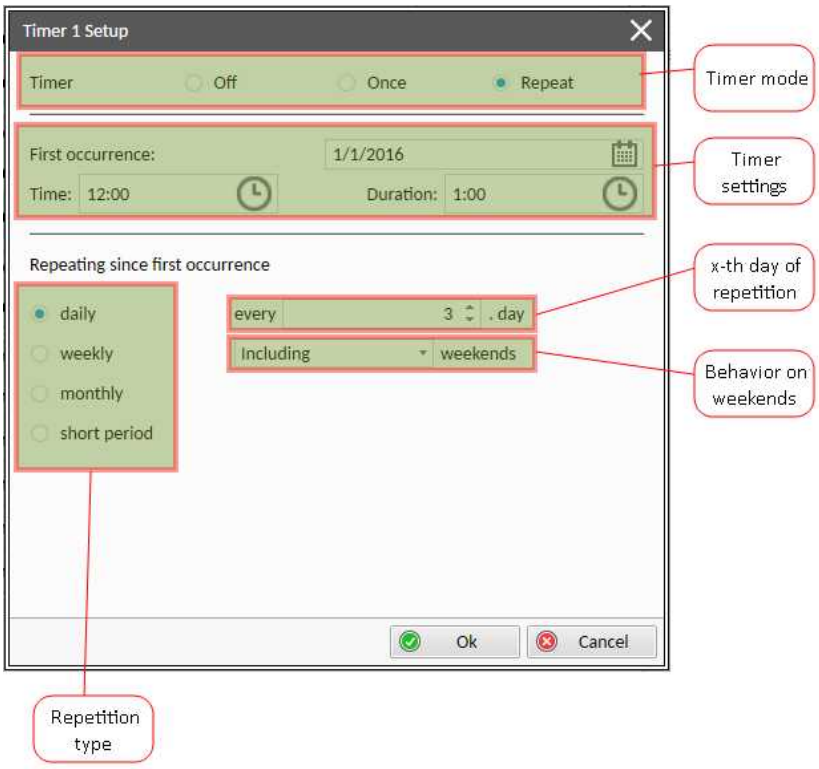



Image 5.46 Daily mode - InteliConfig

In timer mode select Repeat. In repetition type select Daily. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Than select the x-th day of repetition (**Timer 1 Refresh Period (page 433)**) and behavior of timer on weekends (**Timer 1 Weekends (page 434)**).

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

### Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 430)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 431)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 431)**, **Timer 1 First Occur. Time (page 431)** and **Timer 1 Duration (page 432)**. In setpoint **Timer 1 Repeated (page 432)** select Daily and adjust **Timer 1 Refresh Period (page 433)** (x-th day of repetition) and **Timer 1 Weekends (page 434)** (behavior of timer on weekends).

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

## Weekly mode

### Set-up via InteliConfig

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

***Note:*** *First of all function of timer has to be adjusted via setpoint **Timer 1 Function (page 430)**.*

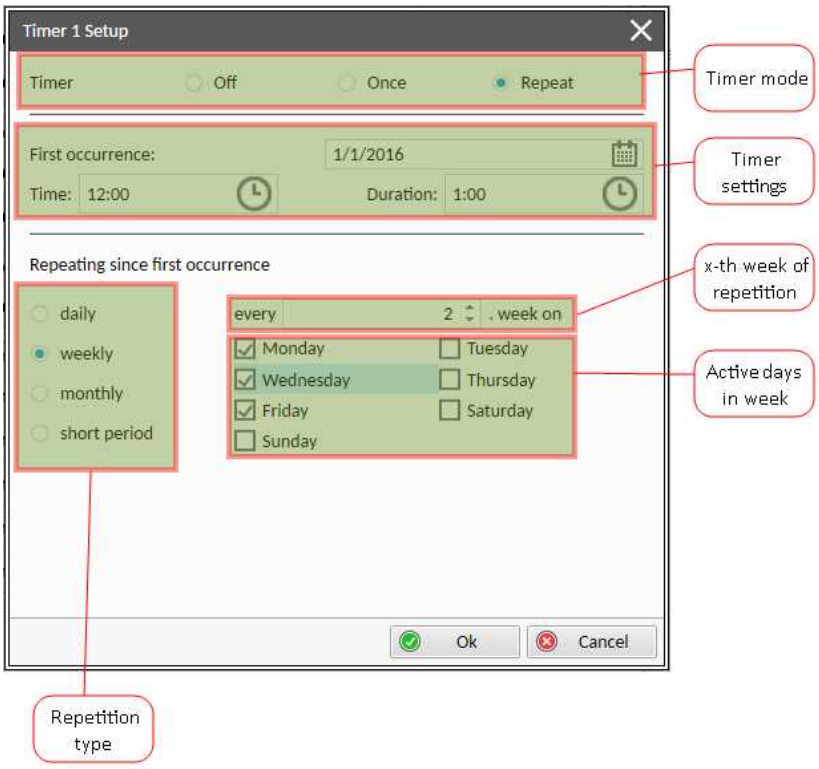



Image 5.47 Weekly mode - InteliConfig

In timer mode select Repeat. In repetition type select Weekly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Than select the x-th week of repetition (**Timer 1 Refresh Period (page 433)**) and days when timer should be active (**Timer 1 Day (page 434)**).

> **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 430)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 431)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 431)**, **Timer 1 First Occur. Time (page 431)** and **Timer 1 Duration (page 432)**. In setpoint **Timer 1 Repeated (page 432)** select Weekly and adjust **Timer 1 Day (page 434)** (days when timer should be active) and **Timer 1 Refresh Period (page 433)** (x-th week of repetition).

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

## Monthly mode

### Set-up via InteliConfig

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

***Note:*** *First of all function of timer has to be adjusted via setpoint **Timer 1 Function (page 430)**.*

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

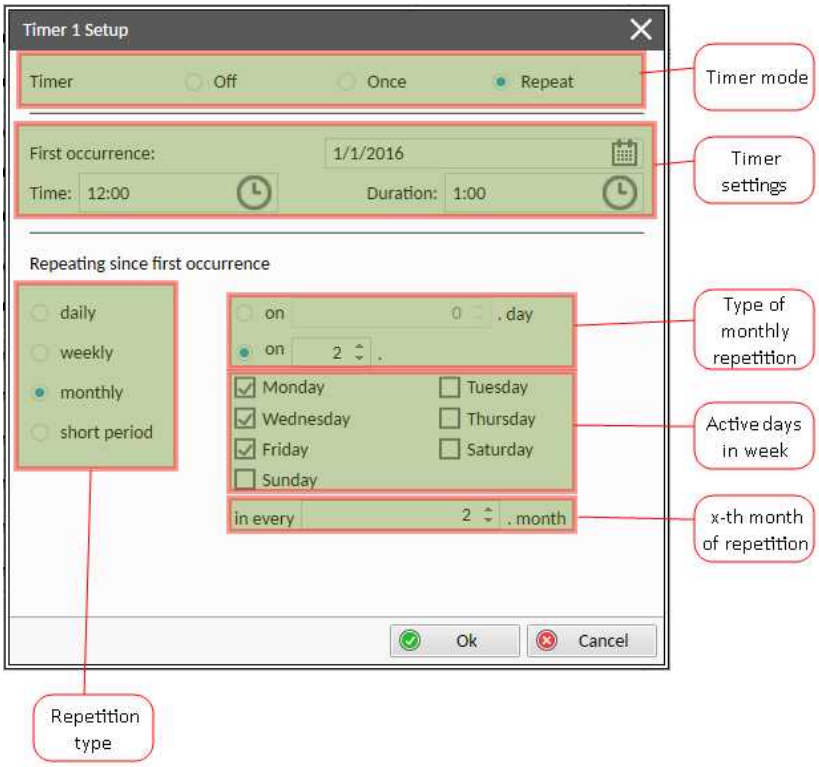



Image 5.48 Monthly mode - InteliConfig

In timer mode select Repeat. In repetition type select Monthly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Than select the type of monthly repetition and the x-th day of repetition (**Timer 1 Repeat Day In Month (page 435)**). Than select the x-th month of repetition.

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

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

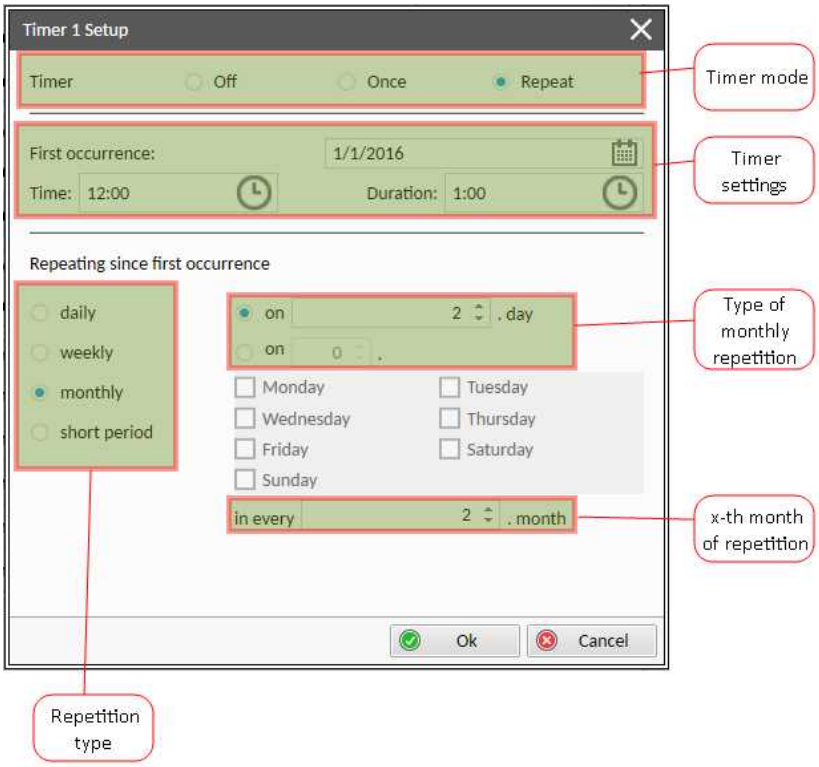



Image 5.49 Monthly mode - InteliConfig

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

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

## Set-up via controller interface

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

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 430)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 431)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 431)**, **Timer 1 First Occur. Time (page 431)** and **Timer 1 Duration (page 432)**. In setpoint **Timer 1 Repeated (page 432)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 435)**, **Timer 1 Refresh Period (page 433)** (x-th month of repetition) and **Timer 1 Repeat Day In Month (page 435)** (concrete day in repeated months).

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

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 430)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 431)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 431)**, **Timer 1 First Occur. Time (page 431)** and **Timer 1 Duration (page 432)**. In setpoint **Timer 1 Repeated (page 432)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 435)**, **Timer 1 Refresh Period (page 433)** (x-th month of repetition), **Timer 1 Repeated Day In Week (page 435)** (days in week when timer is active) and **Timer 1 Repeat Week In Month (page 436)** (concrete week in repeated months).

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

## Short period mode

### Set-up via InteliConfig

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

***Note:*** *First of all function of timer has to be adjusted via setpoint* ***Timer 1 Function (page 430)****.*

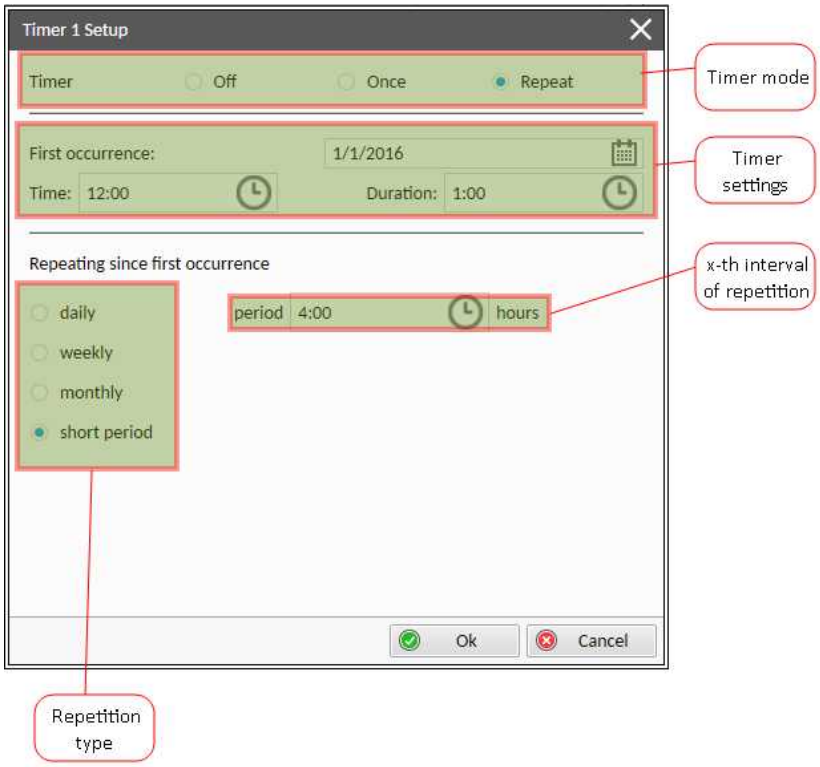



Image 5.50 Short period mode - InteliConfig

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

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

### Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 430)** setpoint. Than go to *Timer 1 Setup* and press enter button. In **Timer 1 Repetition (page 431)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 431)**, **Timer 1 First Occur. Time (page 431)** and **Timer 1 Duration (page 432)**. In setpoint **Timer 1 Repeated (page 432)** select Short Period and adjust **Timer 1 Refresh Period (page 433)** (interval of repetition).

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

## 5.5.21 Rental Timers

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

### How to set-up rental timer

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

- Choose the type of rental timer
  - **Rental Timer 1 (page 443)** (based on engine running hours)
  - **Rental Timer 2 (page 445)** (based on date)
- Adjust the length of chosen timer
- Adjust the warning for user **Rental Timer 1 Wrn (page 445)** or **Rental Timer 2 Wrn (page 447)**(warning will be displayed in alarmlist before elapsing of rental timer)
- Adjust **Rental Timer BOC (page 447)** - common for both timers (if engine is still running after rental timer counts down, this timer will starts count down and after elapse of timer the gen-set will be cooled down and stop)

## 5.5.22 Service timers

### Running hours counters

Service timers are used as maintenance interval counters. Counters can be set by setpoints - **Maintenance Timer 1 (page 301)**, **Maintenance Timer 2 (page 302)** and **Maintenance Timer 3 (page 302)**. All of them work the same way - their values are decremented every hour when the gen-set is running.

Actual value of counters is located either as the same setpoints **Maintenance Timer 1 (page 301)**, **Maintenance Timer 2 (page 302)** and **Maintenance Timer 3 (page 302)** or as values **Maintenance 1 (page 602)**, **Maintenance 2 (page 603)** and **Maintenance 3 (page 603)**.

When the value of counter reaches 0, the alarm **Wrn Maintenance 1 (page 804)** or **Wrn Maintenance 2 (page 805)** or **Wrn Maintenance 3 (page 805)** is active until the respective counter is readjusted back to nonzero value.

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 4 (page 302)**, **Maintenance Timer 5 (page 303)** and **Maintenance Timer 6 (page 303)**. All of them work the same way - actual date is compared with the date adjusted in counter.

Remaining value of counters is located as value **Maintenance 4 (page 603)**, **Maintenance 5 (page 603)** and **Maintenance 6 (page 603)**.

When the actual date reaches value of counter, the alarm **Wrn Maintenance 4 (page 805)** or **Wrn Maintenance 5 (page 805)** or **Wrn Maintenance 6 (page 806)** is active until the respective counter is readjusted back to different date.

Unused counter has to be adjusted to value 1/1/2015.

## 5.5.23 Analog switches

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

| Analog switch | Setpoints | Binary output |
|---|---|---|
| AIN Switch 01 (page 762) | Analog Switch 1 On (page 369)<br>Analog Switch 1 Off (page 370) | AIN Switch01 (page 688) |
| AIN Switch 02 (page 762) | Analog Switch 2 On (page 372)<br>Analog Switch 2 Off (page 373) | AIN Switch02 (page 689) |
| AIN Switch 03 (page 762) | Analog Switch 3 On (page 375)<br>Analog Switch 3 Off (page 376) | AIN Switch03 (page 689) |
| AIN Switch 04 (page 763) | Analog Switch 4 On (page 378)<br>Analog Switch 4 Off (page 379) | AIN Switch04 (page 690) |
| AIN Switch 05 (page 763) | Analog Switch 5 On (page 381)<br>Analog Switch 5 Off (page 382) | AIN Switch05 (page 690) |
| AIN Switch 06 (page 763) | Analog Switch 6 On (page 384)<br>Analog Switch 6 Off (page 385) | AIN Switch06 (page 691) |
| AIN Switch 07 (page 764) | Analog Switch 7 On (page 387)<br>Analog Switch 7 Off (page 388) | AIN Switch07 (page 691) |
| AIN Switch 08 (page 764) | Analog Switch 8 On (page 390)<br>Analog Switch 8 Off (page 391) | AIN Switch08 (page 692) |
| AIN Switch 09 (page 764) | Analog Switch 9 On (page 393)<br>Analog Switch 9 Off (page 394) | AIN Switch09 (page 692) |
| AIN Switch 10 (page 765) | Analog Switch 10 On (page 396)<br>Analog Switch 10 Off (page 397) | AIN Switch10 (page 693) |
| AIN Switch 11 (page 765) | Analog Switch 11 On (page 399)<br>Analog Switch 11 Off (page 400) | AIN Switch11 (page 693) |
| AIN Switch 12 (page 765) | Analog Switch 12 On (page 402)<br>Analog Switch 12 Off (page 403) | AIN Switch12 (page 694) |
| AIN Switch 13 (page 766) | Analog Switch 13 On (page 405)<br>Analog Switch 13 Off (page 406) | AIN Switch13 (page 694) |
| AIN Switch 14 (page 766) | Analog Switch 14 On (page 408)<br>Analog Switch 14 Off (page 409) | AIN Switch14 (page 695) |
| AIN Switch 15 (page 766) | Analog Switch 15 On (page 411)<br>Analog Switch 15 Off (page 412) | AIN Switch15 (page 695) |
| AIN Switch 16 (page 767) | Analog Switch 16 On (page 414)<br>Analog Switch 16 Off (page 415) | AIN Switch16 (page 696) |
| AIN Switch 17 (page 767) | Analog Switch 17 On (page 417)<br>Analog Switch 17 Off (page 418) | AIN Switch17 (page 696) |

| Analog switch | Setpoints | Binary output |
|---|---|---|
| AIN SWITCH 18 (PAGE 767) | Analog Switch 18 On (page 420)<br>Analog Switch 18 Off (page 421) | AIN SWITCH18 (PAGE 697) |
| AIN SWITCH 19 (PAGE 768) | Analog Switch 19 On (page 423)<br>Analog Switch 19 Off (page 424) | AIN SWITCH19 (PAGE 697) |
| AIN SWITCH 20 (PAGE 768) | Analog Switch 20 On (page 426)<br>Analog Switch 20 Off (page 427) | AIN SWITCH20 (PAGE 698) |

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




Image 5.51 Principle of analog switch

## 5.5.24 Additional running engine indications

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

The following conditions are evaluated as additional running engine indication:

- Voltage on the D+ input is higher than the 80% of battery voltage. Connect this input to the D+ (L) terminal of the charging alternator and enable the D+ function by the setpoint **D+ Function (page 272)**. 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 272)** setpoint. The oil pressure is evaluated from the analog input or from the ECU if an ECU is configured.
- Binary input **OIL PRESSURE (PAGE 666)** is in logical 0.
- At least one phase of generator voltage is >25% of nominal voltage.

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

## 5.5.25 Voltage phase sequence detection

Controller detects phase sequence on both voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. The phase sequence is adjusted via setpoint **Phase Rotation (page 267)**. When the phases are connected in different order, following alarms are detected:

- **Generator CCW Rotation (page 811)**
- **Mains CCW Rotation (page 811)**

## 5.5.26 Sensor curves

### Background of the sensor calibration

To correct measuring error of each analog input (pressure, temperature, level, etc.) calibrating constants should be set. Calibration is made by adding the value of setpoint **Analog Input 1 CalibrationCU AIN1 Calibration (page 453)**, or **Analog Input 2 CalibrationCU AIN2 Calibration (page 454)**, or **Analog Input 3 CalibrationCU AIN3 Calibration (page 454)**, or **Analog Input 4 CalibrationCU AIN4 Calibration (page 455)** directly to the calculated value at analog input.

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

### Default sensor curves

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

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

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

> **IMPORTANT: For right behavior of function, curve for this analog input has to be in percentage and setpoint Fuel Tank Volume (page 297) has to be adjusted correctly.**

## 5.5.27 PLC

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

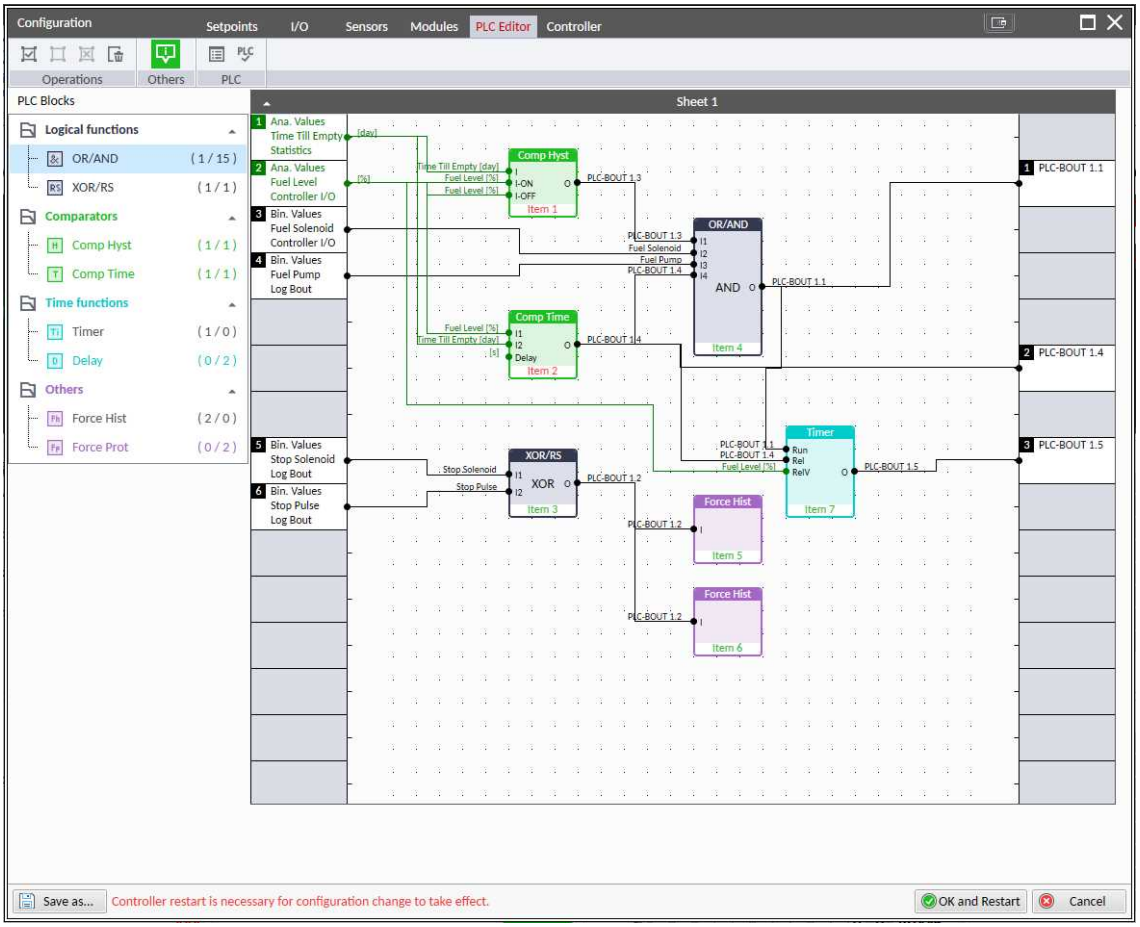



Image 5.52 PLC Editor main page

## List of available PLC blocks

| PLC block | Number of blocks |
|---|---|
| OR/AND | 16 |
| XOR/RS | 2 |
| Comparator with hysteresis (Comp Hyst) | 2 |
| Comparator with delay (Comp Time) | 2 |
| Timer | 1 |
| Delay | 4 |
| Force history record (Force Hist) | 2 |
| Force protection (Force Prot) | 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 following essential steps:

- Adjust the sheet to your needs. See **Working with sheets (page 173)** for more information.
- Add PLC blocks into the sheets. See **Adding PLC blocks (page 173)** for more information.
- Define inputs and outputs of the PLC program. See **Define inputs and outputs (page 174)** for more information.
- Create connections between inputs, blocks and outputs. See **Creating wires (page 177)** for more information.
- Adjust properties of the blocks. See **List of PLC blocks (page 775)** for more information about blocks.

## Working with sheets

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

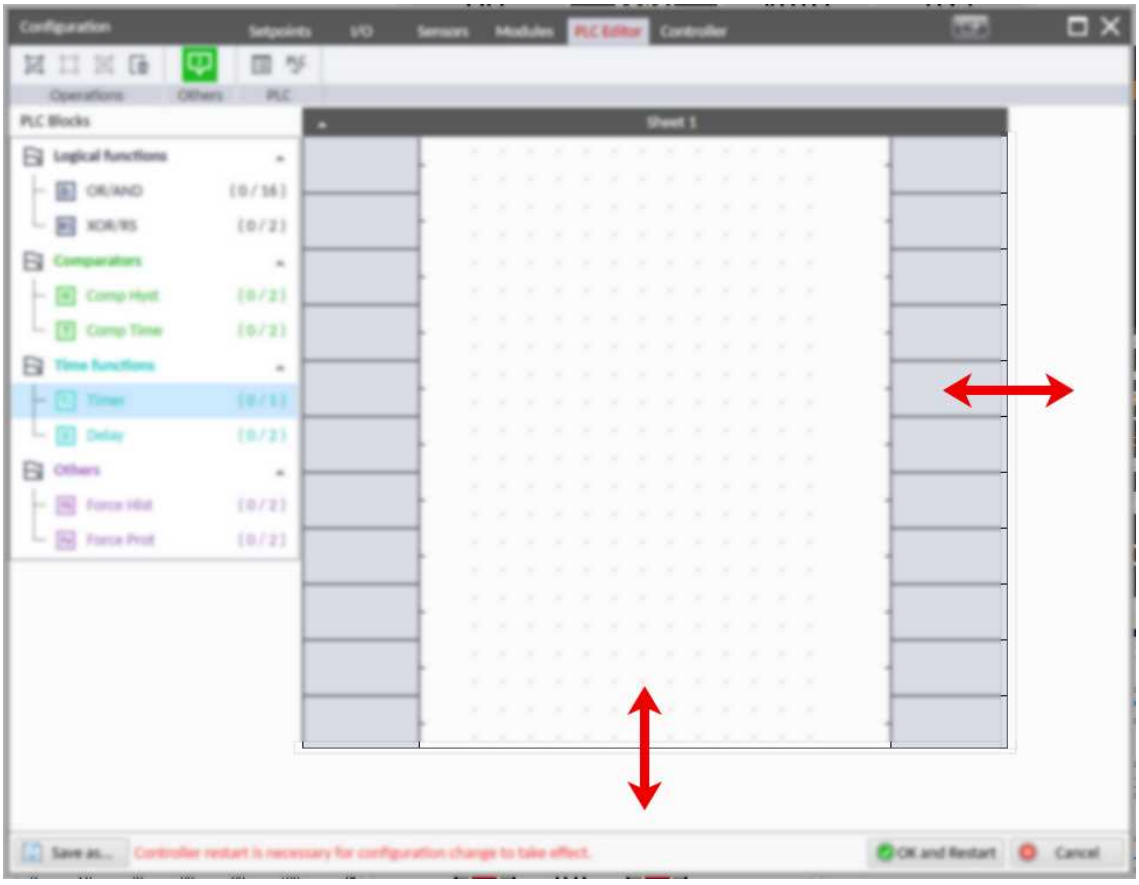



Image 5.53 Adjusting PLC sheet

## Adding PLC blocks

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

- Select required block from the list of available PLC blocks at the left and drag it into the sheet.
- Double-click on the block and adjust properties of the block. See **List of PLC blocks (page 775)** for more information about blocks.

- Connect the block inputs and outputs by drawing wires in the sheet. See **Define inputs and outputs (page 174)** for more information. It is also possible to connected inputs and outputs via properties of selected PLC block.

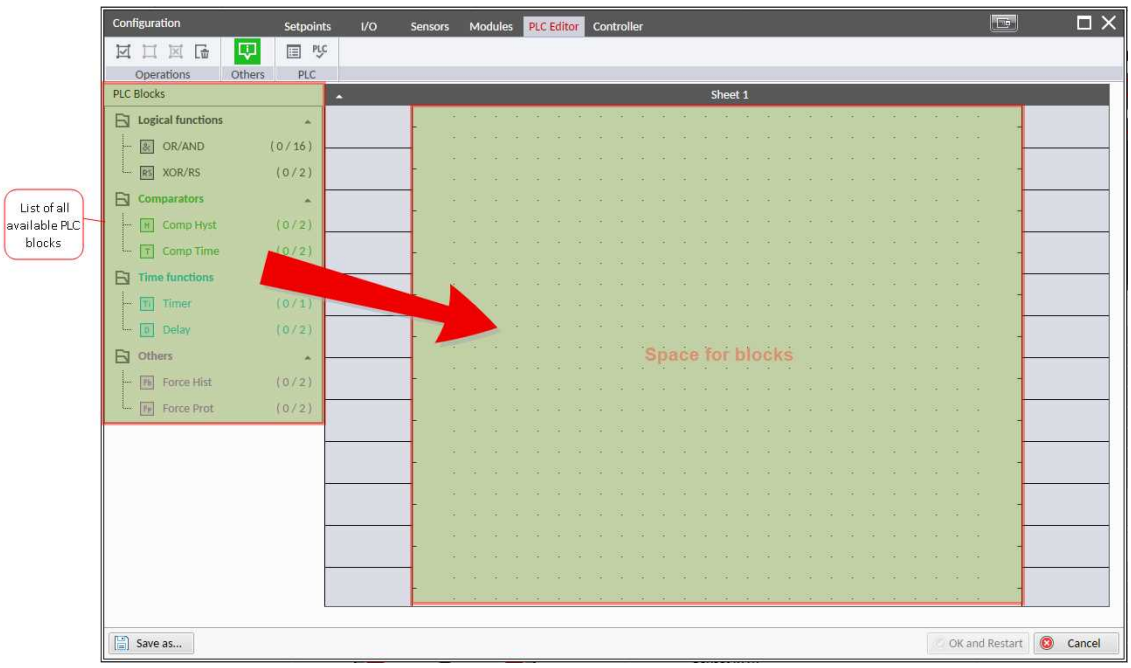



Image 5.54 Adding PLC blocks

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

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

## Define inputs and outputs

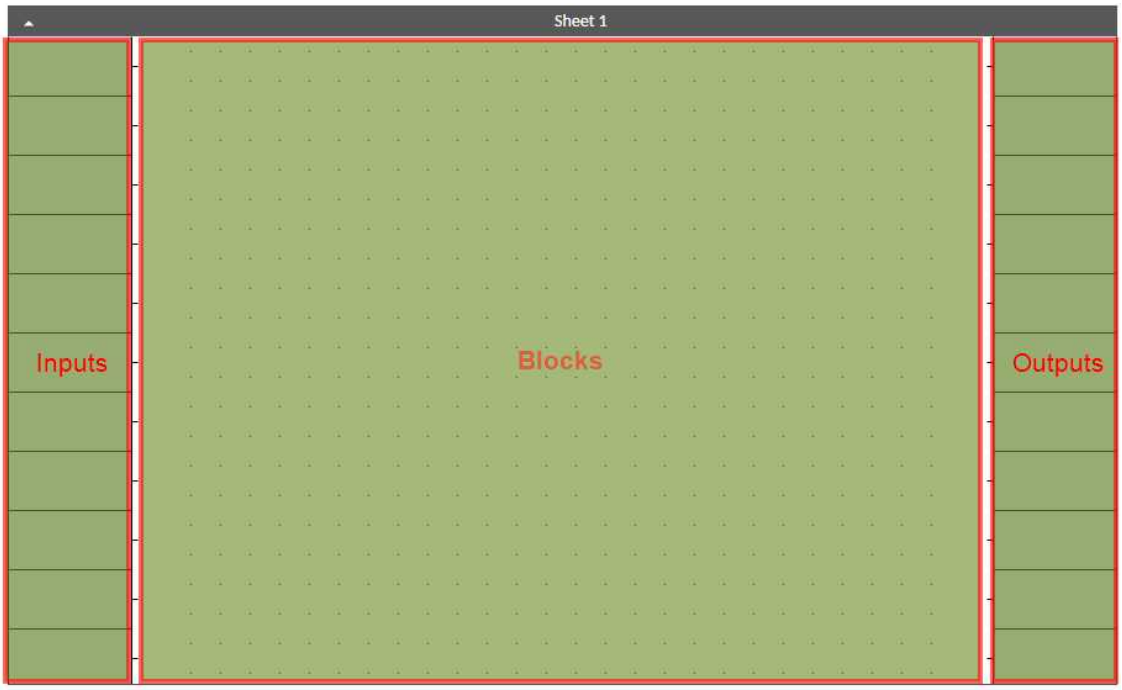
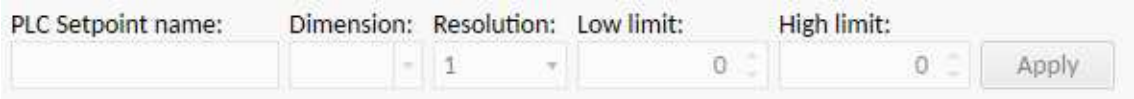



Image 5.55 Blank sheet of PLC editor

## Inputs

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

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



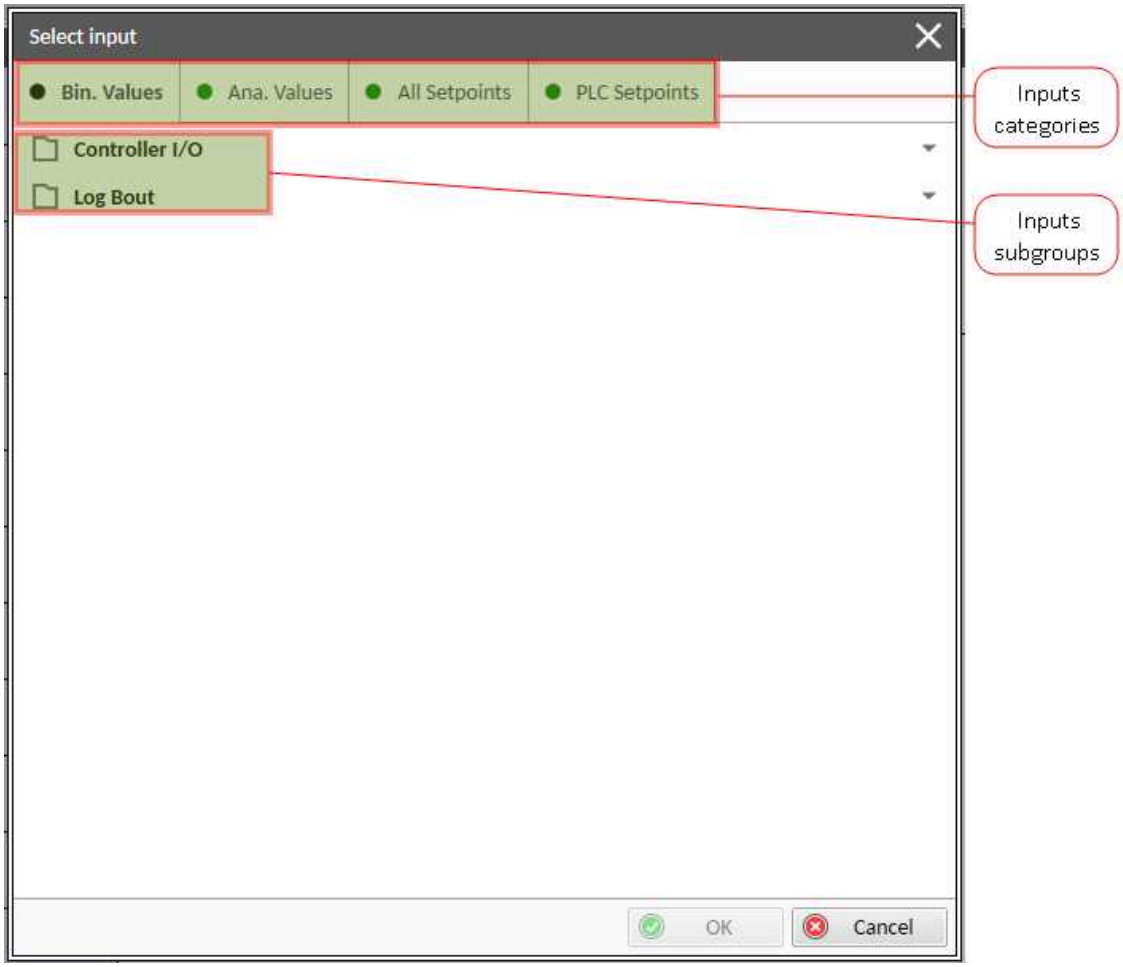



Image 5.56 PLC inputs

## Outputs

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

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

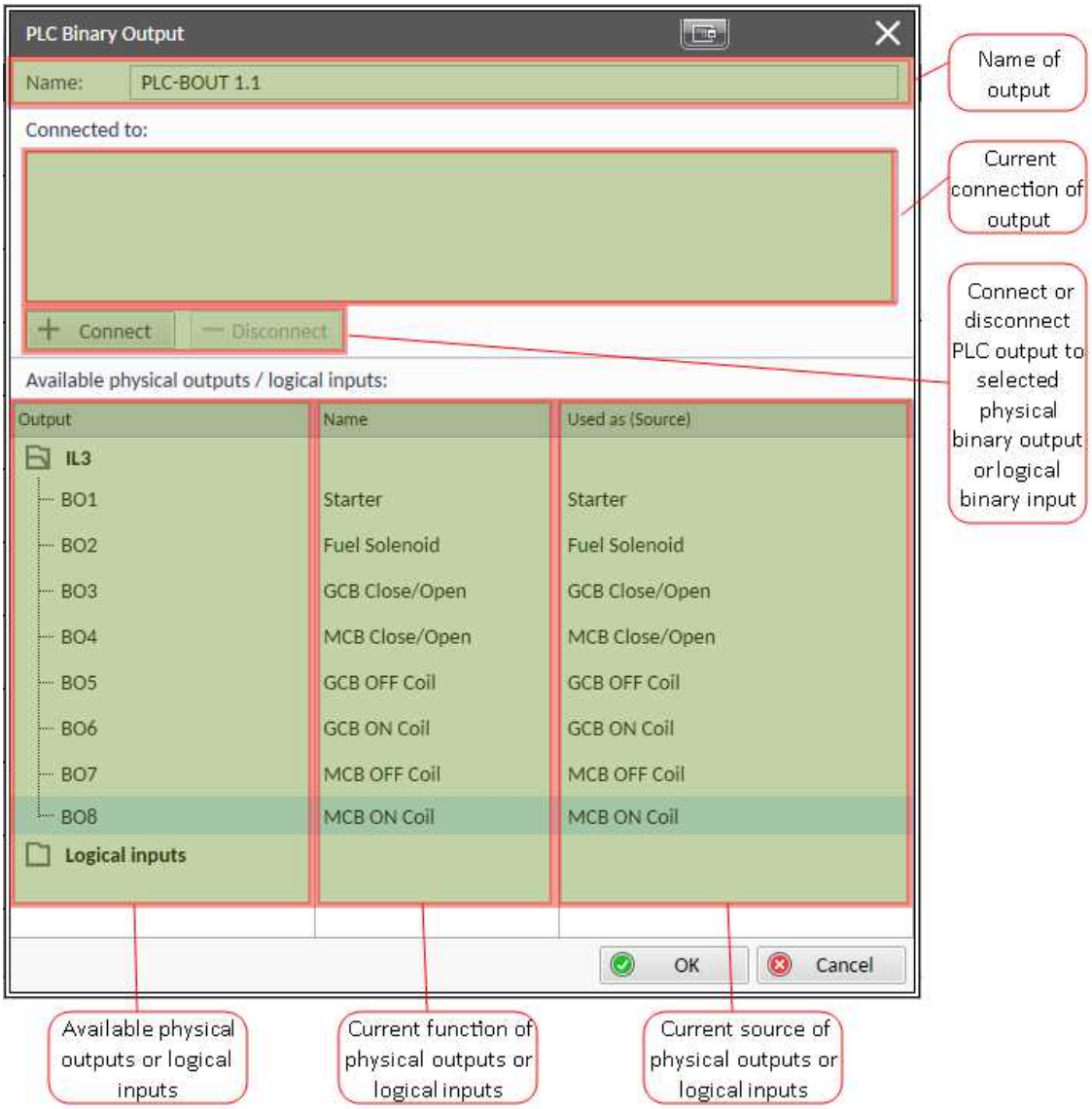



Image 5.57 PLC outputs

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

## Creating wires

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

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

Follow the procedure below to create wire.

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

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

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

## PLC logic execution rules

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

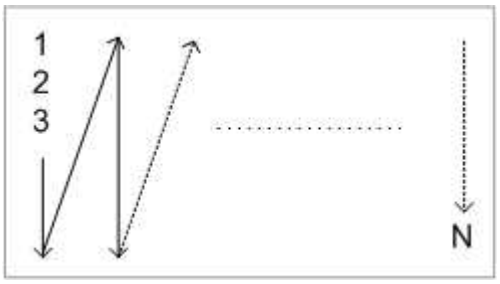
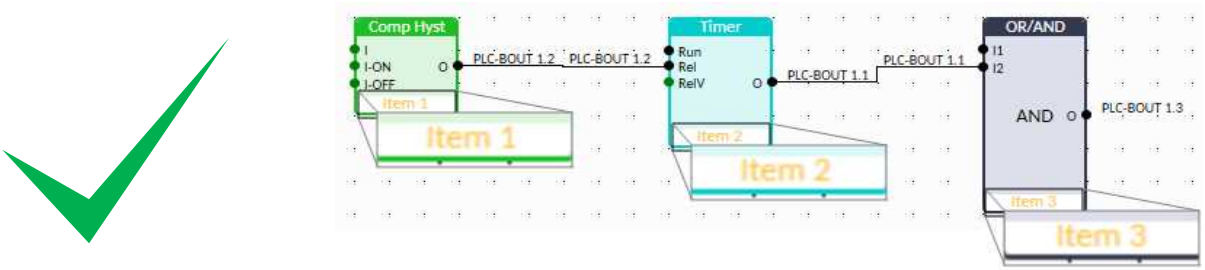
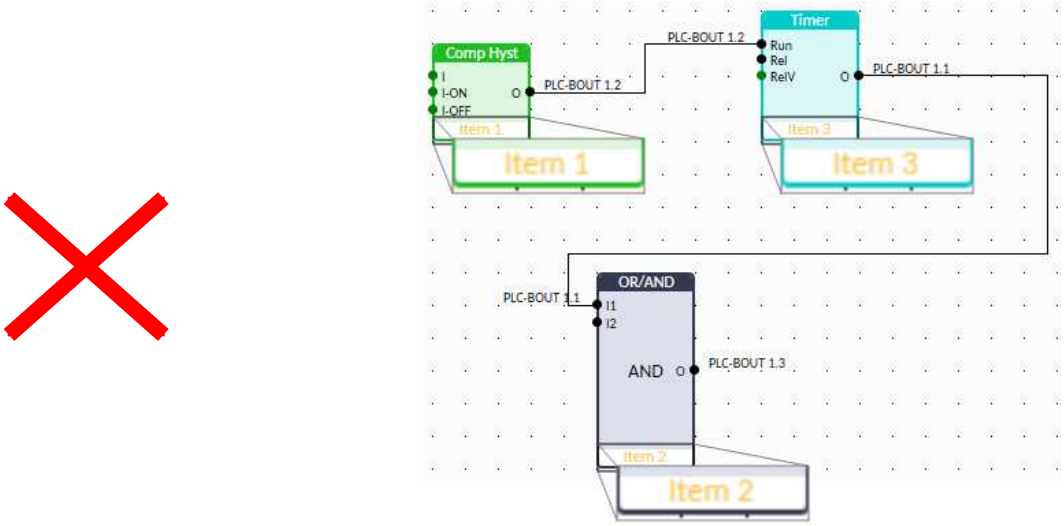



Image 5.58 PLC execution logic

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



## Other functions

### Consistency check

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

### Delete whole content of sheet

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

### Hints

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

### PLC monitor

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

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

# 5.5.28 Tier 4 Final

Tier 4 Final support generally provides monitoring and control of 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 Aftertreatment status information

### After-Treatment screen

This screen is shown with configured ECU which supports Tier 4 Final. After-Treatment screen is automatically shown, once any of selected lamps gets active or change status. Deactivating of the lamp will not trigger showing the screen. The screen is then shown until operator switch it to another one. Alarmlist screen has lower priority so even new alarm appears, After-treatment screen is still displayed. To avoid displaying blank screen, inactive lamps are represented by "dotted" icons. For no active lamp the screen shows all dotted icons. Please see examples below:

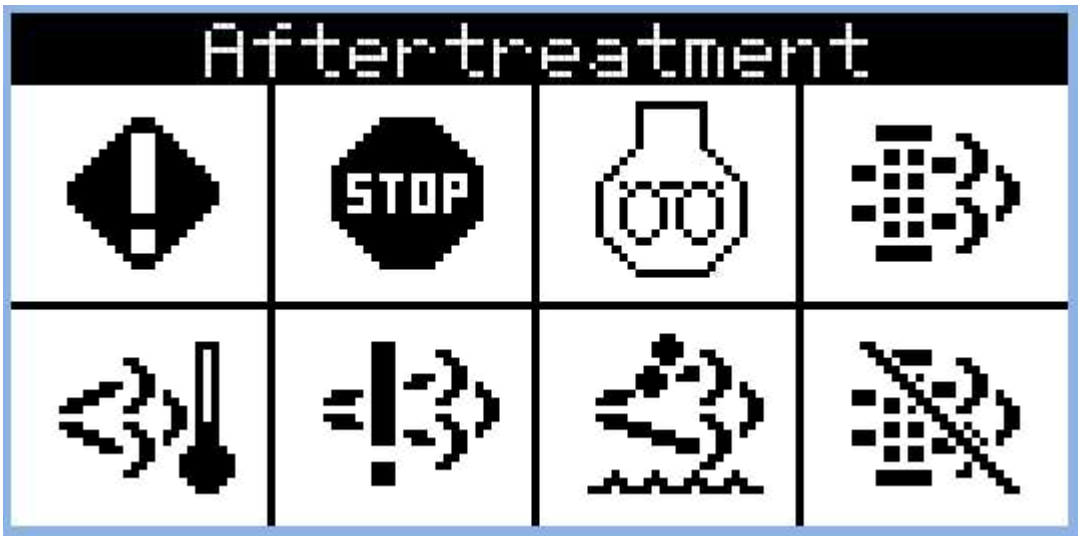



Image 5.59 Example of active Tier 4 Final screen

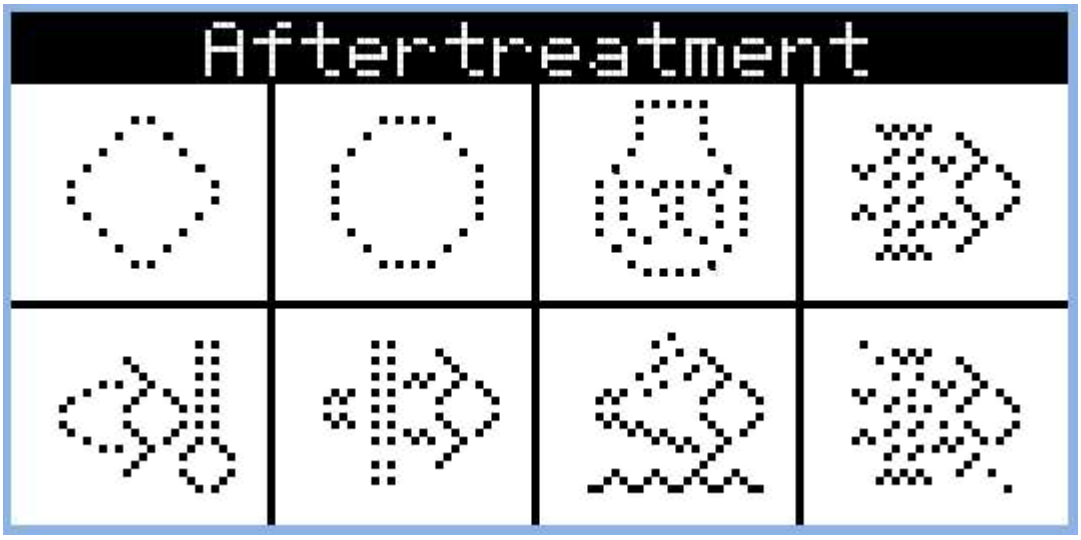



Image 5.60 Example of inactive Tier 4 Final screen

### Universal lamps (icons)

Universal lamp icons are shown on the After-Treatment screen. Based on specific value read in specific frame with specific SPN is every lamp icon 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 lamp |  |  | |
| DPF/SCR lamp command |  |  | ***Note:*** *DPF = Diesel Particulate Filter; SCR = Selective Catalytic Reduction. This lamp also activates alarm* ***After-Treatment (page 809)****.* |
| Exhaust system high temperature lamp command |  |  | ***Note:*** *This lamp also activates alarm* ***After-Treatment (page 809)****.* |
| Malfunction indicator lamp |  |  | ***Note:*** *This value can light or blink on both frequencies. This lamp also activates alarm* ***After-Treatment (page 809)****.* |
| Fluid tank low level indicator |  |  | ***Note:*** *This lamp also activates alarm* ***After-Treatment (page 809)****.* |
| DPF regeneration inhibited |  |  | ***Note:*** *Indicates the state of diesel particulate filter active regeneration inhibition. This lamp also activates alarm* ***After-Treatment (page 809)****.* |

## Analog values

Supported analog values:

- **DPFAshLoad (page 578)**
- **DPFSootLoad (page 578)**
- **DEF Level (page 578)**

### Control of After-Treatment regeneration function

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

- **REGENERATION FORCE (PAGE 666)**
- **REGENERATION INHIB (PAGE 666)**

## 5.5.29 Geo-fencing

Geo-fencing function is kind of protection that evaluates whether the actual GPS location is within predefined area and based on the evaluation takes an action (sends sms, stops engine, make history record etc.). Function is enabled by setpoint **Geo-Fencing (page 450)** or by logical binary input **GEO-FENCING ENABLED (PAGE 661)**.

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 circular geographic area with centre (common for both geo-circles) named Home Position adjusted via setpoints **Home Latitude (page 448)** and **Home Longitude (page 448)** and radius named Fence Radius adjusted via setpoints .**Fence Radius 1 (page 449)** and **Fence Radius 2 (page 449)**.

Protections can be different for both circles. Protection are adjusted via setpoints **Fence 1 Protection (page 451)** and **Fence 2 Protection (page 452)**.

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

## 5.5.30 Mains decoupling protections

### Vector shift

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

Protection is enabled via setpoint **Vector Shift Protection (page 327)**. Limit of protection is adjusted via setpoint **Vector Shift Limit (page 327)**. When protection is activated, the breaker is opened. Which breaker is opened is adjusted via setpoint **Vector Shift CB Selector (page 329)**. Maximal value of vector shift is represented by value **Max Vector Shift (page 594)**.

***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 320)** as the mains is evaluated as healthy.

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

### ROCOF

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

Protection is enabled via setpoint **ROCOF Protection (page 328)**. Limit of protection is adjusted via setpoints **ROCOF df/dt (page 329)** and **ROCOF Windows Length (page 328)**. When protection is activated, the breaker is opened. Which breaker is opened is adjusted via setpoint **Vector Shift CB Selector (page 329)**.

## 5.5.31 Droop

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

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

Function is activated via setpoint **Load/Var Sharing Regulation Type (page 363)**. There are two droop modes - emergency droop and droop.

## Frequency droop

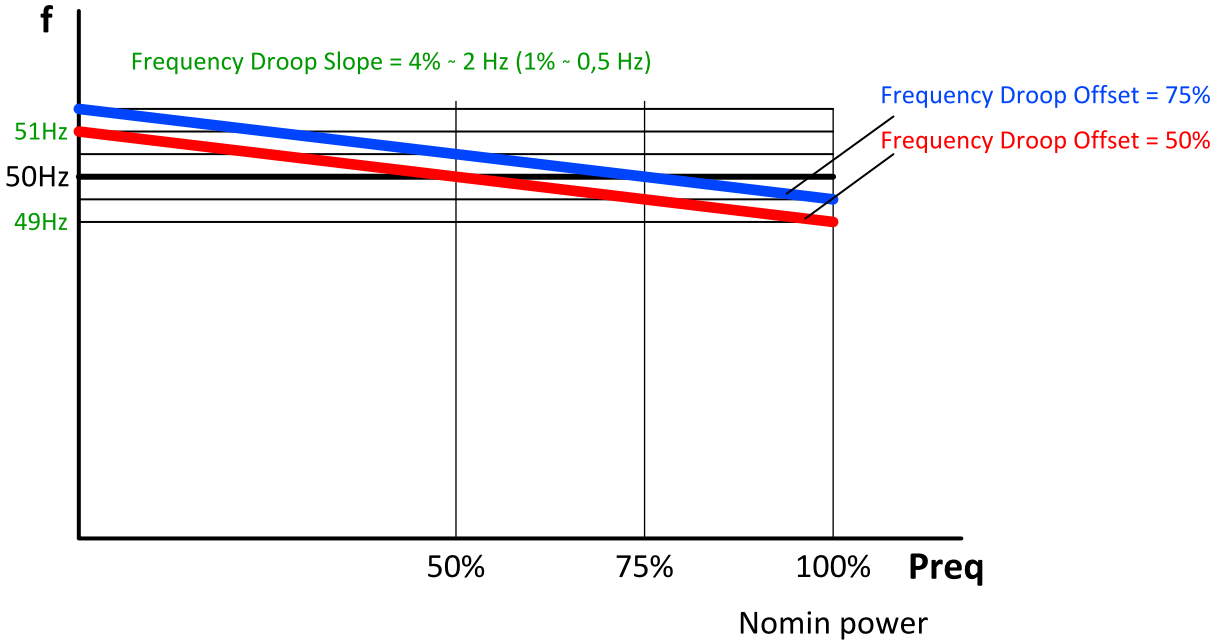



Image 5.61 Frequency droop

Equation:

Required frequency = Nominal frequency - [(Nominal frequency * **Frequency Droop Slope (page 364)** / 100) * ( Active power / Nominal power - **Frequency Droop Offset (page 365)** / 100)).

## Voltage droop

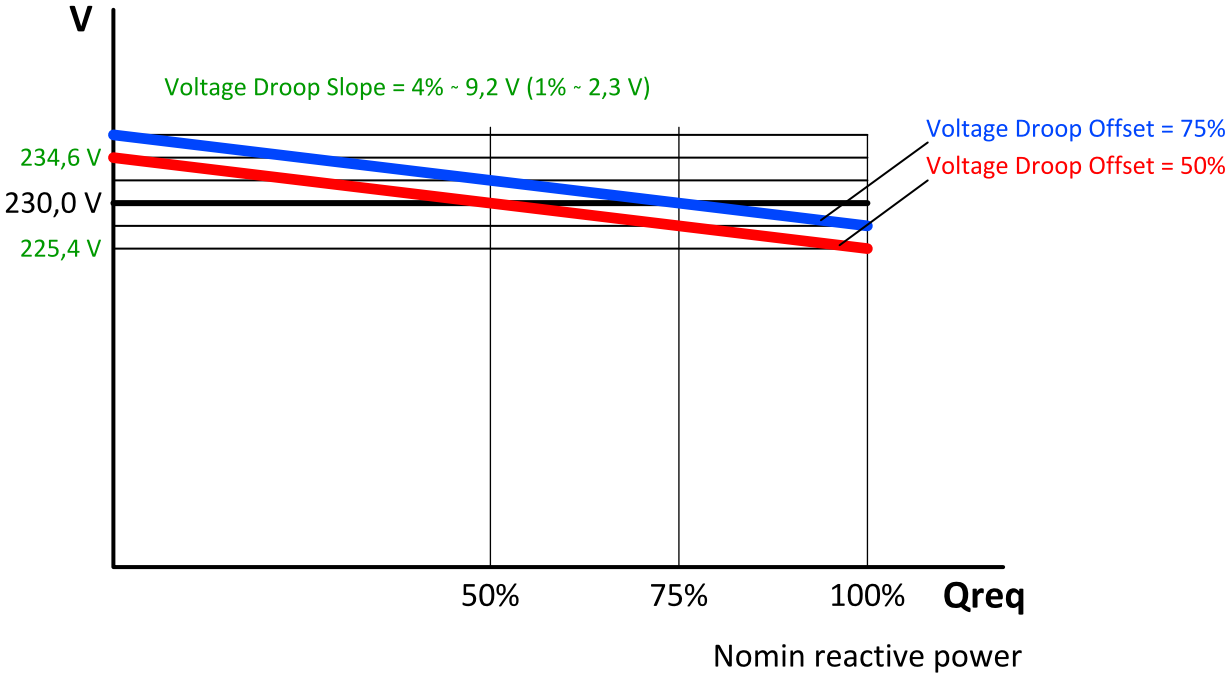



Image 5.62 Voltage droop

Equation

Required voltage = Nominal voltage - [(Nominal voltage * **Voltage Droop Slope (page 365)** / 100) * (Reactive power / Nominal reactive power - **Voltage Droop Offset (page 366)** / 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 669)** in AUTO mode gets active
  - The gen-set operating in droop is not calculated in the load reserve.
  - LBI **REMOTE START/STOP (PAGE 669)** 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 355)** and **Speed Governor Bias (page 347)** (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 364)** = 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 669)** in AUTO mode gets inactive.
- Controller starts soft unload of loaded gen-set
  - Soft unload can be disabled via LBI **DROOP UNLOAD DISL (PAGE 656)** 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 353)**, latest when timer **Load Ramp (page 354)** 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 354)**.

## Forcing of the regulation to droop

- Droop regulation can be forced by LBI **FORCE DROOP OPER (PAGE 657)**.

# Principle of emergency droop

When **Load/Var Sharing Regulation Type (page 363)** = 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 366)**.
- **#Emergency Droop On Delay (page 367)** 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 366)**.
- **#Emergency Droop Off Delay (page 367)** has count down.

## 5.5.32 Alternate configuration

In controller are 3 sets of configuration.

| Configuration set 1 | Configuration set 2 | Configuration set 3 |
|---|---|---|
| Nominal Power 1 (page 457) | Nominal Power 2 (page 461) | Nominal Power 3 (page 465) |
| Nominal Power Split Phase 1 (page 457) | Nominal Power Split Phase 2 (page 461) | Nominal Power Split Phase 3 (page 465) |
| Nominal RPM 1 (page 458) | Nominal RPM 2 (page 462) | Nominal RPM 3 (page 466) |
| Nominal Frequency 1 (page 458) | Nominal Frequency 2 (page 462) | Nominal Frequency 3 (page 466) |
| Nominal Voltage Ph-N 1 (page 459) | Nominal Voltage Ph-N 2 (page 463) | Nominal Voltage Ph-N 3 (page 467) |
| Nominal Voltage Ph-Ph 1 (page 459) | Nominal Voltage Ph-Ph 2 (page 463) | Nominal Voltage Ph-Ph 3 (page 467) |
| Nominal Current 1 (page 458) | Nominal Current 2 (page 462) | Nominal Current 3 (page 466) |
| Connection Type 1 (page 455) | Connection type 2 (page 459) | Connection type 3 (page 463) |

Configuration sets can be changed via logical binary input **ALTERNATE CONFIG 2 (PAGE 634)** and logical binary input **ALTERNATE CONFIG 3 (PAGE 634)**.

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

## 5.5.33 USB host

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

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

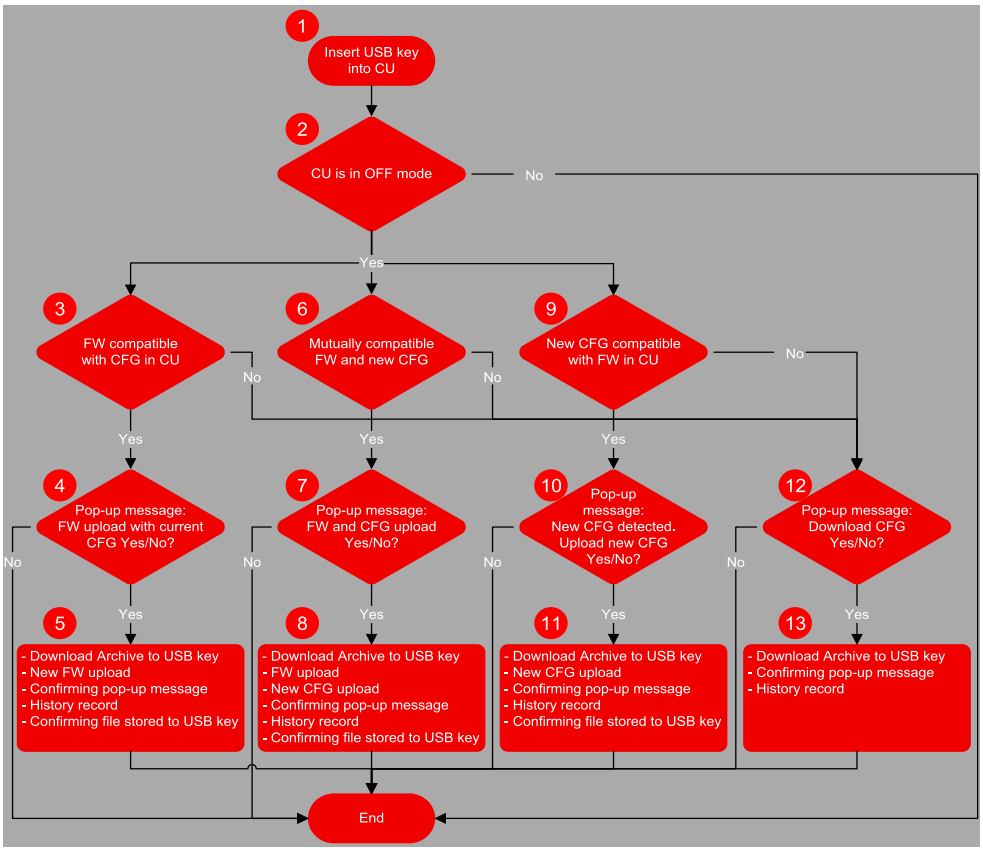



Image 5.63 USB host flowchart

Terminology:

- The Archive = the native file of InteliConfig, including the complete Configuration + History + Statistic + Values (in the time of download) + Alarm list.
- Configuration = the part of Archive, in the terms of Configuration + Setpoints + PLC + IO definitions + Languages.
- New configuration = the configuration created in InteliConfig for the purpose of uploading it into the controller using the USB memory stick. The new configuration is recognized due to it's name. The name has to contain the specific string ="InteliGen200-Genset name-M.N.P.B.aig3".
- Compatible firmware = the firmware version compatible with the configuration in the controller. The name of file including the firmware is "InteliGen200-M.N.P.B.bin".

Abbreviations:

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

## Firmware upload

- Point 1 - controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.
- Point 2 - controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- Point 3 - Conditions for firmware upload with current configuration
  - The new firmware compatible with the version of the configuration in the controller has been detected (and there is no new configuration file).
  - Detection is based on name of firmware - required name: "InteliGen200-M.N.P.B.bin"
  - There can be stored more firmwares on the USB Flash Drive. Controller automatically select the compatible firmware with highest version.
- Point 4 - Pop-up message
  - Confirmation of firmware upload with current configuration
- Point 5 - Firmware upload
  - Current archive is download to USB Flash Drive (Name = SN_YYMMDDHHMM).
  - New firmware is uploaded into the controller without the change of the configuration
  - History record "USB Flash Drive FW upgrade" is made
  - Confirming file (.txt) on USB Flash Drive is made (Name = SN_YYMMDDHHMM)
    - Content: Serial number, Year/Date/Time, Upgrade to the FW "Name of the new FW" successful.
  - Confirmation pop-up message: "FW upgrade success"

## Configuration upload

- Point 1 - controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.
- Point 2 - controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- Point 9 - conditions for new configuration upload
  - The new configuration compatible with the version of the firmware in the controller has been detected (and there is no new firmware file).
  - Detection is based on name of configuration - required name: "InteliGen200-Genset name-M.N.P.B.aig3"
  - There can be only one configuration file
- Point 10 - Pop-up message
  - Confirmation of configuration upload with current firmware
- Point 11 - Configuration upload
  - Current archive is download to USB key (Name = SN_YYMMDDHHMM).
  - New configuration is uploaded into the controller without the change of the firmware

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

## Firmware and configuration upload

- Point 1 - controller detects that USB Flash Drive has been inserted.
  - If the communication via USB B is running controller will not detect the USB memory key.
  - On the other hand if the USB memory key was detected, communication via USB B port is not possible.
- Point 2 - controller is in OFF mode
  - All operations with USB memory key are possible only in OFF mode
- Point 6 - conditions for new firmware and configuration upload
  - The new configuration has been detected. Also there is firmware file compatible with detected new configuration
  - Detection is based on name of configuration - required name: "InteliGen200-Genset name-M.N.P.B.aig3" and on name of firmware - required name: "InteliGen200-M.N.P.B.bin"
  - There can be only one configuration file
  - There can be stored more firmwares on the USB key. Controller automatically select the compatible firmware with highest version.
- Point 7 - Pop-up message
  - Confirmation of configuration and firmware upload
- Point 8 - Configuration and firmware upload
  - Current archive is download to USB key (Name = SN_YYMMDDHHMM).
  - New firmware is uploaded into the controller
  - New configuration is uploaded into the controller
  - History record "USB key FW and CFG upload" is made
  - Confirming file (.txt) on USB key is made (Name = SN_YYMMDDHHMM)
    - Content: Serial number, Year/Date/Time, Upgrade to the FW "Name of the new FW" successful, Upgrade to the FW "Name of the new CFG" successful.
  - Confirmation pop-up message: "FW and CFG upgrade success"

## Configuration download

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

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

## 5.5.34 E-Stop

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

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

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

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

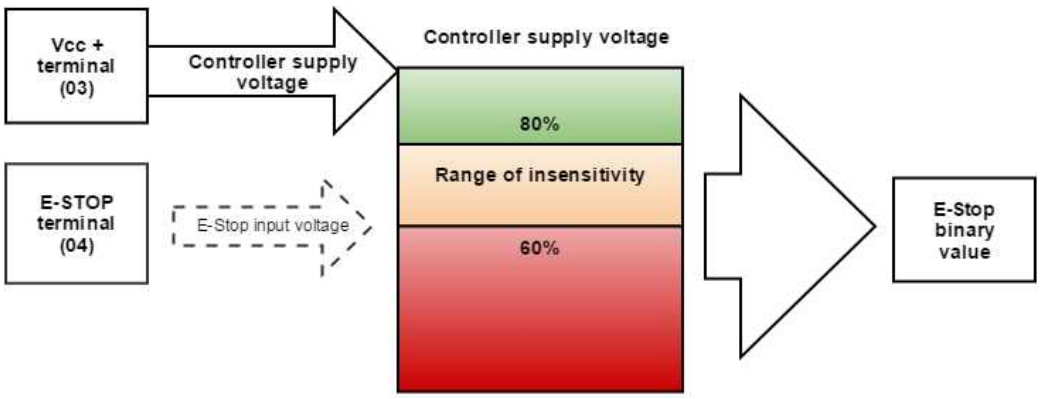



Image 5.64 SW principle of E-STOP

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

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

**Visualization on CU screen**

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

More information about connection **see E-Stop on page 47**.

## 5.5.35 ECU Frequency selection

Setpoint *ECU Freq Select* is no longer in use. However **ECU Frequency Select (page 581)** value was kept and the value can be calculated from **Nominal Frequency (page 262)** setpoint. Sequence for frequency change is executed automatically (engine must be in still condition and ECU is powered on – ECU Power Relay is not configured) in following steps:

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

This sequence does not control LBO **ECU POWER RELAY (PAGE 706)** anyhow.

***Note:*** *If LBO **ECU POWER RELAY (PAGE 706)** is used, this change can be made only in prestart phase. So prestart has to be set up for enough long time.*

## 5.5.36 Mains import measurement

This functionality is available only with the SPTM mode (**Application Mode Select (page 244)** is set to SPTM). Mains import measurement enables the import/export control when genset operates in parallel with mains (**Load Control PTM (page 245)** is set to Imp/Exp). It as well enables mains import based soft load transfer from Mains to Generator when the **Remote Test On Load (page 671)** function is used.

If mains import measurement is not available and **Transfer Mains To Gen (page 352)** is set to SoftTransf, soft load transfer from Mains to Generator depends on **Close Transfer Max Duration (page 351)**, **Load Ramp (page 354)** and **Baseload (page 248)** 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 254)** is set to None or Analog Input), requested generator PF is **Base Power Factor (page 248)** even with **PF Control PTM (page 246)** set to PF Imp/Exp.*

## 5.5.37 Load shedding

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

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

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

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

## How the Load shedding controls the Load shedding outputs

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

Load shedding has three steps and each step is linked with its own binary output, **LOAD SHEDDING STAGE 1 (PAGE 720)**, **LOAD SHEDDING STAGE 2 (PAGE 720)** and **LOAD SHEDDING STAGE 3 (PAGE 721)**

The Load shedding outputs can be activated one by one in the direction 1, 2, 3. The condition for activation are defined by setpoints **Load Shedding Level (page 331)** and **Load Shedding Delay (page 331)**.

The Load shedding outputs are deactivated one by one according to the conditions given by the setpoints **Load Reconnection Level (page 331)**, **Load Reconnection Delay (page 332)**, **Auto Load Reconnection (page 332)**.

For manual reconnection of the load is desired the **Auto Load Reconnection (page 332)** setpoint needs to be disabled and the **MANUAL LOAD RECONNECTION (PAGE 663)** digital input needs to be configured.

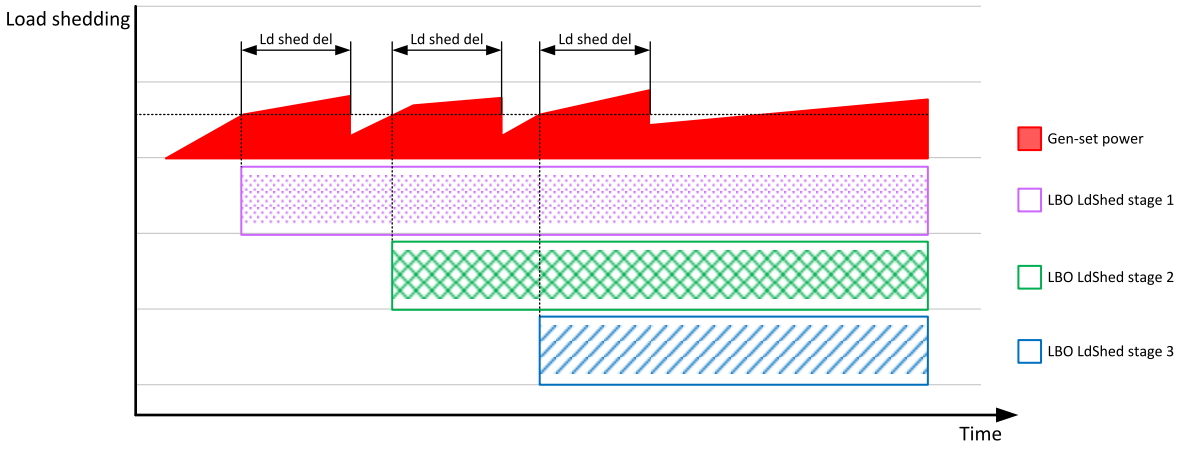



Image 5.65 Load shedding

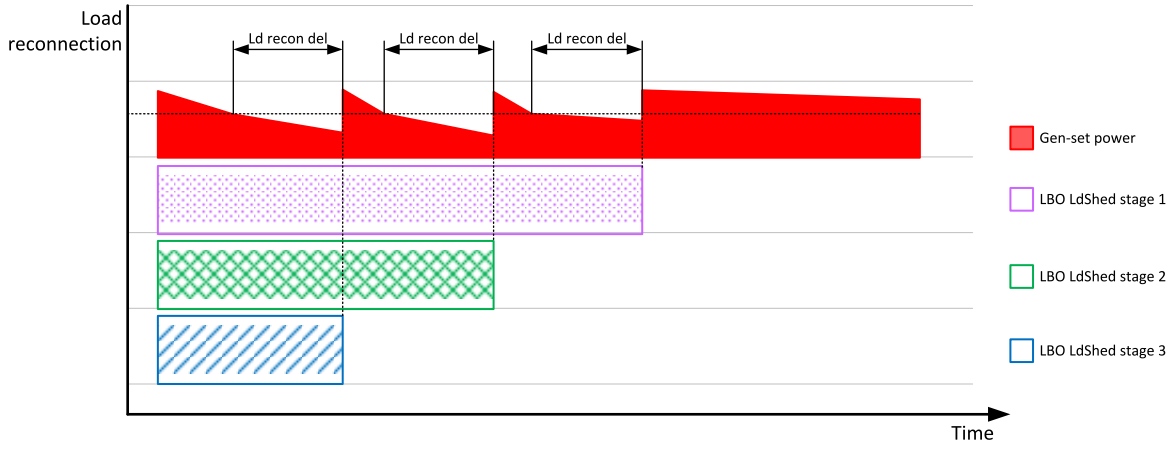



Image 5.66 Load reconnection

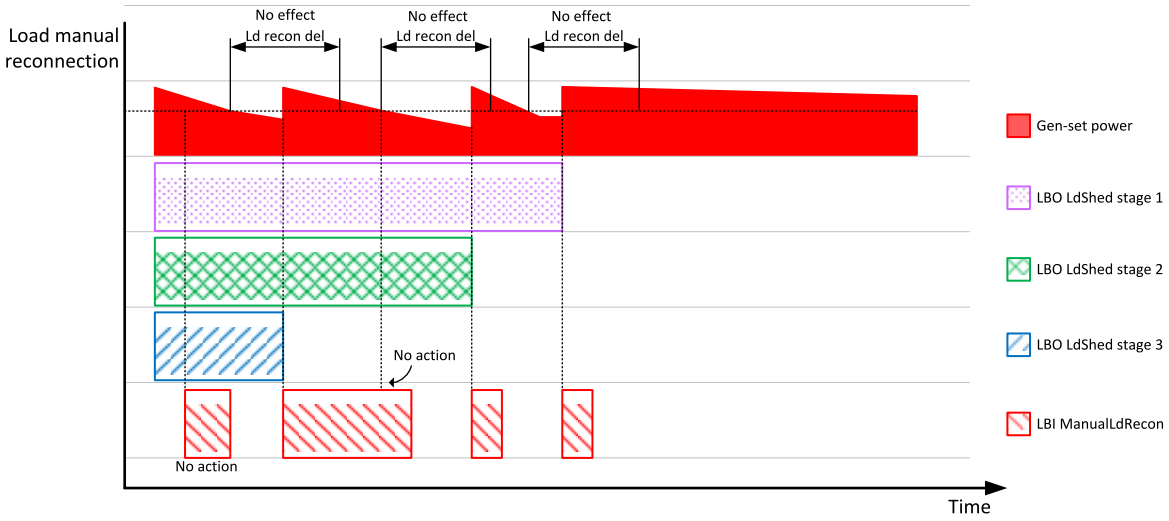



Image 5.67 Load manual reconnection

## 5.5.38 Peak shaving

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

The Peak shaving function is active only in AUT mode in Parallel to Mains operation. Peak shaving is based on active power only. If load consumption increases over **Peak Shaving Start Level (page 255)** and for period longer than **Peak Shaving Start/Stop Delay (page 256)** the Gen-set is started. If load consumption decreases below **Peak Shaving Stop Level (page 255)** and period longer than**Peak Shaving Start/Stop Delay (page 256)** the Gen-set is stopped. The activation of the function is indicated by LBO:**PEAK SHAVING ACTIVE (PAGE 729)**.

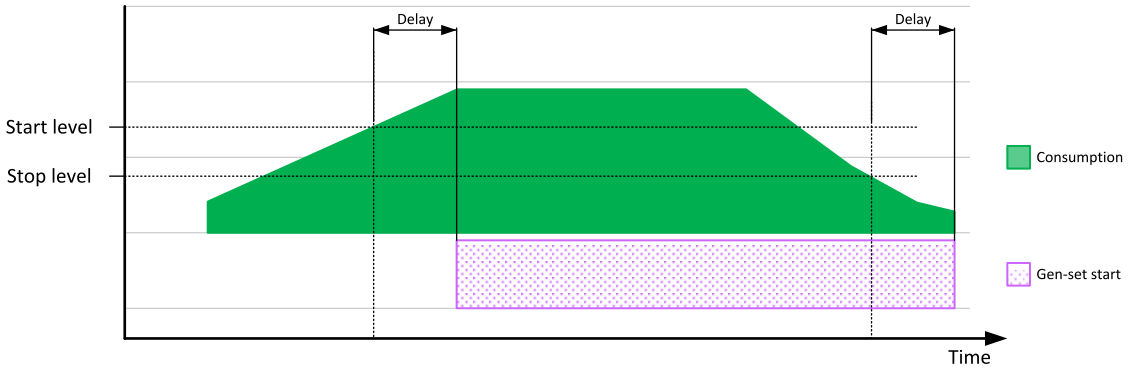



Image 5.68 Peak shaving

## 5.5.39 Cybernetic security

The cybernetic security is formed by:

- Hardening the storage of a credentials
- 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

> **IMPORTANT: Due to this, we do not recommend performing a rollback from FW 1.3.0 to FW version 1.2.1 or older.**

## 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 the brute force will take a place when an invalid password is entered repeatedly.

- If the invalid password is entered 5 times, the controller gets blocked for entering password for a while.
- Each further entering of the invalid password cause the consequent blocking time is 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 have no influence to controller/genset 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

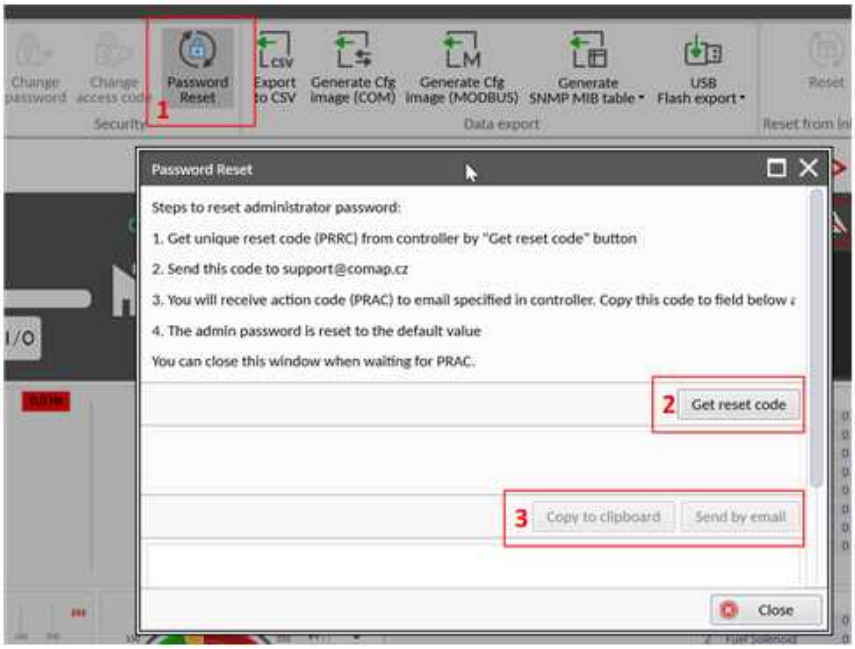
If **the administrator password is lost or controller is permanently locked** due to brute-force attack protection, proceed according to a procedure described below:

> **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 **IG500**, serial number **FF110336**. 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:**

```
ADgjZI2EcREqKq7Dyw/K0eyEURVNy3veXPVcsMuKZpw8hcImRqxyso7/LGec9y
QVthRMC53dZ2SLPHga50qVdpjuNuzLImdK5iDA5J13VIHZ0rW8eInUxj3+qWPa
pADf7nPC9B+t40IXChFPns6Rd4ey1VeAbj+7aca9iyhGUk8cN5V0ePN7+byWND
c7nO+KPop1eoQCgRdMh8AiH60ut7ME2u+qU3FOMGl65tmqFGXESCu3cQ+FcsF3
Sxs43QAnYw3sSRPZa57JStdEB3Nk13ooNxH7Bv/gfwsUEjvII3s2WsbjQZ4x/a
XBQF+kpl59usnz0oXaY+N8RTHd1ynEbyQ=
```

Please note folowing points:
- This code can be used only in the controller from which the corresponding request was generated.
- The code has no time-limited validity
- The code becomes invalid if someone enters valid administrator password into the controller
- The code becomes invalid if someone enters another (invalid) code three-times into the controller

Sincerely
ComAp technical support

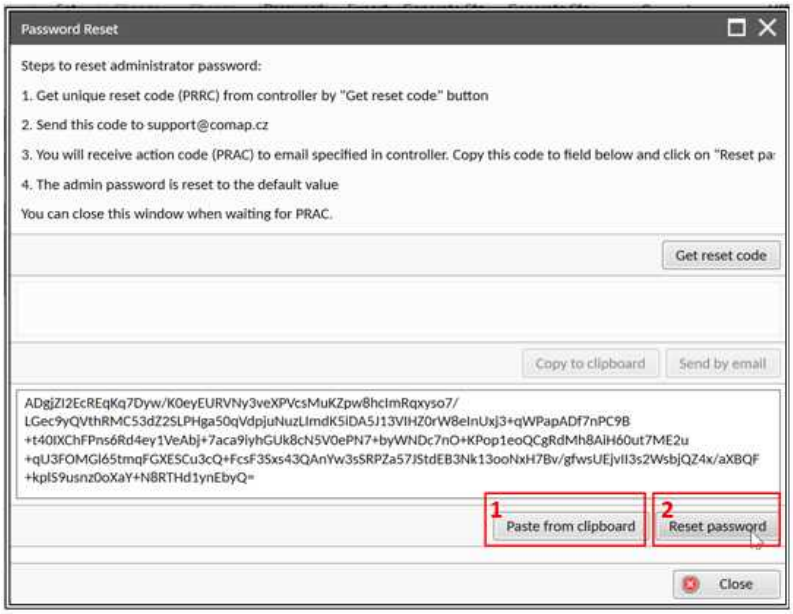
---

If you know the controller mentioned above but have not submitted any request for password reset please contact ComAp technical support support@comap.cz.
If you do not recognize this activity at all you may ignore this e-mail.

This is an automatically generated e-mail. Please do not reply.

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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 passed successfully penetration tests and cybersecurity audit.

## Web interface can be disabled

A setpoint has been added to disable the CM-ETHERNET built-in web interface.

> **IMPORTANT: As the web interface is using HTTP protocol it is recommended to disable the web interface unless the controller is connected into a trusted secure network.**

**back to Functions**

# 6 Communication

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6.2 Connection to 3rd party systems ..... 211
6.3 Replacing InternetBridge-NT ..... 226

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## 6.1 PC

6.1.1 Direct communication ..... 198
6.1.2 Remote communication ..... 200

### 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 468)** 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.*

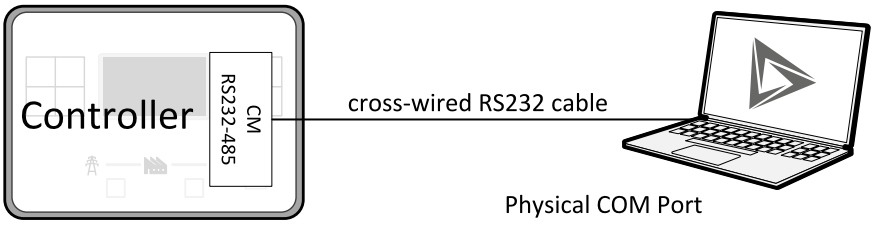



Image 6.1 Cross-wired RS232 cable is used

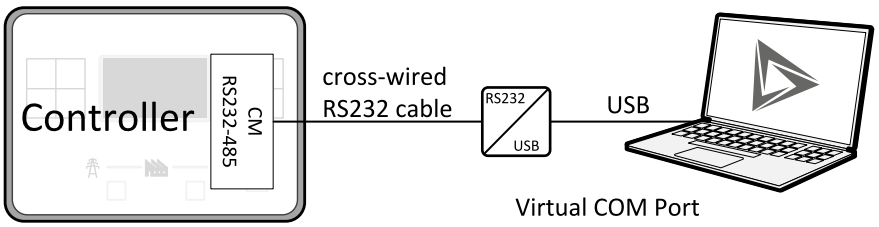



Image 6.2 Cross-wired RS232 cable and USB is used

## Connection via RS485

Plug-in module CM-RS232-485 or on board RS485 connector can be used for communication via RS485 connection.

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 469)** port of the controller.

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

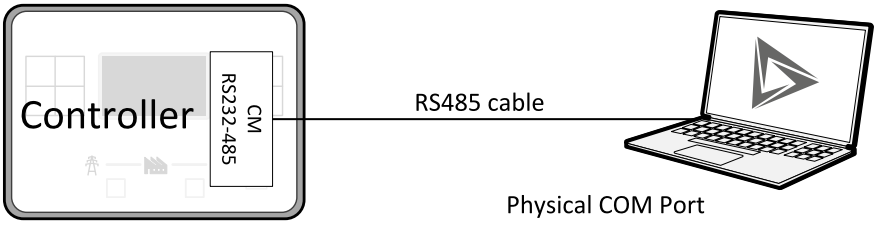



Image 6.3 Plug-in module CM RS232-485 is used

## Connection via Ethernet

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

The module is plugged into the slot located on the rear side of the controller. To find more information about installation of the modules **see Plug-in module installation on page 58**.

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

To connect your PC tool to the controller use the INTERNET connection type and just put the CM-Ethernet IP address into the gen-set address box in the PC tool. If you do not use the default **ComAp TCP Port (page 507)** 23, then you also have to specify the port number using a colon.

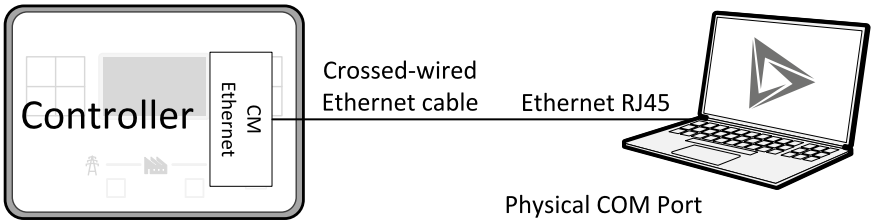



Image 6.4 Ethernet cable is used

## Connection via USB

USB interface uses HID profile.

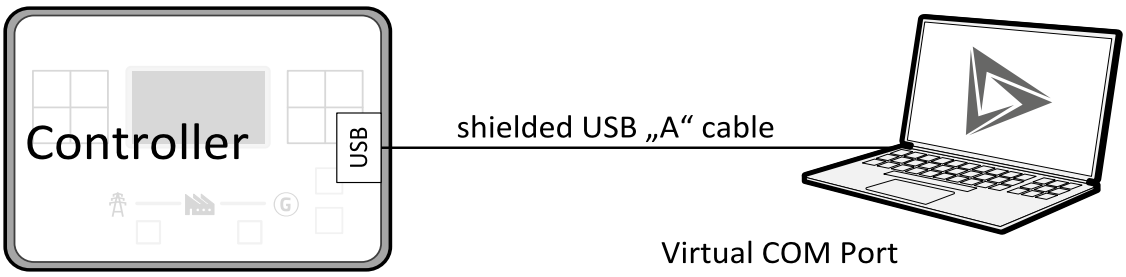



Image 6.5 Shielded USB type A cable is used

back to Communication

## 6.1.2 Remote communication

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

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

### Ethernet LAN connection

Direct IP LAN connection is intended to be used if the CM-Ethernet module is reachable from the client computer by specifying the IP address at which the module can be contacted.

- If direct IP connection is to be used within a local network the CM-Ethernet must have static IP address in the respective local network.

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

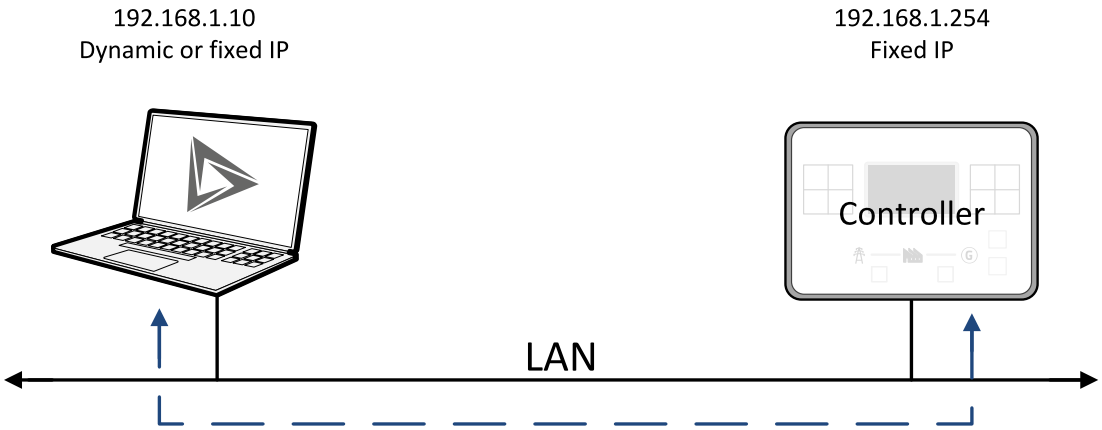



Image 6.6 Ethernet LAN connection

#### Setting-up static IP address

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

First way is to switch theCM-Ethernet to manual IP address mode. Adjust the setpoint **IP Address Mode (page 501)** to FIXED. In that case all setpoints of IP settings(**IP Address (page 501)**, **Subnet Mask (page 502)**, **Gateway IP (page 502)**, **DNS IP Address 1 (page 503)**) have to be adjusted manually. If this method is used several basic rules should be kept to avoid conflicts with the remaining network infrastructure:

- The static IP used in the controller must be selected in accordance with the local network in which CM-Ethernet is connected.
- The static IP used in the controller must be excluded from the pool of addresses which is assigned by DHCP server, which is in charge of the respective local network.
- The local infrastructure must generally allow using devices with manually assigned IP addresses.
- There must not be any other device using the same static IP address. This can be tested from a computer connected to the same network using "ping <required_ip_address>" command issued from the command line. The IP address is not occupied if there is not any response to the ping command.

***Note:*** *The list above contains only basic rules. Other specific restrictions/rules may take place depending on the local network security policy, technology used, topology etc.*

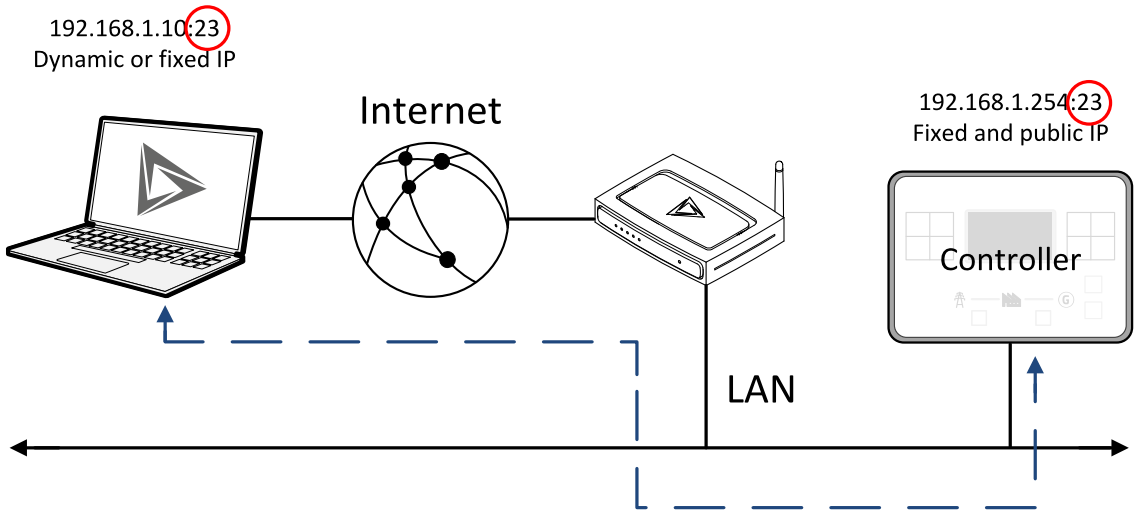
Next way is to switch the CM-Ethernet to automatic IP address mode. Adjust the setpoint **IP Address Mode (page 501)** to AUTOMATIC. In that case all IP settings are assigned by DHCP server. Then configure the DHCP server to assign always the same IP address (i.e. static IP address) to the particular CM-Ethernet according to it's MAC address.

# Internet connection

## Public static IP

If public static IP connection is to be used from the Internet, the IP address, which is entered into the client computer, must be static and public in scope of the Internet.

- If CM-Ethernet is connected to Internet via a local ethernet network then in most cases port forwarding must be created from the public IP address of the network gateway to the local IP address of CM-Ethernet at the port specified for ComAp protocol. Different port numbers can be used to create multiple port forwarding rules in the same local network.




## AirGate

This connection type is intended for remote connection from InteliConfig,or any other ComAp PC tool over the Internet in situations, where obtaining fixed public IP address is not possible. Only two remote clients can be connected at the same time.

This connection type is active if AirGate connection is enabled. Setpoint **AirGate Address (page 507)** must contain AirGate server address. It can be entered in text form as well as numeric form. There is a public AirGate server available at address "airgate.comap.cz".

Once the controller is attached to the Internet and the AirGate server address is properly adjusted then the controller registers automatically to the server and an identification string AirGate ID is given to a controller, which is visible at the controller screen.

To connect your PC tool to the controller use the AirGate connection, put the the same AirGate address as in the controller into the AIRGATE ADDRESS field and use the AirGate ID displayed on the controller.

## SMS

### Event SMS

The InteliGen 200 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 497)**

***Note:*** *Firstly setpoint **Telephone Number 1 (page 491)** has to be adjusted.*

The following events can be received by mobile phone:

- Engine Start/Stop
  - Manual Start/Stop
  - Remote Start/Stop
- Load on Gen-set

Message structure:

- Genset Name (hh:mm:ss dd.mm.yyyy)
- hh:mm:ss Load on Genset

### Alarm SMS

The InteliGen 200 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 498)**
- **Sd Messages (page 498)**
- **BOC Message (page 498)**

***Note:*** *Firstly setpoint **Telephone Number 1 (page 491)** has to be adjusted.*

Message structure:

- Gen-set Name
- AL=(Alarm 1, Alarm 2, Alarm x)

***Note:*** *Asterisk means that alarm is unconfirmed and exclamation mark means that alarm is active.*

## SMS commands

To control the gen-set equipped with InteliGen 200 controller and CM-GPRS or CM-4G-GPS communication module (or modem) via SMS requests, send an SMS in the structure of:

# xxxx, yyyy, zzzz, etc.

SMS send to the telephone number of the SIM card in your CM-GPRS module (or modem). Where the "#" mark means the controller access code, "xxxx" means the Command 1, "yyyy" is Command 2, "zzzz" is Command 3, etc.

***Note:*** *Access code is set up via InteliConfig.*

**IMPORTANT: If wrong controller access code is set, then only help command is working.**

| | |
|---|---|
| start | Start the engine in MAN mode. |
| stop | Stop the engine in MAN mode. |
| fault reset | Acknowledging alarms and deactivating the horn output. |
| gcb close | Closing GCB in MAN and TEST mode. |
| gcb open | Opening GCB in MAN and TEST mode. |
| off | Switching to OFF mode. |
| man | Switching to MAN mode. |
| auto | Switching to AUTO mode. |
| status | Get status information from controller unit. |
| help | Get a list of available SMS requests. |

***Note:*** *Between commands are internal delays adjusted due to system requirements.*

**Example:** When the controller, in AUTO mode, with a controller name of "InteliGen 200-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 200-Test: <OK>,<OK>,<OK>, <OK>,<OK>, <OK>
The value <OK> or <ERROR> means if the command has been performed succesfuly or not.

# Emails

## Event Email

The InteliGen 200 controller equipped with the CM-Ethernet communication module is able to send Event Email according to the setting of setpoint:

- **Event Message (page 497)**

***Note:*** *Firstly setpoints **Email Address 1 (page 494)** and **SMTP Sender Address (page 488)** (for CM-GPRS) or **SMTP Sender Address (page 500)** (for CM-Ethernet) have to be adjusted.*

***Note:*** ***Summer Time Mode (page 428)** and **Time Zone (page 497)** have to be adjusted for correct time in emails.*

Message structure:

Controller

---

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

---

Alarm 1

Alarm 2

Alarm 3

Events

---

hh:mm:ss Event 1

hh:mm:ss Event 2

hh:mm:ss Event 3

## Alarm Email

The InteliGen 200 controller equipped with the CM-Ethernet communication module is able to send Alarm Emails according to the setting of setpoints:

- **Wrn Message (page 498)**
- **Sd Messages (page 498)**
- **BOC Message (page 498)**

***Note:*** *Firstly setpoints* ***Email Address 1 (page 494)*** *and* ***SMTP Sender Address (page 488)*** *(for CM-GPRS) or* ***SMTP Sender Address (page 500)*** *(for CM-Ethernet) have to be adjusted.*

***Note:*** ***Summer Time Mode (page 428)*** *and* ***Time Zone (page 497)*** *have to be adjusted for correct time in emails.*

Message structure:

Controller

---

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

---

Alarm 1

Alarm 2

Alarm 3

History events

---

0 dd/mm/yyyy hh:mm:ss.0 Event 1

-1 dd/mm/yyyy hh:mm:ss.0 Event 2

-2 dd/mm/yyyy hh:mm:ss.0 Event 3

***Note:*** *Asterisk means that alarm is unconfirmed and exclamation mark means that alarm is active.*

# Web Server

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

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

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

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

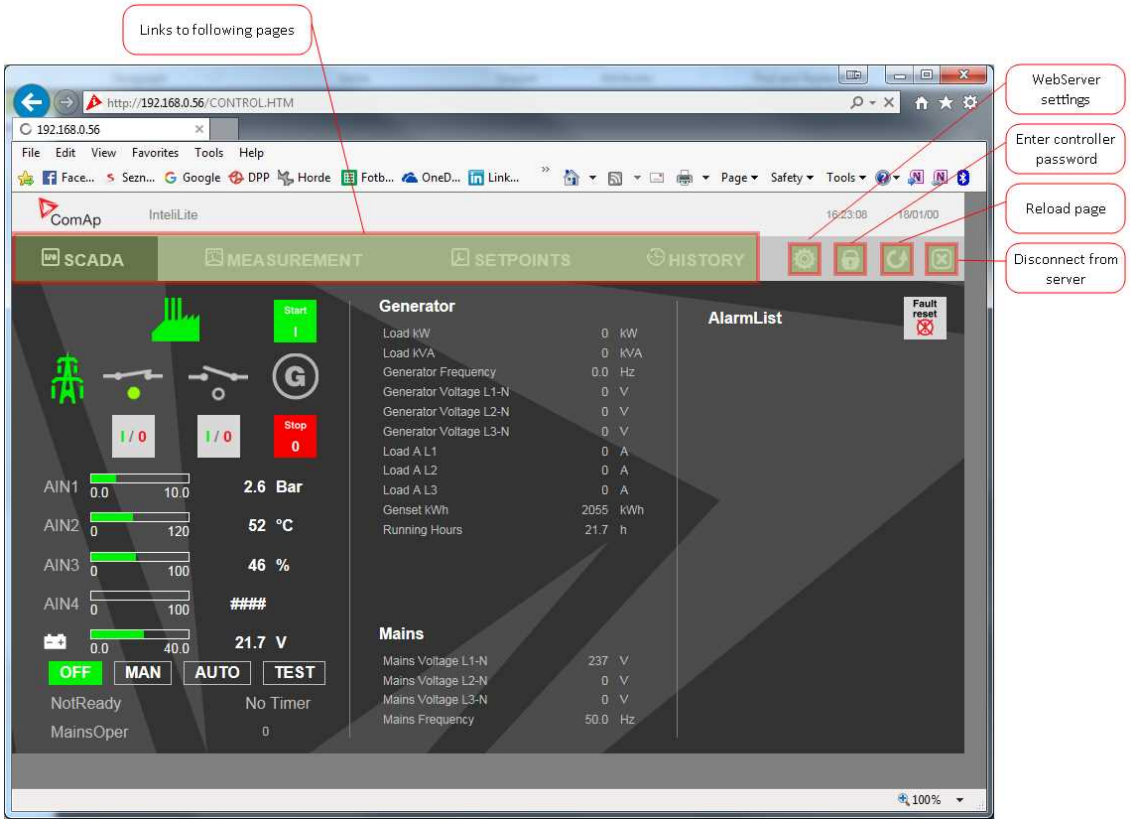



Image 6.7 Web Server main screen

## Scada

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

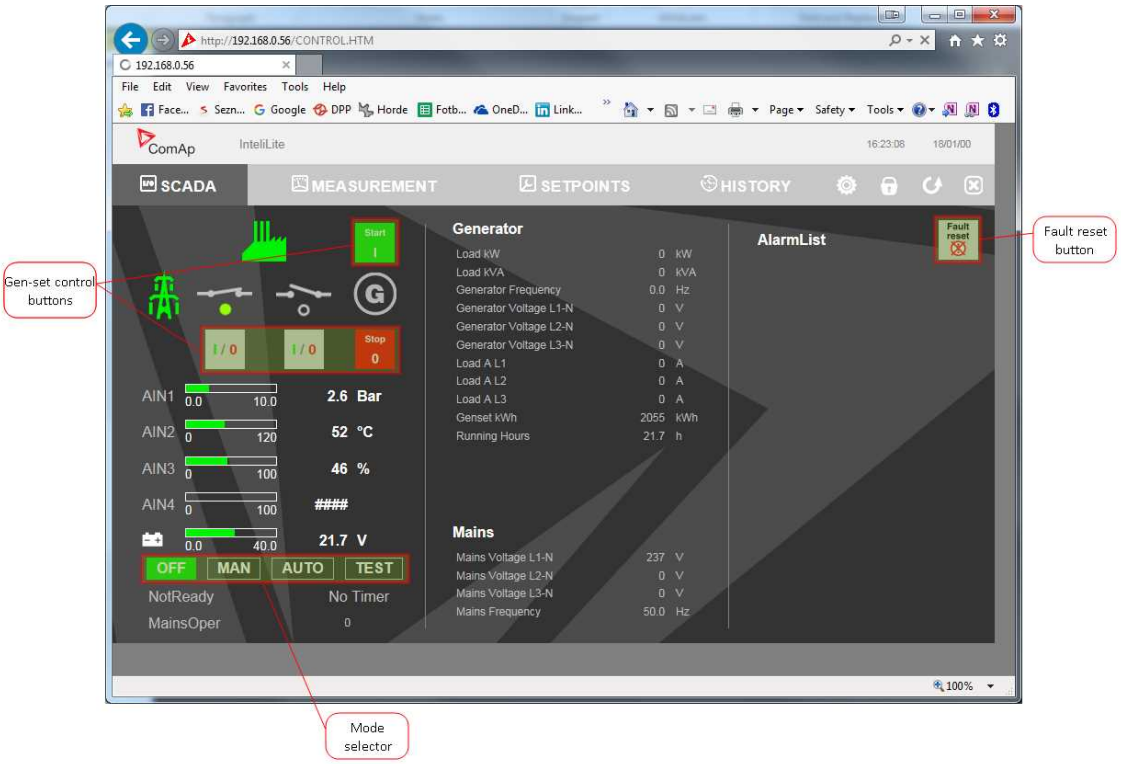



Image 6.8 Web Server - Scada screen

## Measurement

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

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

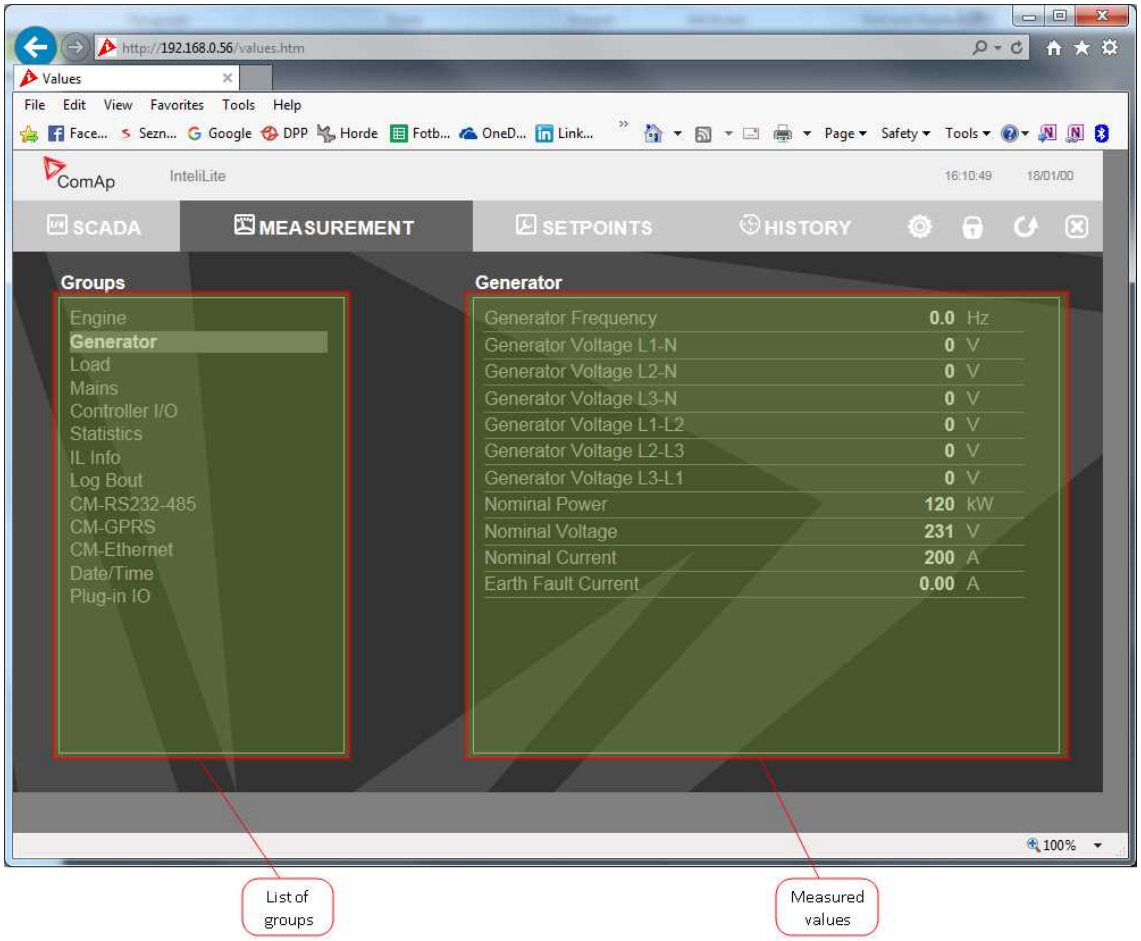



Image 6.9 Web Server - measurement screen

## Setpoints

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

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

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

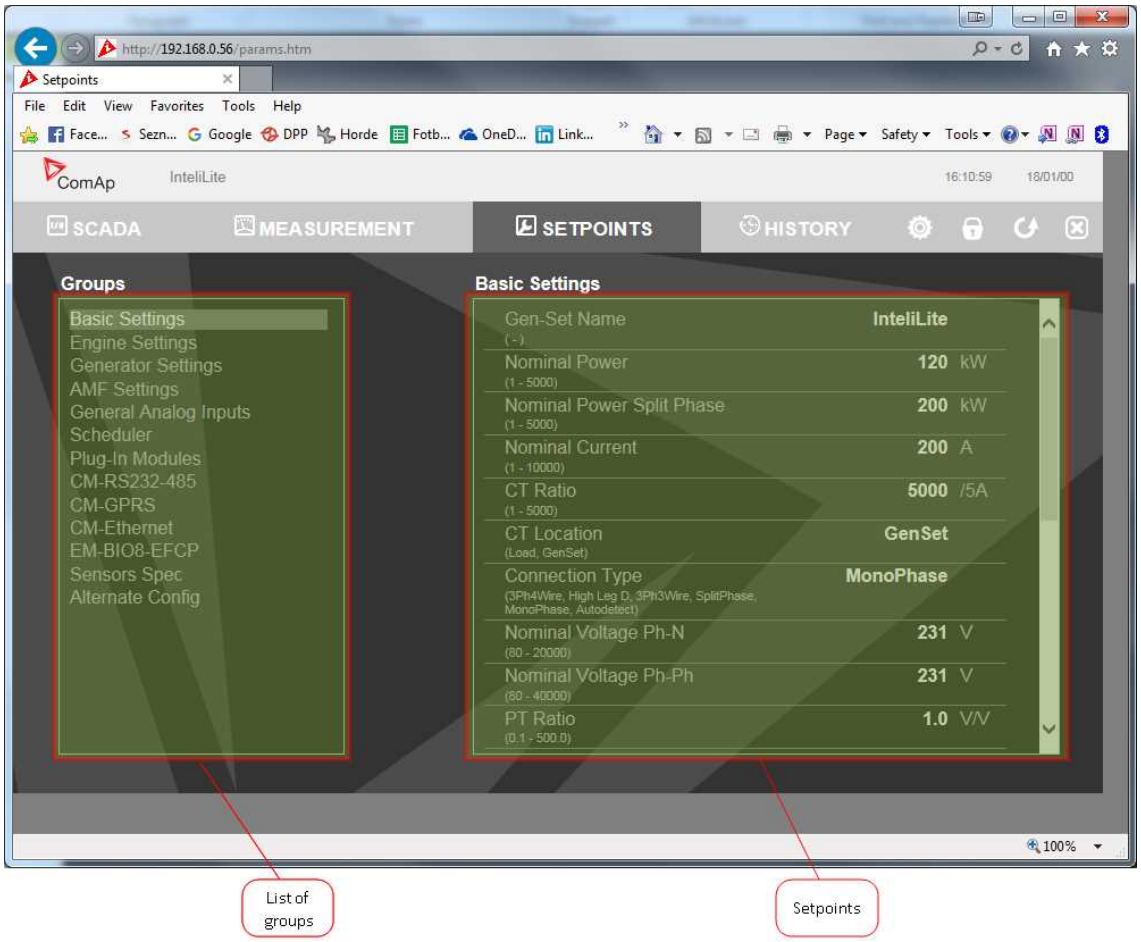


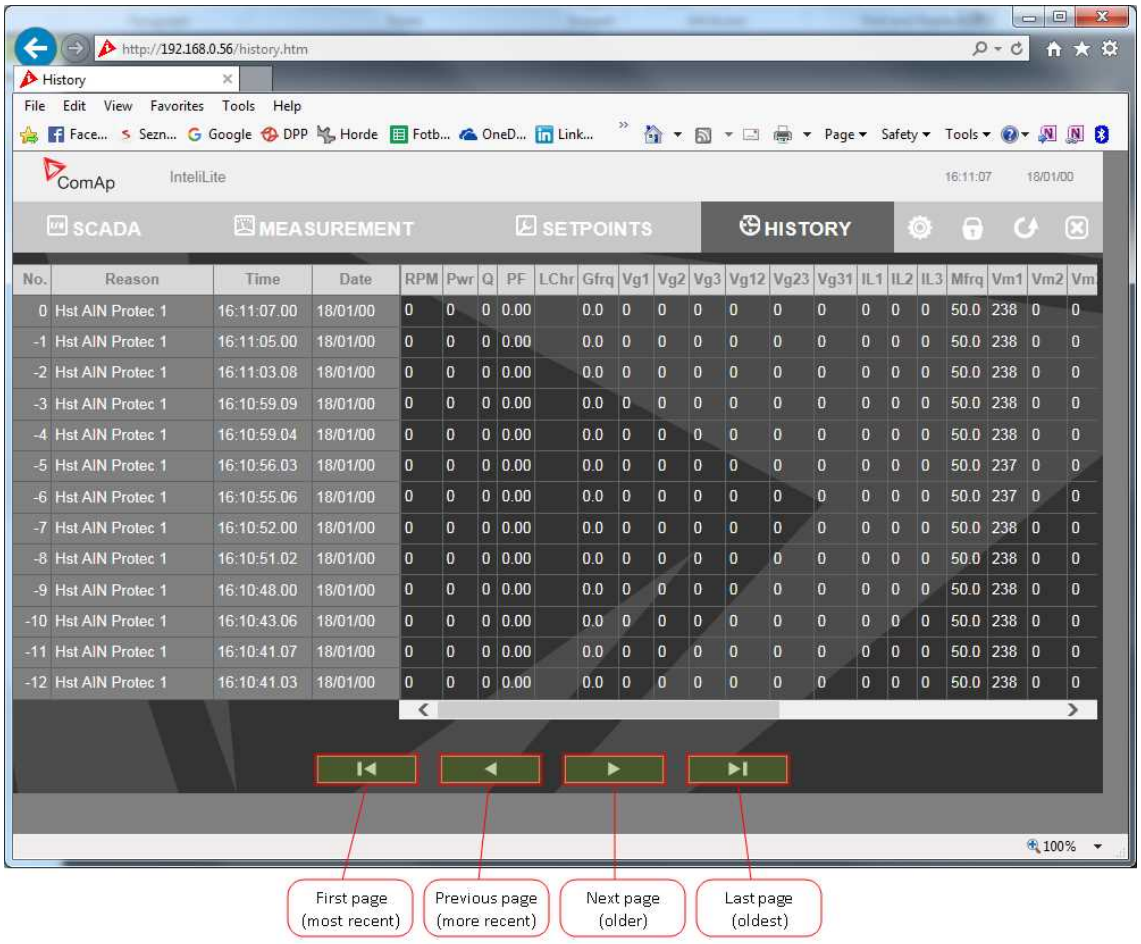

Image 6.10 Web Server - Setpoints screen

## History

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

Use the control buttons to move within the history file.

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




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

Image 6.11 Web Server - History screen

### Web Server Adjustment

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

Select the controller language the web pages will appear in.

Select the rate of automatic refresh of the scada page.

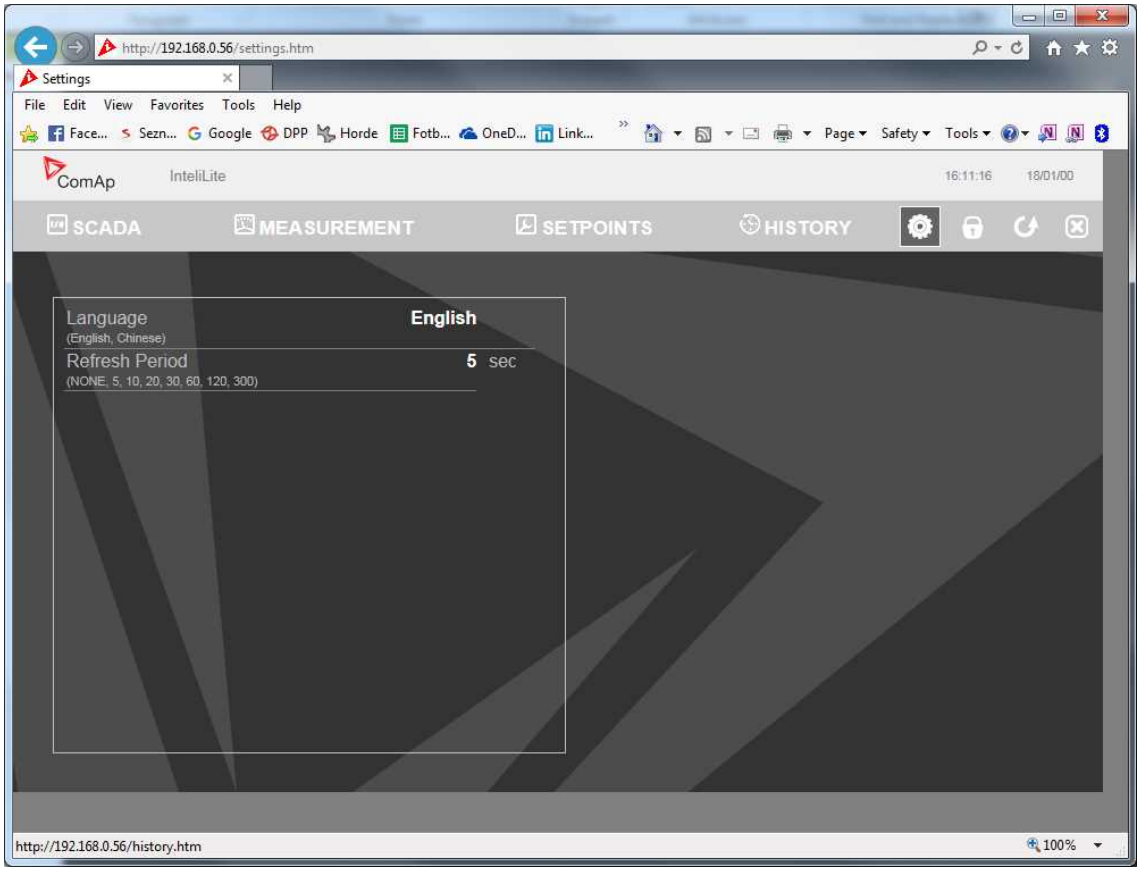



Image 6.12 Web Server - Adjustment screen

back to Communication

# 6.2 Connection to 3rd party systems

6.2.1 SNMP ..... 211
6.2.2 MODBUS-RTU, MODBUS/TCP ..... 213

back to Communication

## 6.2.1 SNMP

SNMP is an UDP-based client-server protocol used for providing data and events into a supervisory system (building management system). The controller plays the role of a „SNMP Agent“ while the supervisory system plays the role of a „SNMP Manager“.

- CM-Ethernet module is required for SNMP function
- Supported versions - SNMP v1 and SNMP v2c

The SNMP Agent function is to be enabled by the setpoint **SNMP Agent (page 504)** in the CM-Ethernet setpoint group. The setpoints **SNMP RD Community String (page 505)** and **SNMP WR Community String**

**(page 505)** in the same group can be used to customize the „community strings“ for the read and write operations which have function like „passwords“. All requests sent from the SNMP Manager have to contain community string which match with the community string adjusted in the controller otherwise the controller refuses the operation.

## MIB table

The „MIB table“ (Management Information Base) is a table which gives to the Manager description of all objects provided by the Agent.

- The MIB table is specific for each controller type and configuration
- The MIB table is to be exported from the controller configuration using InteliConfig
- Controllers with identical firmware and configuration share also identical MIB table, however if the configuration and/or firmware is not identical the MIB table is different and must be exported separately for each controller.

The root node of the MIB table of InteliGen controller is enterprises.comapProjekt.il, which is 1.3.6.1.4.1.28634.14. Under this node there are following sub-nodes :

- Notifications group (SMI v2 only) contains definitions of all notification-type objects that the Agent may send to the Manager.
- GroupRdFix contains read-only objects that exist in all controller regardless of the firmware version/type and configuration.
- GroupRdCfg contains read-only objects that depend on the firmware version/type and configuration.
- GroupWrFix contains read-write objects that exist in all controller regardless of the firmware version/type and configuration.
- GroupWrCfg contains read-write objects that depend on the firmware version/type and configuration.
- GroupW contains write-only objects.
- NotificationData group contains objects that are accessible only as bindings of the notification messages.

### SMI version

In InteliConfig the MIB table may be exported in two different formats – SMI v1 and SMI v2. The format which shall be used for export depends on the SNMP Manager and SMI version that it does support.

Typically, SMI v1 is used for SNMP v1 and vice versa, but it is not a rule and SMI v2 may be also used for SNMP v1.

## SNMP reserved objects

| Name | OID | Access | Data type | Meaning |
|---|---|---|---|---|
| pfActionArgument | groupWrFix.24550 | read,write | Gauge32 | Writing: command argument<br>Reading: command return value |
| pfActionCommand | groupW.24551 | write | Integer32 | Command code 1) |
| pfPassword | groupW.24524 | write | Integer32 | Password |

1) For list of commands, arguments and description of the procedure of invoking commands see the description of the MODBUS protocol.

## SNMP notifications

Except the request-response communication model, in which the communication is controlled by the Manager, there are also messages that the Agent sends without any requests. These messages are called „Notifications“ and inform the Manager about significant events occurred in the Agent.

The controller can send notifications to two different SNMP Managers (two different IP addresses). The addresses are to be adjusted in the CM-Ethernet setpoint group by the setpoints **SNMP Traps IP Address 1 (page 505)** and **SNMP Traps IP Address 2 (page 506)**. If the Manager address is not adjusted the particular notification channel is off. The controller will send the notifications in format adjusted by the setpoint SNMP Trap Format.

- Each notification (kind of event) is identified by an unique identifier (Trap ID in SNMPv1 or Notification OID in SNMPv2). This unique identifier gives the specific meaning to the notification message, e.g. Protection 1. level - Fuel Level - alarm activated.
- All possible notifications and their identifiers are listed in the MIB table.
- The notification message also contains controller name, serial number and textual description of the event.

## Operational events

This events are used for SNMP traps. See the list below:

- Start commands of gen-set
  - Start button
  - Remote start
- Stop commands of gen-set
  - Stop button
  - Remote stop
- Breaker record
  - Load on gen-set

# 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 (via 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 468)** or **COM2 Mode (page 469)** into the Modbus position. The serial speed for MODBUS-RTU communication is to be adjusted by the setpoint **COM1 MODBUS Communication Speed (page 469)** or **COM2 MODBUS Communication Speed (page 470)**.
- 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 504)**.

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<br>Write: 06, 16 |
| 4200 .. 7167 | Reserved registers | Read/Write, depends on each specific register | Input Registers<br>Holding Registers | Read: 03, 04<br>Write: 06, 16 |

## Configurable part of the map

The contents of the configurable part of the map is specified in the configuration table. It can be changed by the customer as well as exported in a human-readable format using the configuration tool.

**Discrete inputs**

The discrete inputs are read-only objects located in the address range 0-999. The source ComAp objects for discrete inputs can be:

- Single bit of any value of any binary type.
- Protection (e.g. 2nd-level protection of the state "xyz"). The input is high if the protection is active regardless of if it is configured or not.

**Input registers**

The input registers are read-only numeric values located in the address range 1000-2999. The source ComAp objects can be:

- Any controller value of any data type. The mapping of the particular data type into registers is described in **Mapping data types to registers (page 215)**.

**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 215)**.

### Default contents of the configurable part

The default map of MODBUS objects contain following items. This map expects the PC tool does have the function allowing the user to modify the map.

| Object type | Starting object address | Controller object |
|---|---|---|
| Discrete inputs | 0000 | Physical binary inputs CU + configured* modules<br>Logical binary outputs<br>Protections on binary inputs CU + configured* modules<br>Protections on analog inputs CU + configured* modules<br>All Built-in fixed protections |
| Input registers | 1000 | All configured* visible values |
| Holding registers | 3000 | None |

*Present in the default configuration.

**IMPORTANT: The default map of a particular firmware branch and application must not change when a new version of the firmware is created. If new objects are added they must be added to free positions so, that the previous content is not affected.**

**IMPORTANT: The default map of a particular firmware branch must not contain different values in different applications at the same MODBUS address. It means if a ComAp object does not make sense in some application type the respective MODBUS address must be left unassigned.**

## Mapping data types to registers

As there are multiple data types in the controller but only one data type in MODBUS (the register, which is 2 byte long), a mapping table is necessary to compose and decompose the MODBUS messages correctly.

| Data type | Meaning | Number of registers | Data maping |
|---|---|---|---|
| Integer8 | 1-byte signed integer | 1 | MSB = sign extension<br>LSB = value |
| Unsigned8 | 1-byte unsigned integer | 1 | MSB = 0<br>LSB = value |
| Integer16 | 2-byte signed integer | 1 | MSB = value, MSB<br>LSB = value, LSB |
| Unsigned16 | 2-byte unsigned integer | 1 | MSB = value, MSB<br>LSB = value, LSB |
| Integer32 | 4-byte signed integer | 2 | MSB1 = value, byte 3 (MSB)<br>LSB1 = value, byte 2<br>MSB2 = value, byte 1<br>LSB2 = value, byte 0 (LSB) |
| Unsigned32 | 4-byte unsigned integer | 2 | MSB1 = value, byte 3 (MSB)<br>LSB1 = value, byte 2<br>MSB2 = value, byte 1 |

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

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

*) 1 .. level 1 (yellow), 2 .. level 2 (red), 3 .. sensor fail

**) Bit0 – alarm is active, Bit1 – alarm is confirmed

***) String encoding is UTF-8

## Error codes (exception codes)

Exception code is returned by the controller (server) if the query sent from the client could not be completed successfuly.

The controller responds with the error codes in as follows:

- 01 – Ilegal function is returned if an incompatible type of operation is applied for a specific object, e.g. if function 03 is applied to a binary object.
- 02 – illegal address is returned if the client tries to perform an operation with a object address that is not related to any existing object or that is located inside an object which is composed by multiple addresses (registers).
- 04 – device error is returned in all other errorneous situations. More detailed specification of the problem can be consequently obtained by reading the registers 4205 – 4206.

## Reserved registers

There are several registers with specific meaning. These registers are available in all controllers regardless of the configuration.

| Register addresses | Number of registers | Access | Data type | Meaning |
|---|---|---|---|---|
| 4200 - 4201 | 2 | read/write | Time | RTC Time in BCD code |
| 4202 - 4203 | 2 | read/write | Date | RTC Date in BCD code |
| 4204 | 1 | read/write | Unsigned8 | Index of the language that is used for text data provided by MODBUS (e.g. alarmlist messages). |
| 4205 - 4206 | 2 | read | Unsigned32 | Last application error. To be read after the device returns the exception code 04. It contains specific information about the error. |
| 4207 - 4208 | 2 | read/write | Unsigned32 | Writing:command argument<br>Reading: command return value |
| 4209 | 1 | write | Unsigned16 | Command code |
| 4010 | 1 | - | - | Not implemented |
| 4211 | 1 | write | Unsigned16 | Password |
| 4212 - 4213 | 2 | read | Unsigned32 | Communication status |
| 4214 | 1 | read | Unsigned8 | Number of items in the Alarmlist |
| 4215 - 4241 | 27 | read | Alarm | 1. record in alarm list |
| 4242 - 4268 | 27 | read | Alarm | 2. record in alarm list |
| 4269 - 4295 | 27 | read | Alarm | 3. record in alarm list |
| 4296 - 4322 | 27 | read | Alarm | 4. record in alarm list |
| 4323 - 4349 | 27 | read | Alarm | 5. record in alarm list |
| 4350 - 4376 | 27 | read | Alarm | 6. record in alarm list |
| 4377 - 4403 | 27 | read | Alarm | 7. record in alarm list |
| 4404 - 4430 | 27 | read | Alarm | 8. record in alarm list |
| 4431 - 4457 | 27 | read | Alarm | 9. record in alarm list |
| 4458 - 4484 | 27 | read | Alarm | 10. record in alarm list |
| 4485 - 4511 | 27 | read | Alarm | 11. record in alarm list |
| 4512 - 4538 | 27 | read | Alarm | 12. record in alarm list |
| 4539 - 4565 | 27 | read | Alarm | 13. record in alarm list |
| 4566 - 4592 | 27 | read | Alarm | 14. record in alarm list |
| 4593 - 4619 | 27 | read | Alarm | 15. record in alarm list |
| 4620 - 4646 | 27 | read | Alarm | 16. record in alarm list |

## List of commands and arguments

"Commands" are used to invoke a specific action in the controller via the communication channel. The list of available actions is in the table below. The general procedure of writing a command via MODBUS is as follows:

1. (Optional) Write required level of password into the register 44212 (register address 4211). Use function 6. If the password is required or not depends on configuration of access rules. It can be adjusted/modified by InteliConfig.

2. Write the command argument into the registers 44208-44209 (register addresses 4207-4208). Use function 16.
3. Write the command code into the register 44210 (register address 4209). Use function 6.
4. (Optional) Read the command return value from the registers 44208-44209 (register addresses 4207-4208). Use function 3.
5. If the command was executed the return value is as listed in the table. If the command was accepted but there was an error during execution the return value indicates the reason:
   a. 0x00000001 – invalid argument
   b. 0x00000002 – command refused (e.g. controller not in MAN, breaker can not be closed in the specific situation etc.)

| Action | Command code | Argument | Return value |
|---|---|---|---|
| Engine start *) | 0x01 | 0x01FE0000 | 0x000001FF |
| Engine stop *) | 0x01 | 0x02FD0000 | 0x000002FE |
| Fault reset *) | 0x01 | 0x08F70000 | 0x000008F8 |
| Horn reset *) | 0x01 | 0x04FB0000 | 0x000004FC |
| GCB toggle *) | 0x02 | 0x11EE0000 | 0x000011EF |
| GCB on | 0x02 | 0x11EF0000 | 0x000011F0 |
| GCB off | 0x02 | 0x11F00000 | 0x000011F1 |
| MCB toggle *) | 0x02 | 0x12ED0000 | 0x000012EE |
| MCB on | 0x02 | 0x12EE0000 | 0x000012EF |
| MCB off | 0x02 | 0x12EF0000 | 0x000012F0 |

*) This action is an equivalent of pressing the front panel button

# MODBUS examples

### Modbus RTU examples

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

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

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

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

We read value 240 from register 01053. From table of modbus registers we get dimension of read value and "Dec". Dec=1 means shift one decimal place to the right. So battery voltage is **24.0 V**.

- Reading Nominal power
  - Export table of values from InteliConfig

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

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

| Response: (Numbers in Hex) | | | | | | |
|---|---|---|---|---|---|---|
| 01 | 03 | 02 | 00 | C8 | B9 | D2 |
| Controller address | Modbus function | Length of data $02_{hex}$ = 2 bytes read | Data $00C8_{hex}$ = **200**$_{dec}$ | | CRC | |

Read nominal power is 200 kW.

- Reading all binary inputs as modbus register

| Table: Values | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Allowed MODBUS functions: 03, 04 | | | | | | | | | |
| Register(s) | Com.Obj. | Name | Dimension | Type | Len | Dec | Min | Max | Group |
| **01068** | 8235 | **Binary Inputs** | | Binary#2 | 2 | **0** | - | - | Controller I/O |

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

| Response: (Numbers in Hex) | | | | | | |
|---|---|---|---|---|---|---|
| 01 | 03 | 02 | 00 | 12 | 38 | 49 |
| Controller address | Modbus function | Length of data<br>$02_{hex}$ = 2 bytes read | Data<br>$0012_{hex}$ = **00010010**$_{bin}$ | | CRC | |

Binary inputs is 00010010. It means Binary input 2 and binary input 5 are active.

***Note:*** *You can use modbus function 4 insted of 3, rest of data remain same (CRC differs).*

- Reading binary inputs as coil status.

| Table: Binaries | | | | | | |
|---|---|---|---|---|---|---|
| Allowed MODBUS functions: 01, 02 | | | | | | |
| Addresses<br>Modbus Addr.<br>Prot. Addr. | Source<br>= Value<br>= State | C.O.#<br>State # | Name of Value<br>Name of State | Bit # | Bit Name<br>Activated by protection(s): | Group |
| 00000 | Value | 8235 | Binary Inputs | 1 | GCB Feedback | Controller I/O |
| 00001 | Value | 8235 | Binary Inputs | 2 | MCB Feedback | Controller I/O |
| 00002 | Value | 8235 | Binary Inputs | 3 | Emergency Stop | Controller I/O |

We will read state of MCB Feedback binary input.

| Request: (Numbers in Hex) | | | | | | | |
|---|---|---|---|---|---|---|---|
| 01 | 01 | 00 | 01 | 00 | 01 | AC | 0A |
| Controller address | Modbus function | Register address<br>$0001_{hex}$ = **$0001_{dec}$** | | Number of registers | | CRC | |

| Response: (Numbers in Hex) | | | | | |
|---|---|---|---|---|---|
| 01 | 01 | 01 | 01 | 90 | 48 |
| Controller address | Modbus function | Length of data<br>$01_{hex}$ = 1 byte read | Data<br>$01_{hex}$ = active | CRC | |

The readed data is 01, it means this binary input is active.

***Note:*** *You can use modbus function 2 insted of 1, rest of data remains same (CRC differs).*

### Starting the engine

Before starting engine you may need to write password. Depends on your settings in controller.

Table **Reserved registers (page 217)**

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

Table **List of commands and arguments (page 218)**

| Action | Command code | Argument | Return value |
|---|---|---|---|
| Engine start | 0x01 | 0x01FE0000 | 0x000001FF |
| Engine stop | 0x01 | 0x02FD0000 | 0x000002FE |

| Request 1/2: (Numbers in Hex) | | | | | | |
|---|---|---|---|---|---|---|
| 01 | 10 | 10 | 6F | 00 | 03 | 06 |
| Controller address | Modbus function<br>$10_{hex} = 16_{dec}$ | Register address<br>$106F_{hex} = \mathbf{4207}_{dec}$ | | Number of registers | | Data length in bytes |

| Request 2/2: (Numbers in Hex) | | | | | | | |
|---|---|---|---|---|---|---|---|
| 01 | FE | 00 | 00 | 00 | 01 | 68 | 0B |
| Argument | | | | Command code | | CRC | |

***Note:*** *Command and argument may be written as one "packet" (function 16) or you can split it and write argument (function 16) and after that write command code (function 6).*

### Password

This password is the same as in InteliConfig or directly in controller.

Table **Reserved registers (page 217)**

| Register addresses | Number of registers | Access | Data type | Meaning |
|---|---|---|---|---|
| 4211 | 1 | write | Unsigned16 | Password |

***Note:*** *Default password is "0".*

In this example the password is "1234".

| Request: (Numbers in Hex) | | | | | | | |
|---|---|---|---|---|---|---|---|
| 01 | 06 | 10 | 73 | 04 | D2 | 7C | D1 |
| Controller address | Modbus function | Register address $1073_{hex}$ = **4211**$_{dec}$ | | Password $04D2_{hex}$ = **1234**$_{dec}$ | | CRC | |

| Response for success: (Numbers in Hex) | | | | | | | |
|---|---|---|---|---|---|---|---|
| 01 | 06 | 10 | 73 | 00 | 00 | 7C | D1 |
| Controller address | Modbus function | Register address $1073_{hex}$ = **4211**$_{dec}$ | | Allways zero. | | CRC | |

| Response for bad password: (Numbers in Hex) | | | | |
|---|---|---|---|---|
| 01 | 86 | 04 | 43 | A3 |
| Controller address | Modbus exception for function 6. | 04 – device error **see Error codes (exception codes) on page 217** | CRC | |

▶ Nominal Power – writing

| Table: Setpoints | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Allowed MODBUS functions: 03, 04, 06, 16 | | | | | | | | | |
| Register(s) | Com.Obj. | Name | Dimension | Type | Len | Dec | Min | Max | Group |
| **03008** | 8276 | **Nominal Power** | **kW** | Unsigned | 2 | **0** | 1 | 5000 | Basic Settings |

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

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

Writen setpoint nominal power is 100 kW.

▶ CRC calculation

The check field allows the receiver to check the validity of the message. The check field value is the Cyclical Redundancy Check (CRC) based on the polynomial $x^{16}+x^{15}+x^2+1$. CRC is counted from all message bytes preceding the check field.

Online CRC calculator: http://www.lammertbies.nl/comm/info/crc-calculation.html Use CRC-16 (Modbus)

Write LSB first.

For writing nominal power 100 kW the CRC is calculated from this data: $01060BC00064_{hex}$

**Modbus TCP examples**

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

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

| Request: (Numbers in Hex) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 00 | 00 | 00 | 00 | 00 | 06 | 01 | 03 | 04 | 1D | 00 | 01 |
| transaction identifier (usually 0) | | protocol identifier (usually 0) | | Length of data bytes following | | Controller address | Modbus function | Register address $041D_{hex}$ = **1053**$_{dec}$ | | Number of registers | |

| Request: (Numbers in Hex) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 00 | 00 | 00 | 00 | 00 | 06 | 01 | 03 | 04 | 1D | 00 | 01 |
| transaction identifier (usually 0) | | protocol identifier (usually 0) | | Length of data bytes following | | Controller address | Modbus function | Register address $041D_{hex}$ = **1053**$_{dec}$ | | Number of registers | |

| Response: (Numbers in Hex) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 00 | 00 | 00 | 00 | 00 | 05 | 01 | 03 | 02 | 00 | F0 |
| transaction identifier (usually 0) | | protocol identifier (usually 0) | | Length of data bytes following | | Controller address | Modbus function | Length of data $02_{hex}$ = 2 bytes read | Data $00F0_{hex}$ = **240**$_{dec}$ | |

We read value 240 from register 01053. From table of modbus registers we get dimension of read value and "Dec". Dec=1 means shift one decimal place to the right. So battery voltage is **24.0 V**.

**back to Connection to 3rd party systems**

# 6.3 Replacing InternetBridge-NT

## 6.3.1 Sites with "NT" family controllers

The CAN module InteliBridge-NT was designed to provide ethernet or cellular connectivity for InteliGen NT, InteliSys NT, InteliSys Gas controllers and it's derivatives. The typical topology of InteliBridge-NT connection was as follows:

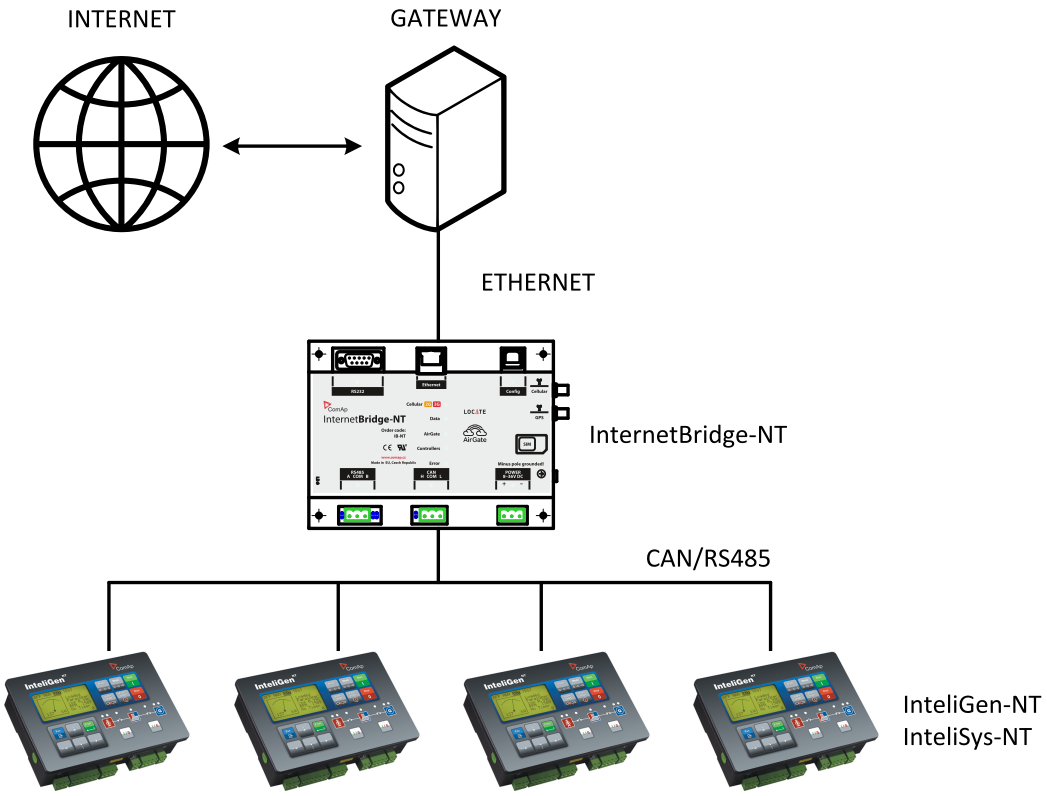



Image 6.13 InteliBridge-NT, wired internet connection

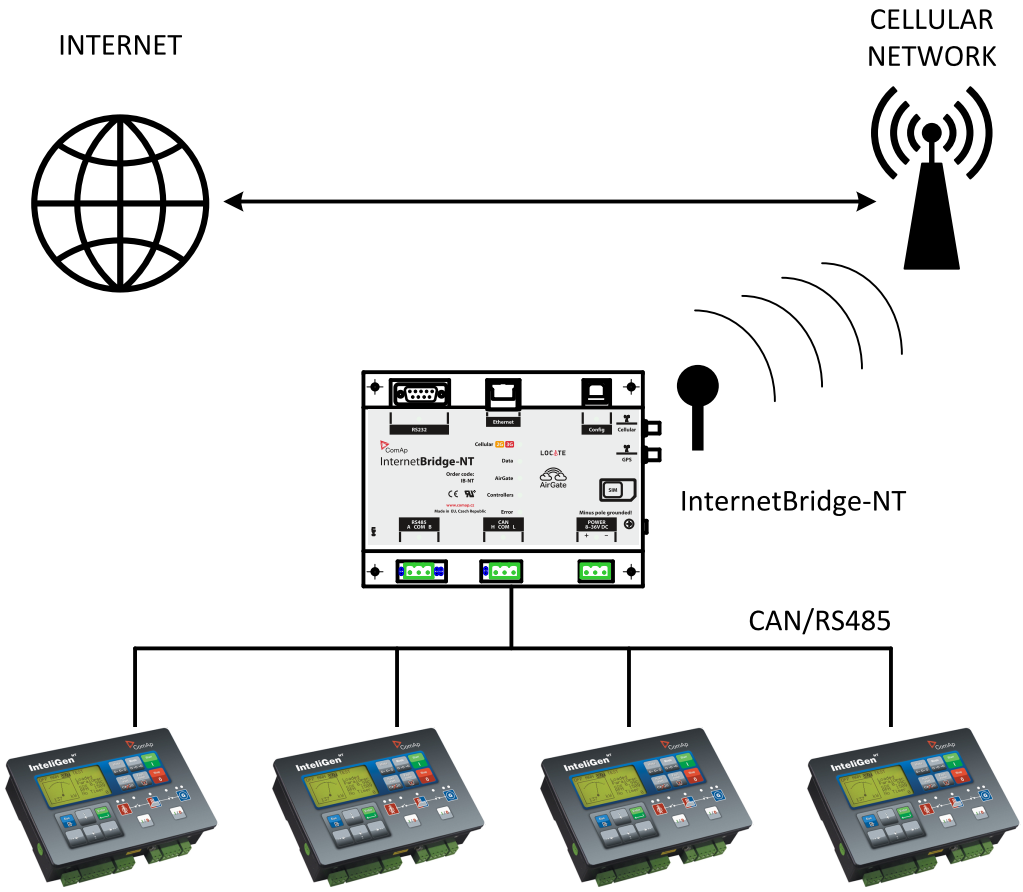



Image 6.14 InteliBridge-NT, cellular internet connection

## 6.3.2 Sites with new controller families

In the new controller product families the connectivity is based primarily on ethernet - a modern, fast and reliable communication technology. The communication interface has been **moved inside the controllers**, either as built-in or as plug-in modules. Thus, there is no need of external CAN module to provide the connectivity. The topology has changed as described at following pictures.

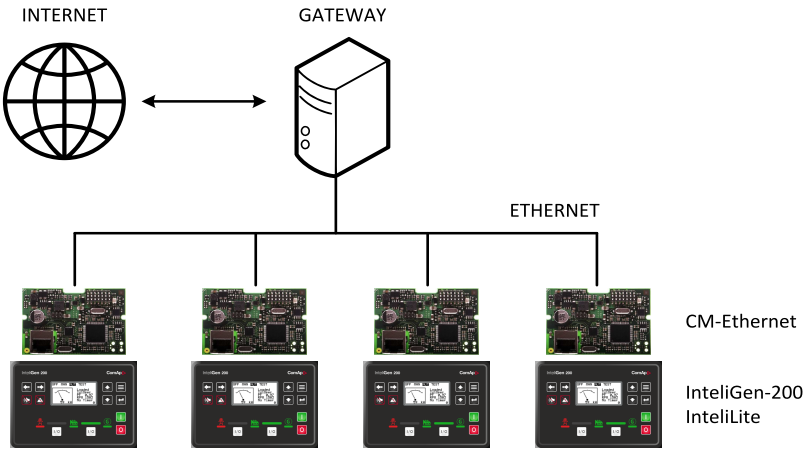


Image 6.15 InteliGen 200, wired internet connection

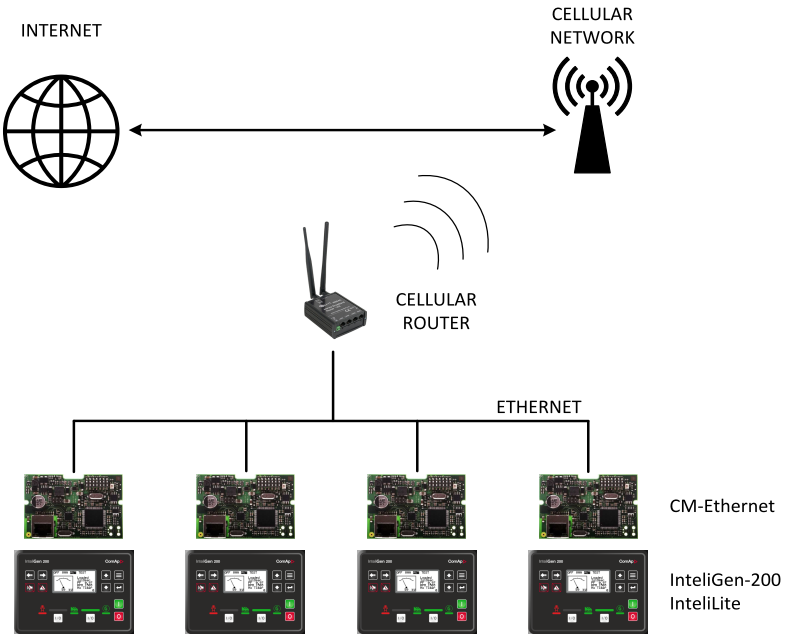



Image 6.16 InteliGen 200, cellular internet connection via cellular router

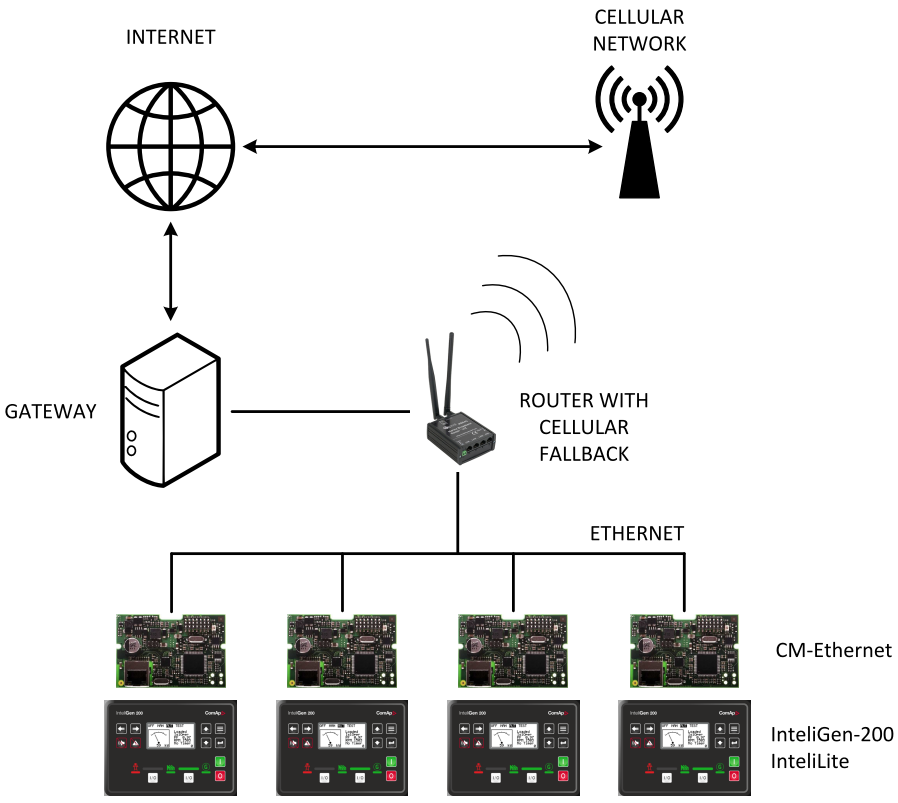



Image 6.17 InteliGen 200, wired internet connection with cellular fallback

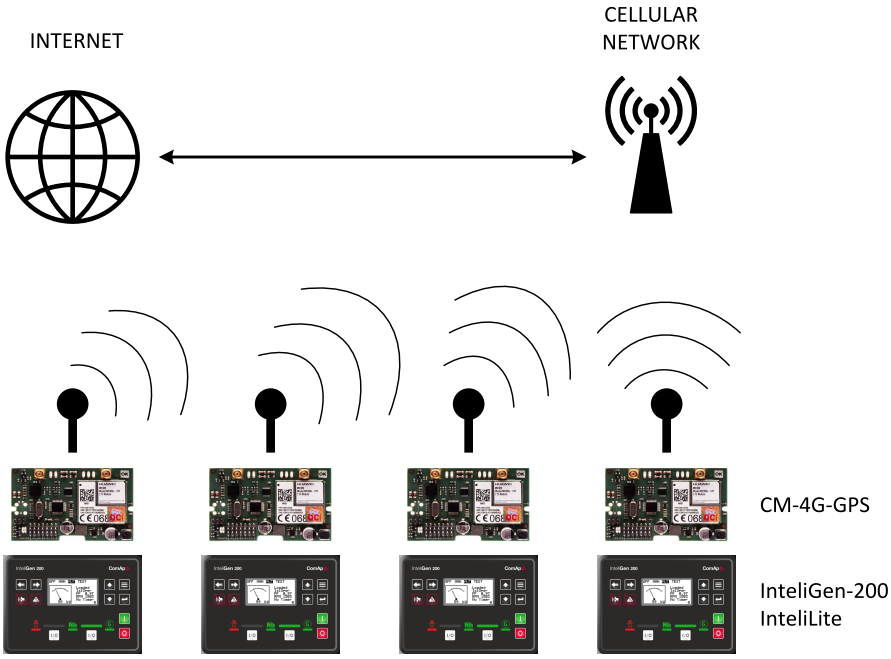



Image 6.18 InteliGen 200, cellular internet connection via separate cellular modules

## 6.3.3 Combined sites

There might be also sites where the "NT" controllers are used together with newly installed controllers from the new product families. In such a case the topology respects the different connectivity:

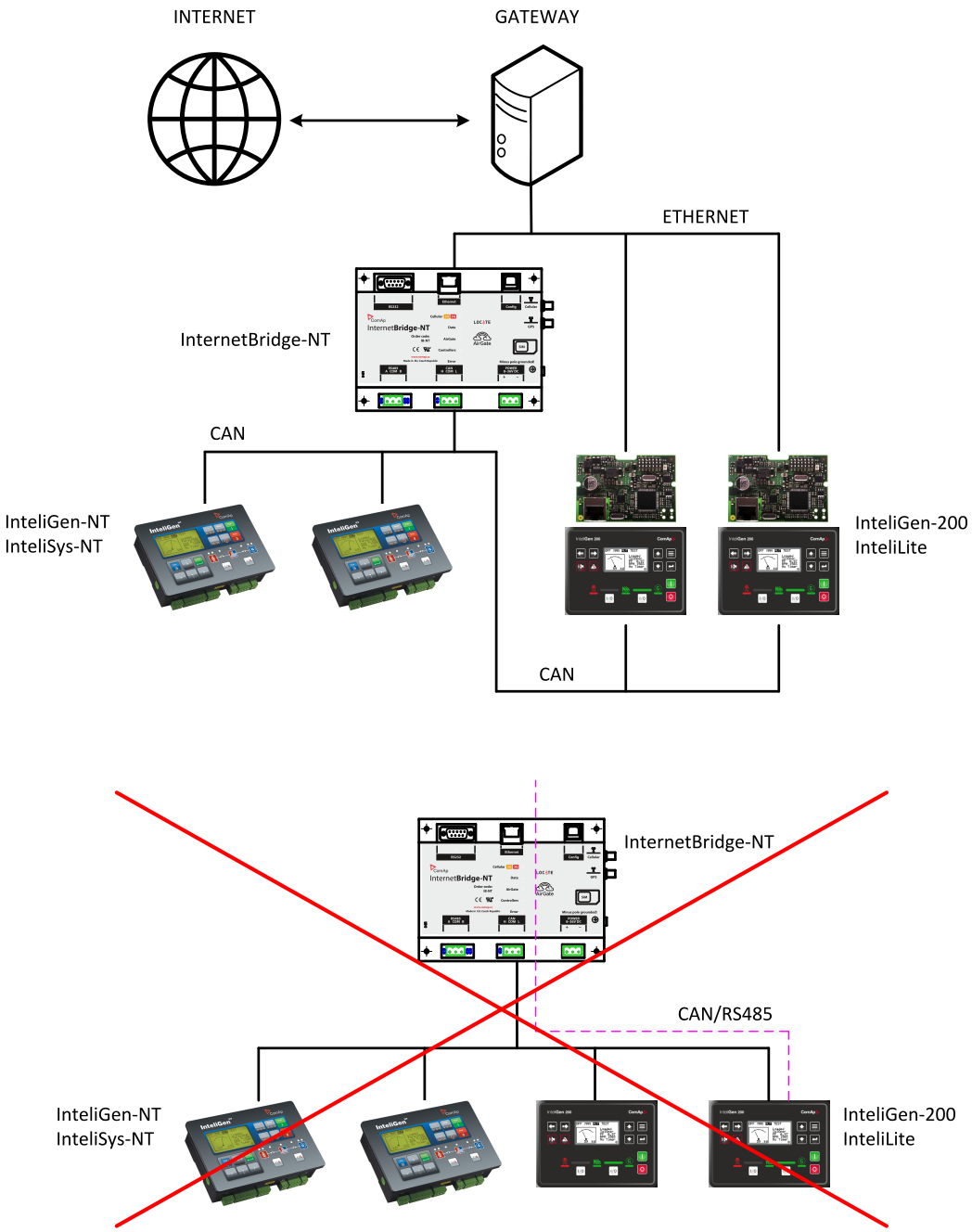



Image 6.19 Combined site, wired internet connection

***Note:*** *The controllers from new product lines are not supported in InteliBridge-NT and thus not accessible via it.*

# 7 Technical data

## Power supply

| | |
|---|---|
| **Power supply range** | 8-36 V DC |
| **Power consumption** | 320 mA / 8 V DC<br>210 mA / 12 V DC<br>120 mA / 24 V DC<br>90 mA / 36 V DC |
| **RTC battery** | Replaceable |
| **Fusing** | Power terminal max. 4 A<br>w/o BOUT consumption<br>E-Stop max.12 A |
| **Fusing E-Stop** | 12 A |
| **Max. Power Dissipation** | 9 W |

## D+

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

## Operating conditions

| | |
|---|---|
| **Operating temperature** | -20 °C to +70 °C |
| **Operating temperature for Low Temp. version** | -40 °C to +70 °C |
| **Storage temperature** | -30 °C to +80 °C |
| **Protection degree (front panel)** | IP 65 |
| **Operating humidity** | 95 % w/o condensation |
| **Vibration** | 5-25 Hz, ± 1.6 mm<br>25-100 Hz, a = 4 g |
| **Shocks** | a = 500 m/s$^2$ |
| Surrounding air temperature rating 70 °C | |
| Suitable for pollution degree 2 | |

## Voltage measurement

| | |
|---|---|
| **Measurement inputs** | 3 ph-n Gen voltage , 3 ph-n Mains |
| **Measurement range** | 277 V / 480 V AC (EU)<br>346 V / 600 V AC (US/Canada) |
| **Linear measurement and protection range** | 381 V / 660 V |
| **Accuracy** | 1 % |
| **Frequency range** | 40-70 Hz (accuracy 0.1 Hz) |
| **Input impedance** | 0.72 MΩ ph-ph , 0.36 MΩ ph-n |

## Current measurement

| | |
|---|---|
| **Measurement inputs** | 3ph Gen current, 1ph Mains current |
| **Measurement range** | 5 A |
| **Max. allowed current** | 10 A |
| **Accuracy** | ±1.5 % for full temperature range (1 % from 0 °C to 50 °C) |
| **Input impedance** | <0.1 Ω |

## Display

| | |
|---|---|
| **Type** | Build-in monochromatic 3.2" |
| **Resolution** | 132 × 64 px |

## E-Stop

| |
|---|
| Dedicated terminal for E-Stop input |
| Physically disconnects binary outputs 1 & 2 from power |

## Binary inputs

| | |
|---|---|
| **Number** | 8, non-isolated |
| **Close/Open indication** | 0-2 V DC close contact<br>6-36 V DC open contact |

## Binary outputs

| | |
|---|---|
| **Low current** | 6 low current output, non-isolated<br>BO 3-8 = 0.5 A<br>switching to Positive supply terminal |
| **High current** | 2 high current output, non-isolated<br>BO 1, 2 = 4 A<br>switching to Positive supply terminal |

## Analog inputs

| | |
|---|---|
| **Number** | 4, Resistive |
| **Type** | Resistive |
| **Resolution** | 0.1 Ω |
| **Range** | 0-2500 Ω |
| **Input impedance** | 170 Ω |
| **Accuracy** | ±2 % from value in range 0-2500 Ω<br>±1.5 kΩ in range 2.5-15 kΩ |

## Voltage regulator output

| | |
|---|---|
| **Protection** | Isolated |
| **Type** | max ± 10 V DC |

## Speed governor output

| | |
|---|---|
| **Output type** | ±10 VDC or 5 V @ 500 Hz<br>PWM selectable by jumper |
| **Protection** | Non-isolated |

## Magnetic pickup

| | |
|---|---|
| **Voltage input range** | 4 Vpk-pk to 50 Vpk-pk in range 4 Hz to 1 kHz<br>6 Vpk-pk to 50 Vpk-pk in range 1 kHz to 5 kHz<br>10 Vpk-pk to 50 Vpk-pk in range 4 Hz to 10 kHz |
| **Frequency input range** | 4 Hz to 10 kHz |
| **Frequency measurement tolerance** | 0.2 % from range 10 kHz |

## Communications

| | |
|---|---|
| **USB Device** | Non-isolated type B connector |
| **USB Host** | Non-isolated type A connector |
| **RS 485** | Isolated |
| **CAN 1 + CAN 2** | 250 / 50 kbps, isolated,<br>nominal impedance 120 Ω |

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## 8.1.1 Setpoints

**What setpoints are:**

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

All setpoints can be protected by a password against unauthorized changes. Password protection can be assigned to the setpoints during the configuration procedure. See the chapter **Password (page 86)** 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.**

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For full list of setpoints go to the chapter **List of setpoints (page 237)**.

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# Group: Process Control

## Subgroup: Application Selector

### Application Mode Select

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **Range [units]** | SPtM / MINT [-] | | |
| **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. |

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## Load Control PTM

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 248)**. The rest of power is supplied from the mains or exported to the mains (depends on proportions of load and **Baseload (page 248)** setpoint). Even in baseload control mode can be the Import/Export limited. This function can be activated by setpoint **Import/Export Limitation (page 250)** = 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 249)**.<br>**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<br>**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). |
| 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 249)**. 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 305)****. If the requested load (given by the active load control mode, e.g. Baseload, Import/Export) is below this limit the requested load is limited to the level adjusted by this setpoint.*

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## PF Control PTM

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 **Base Power Factor (page 248)** 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. |
| 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 249)**. 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. |

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## #System Load Control PTM

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 250)**. 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 250)** 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 250)**) 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 248)** in parallel to mains operation and does not depend on active load control mode.*

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## #System PF Control PTM

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 | Gensets PF is controlled by their PF control loops to provide constant power factor adjusted by setpoint **#System Power Factor (page 251)**. InteliMains 210 doesn't play active role in PF control in parallel to mains operation. |
| Var Sharing | Gensets PF is controlled by InteliMains 210 through the VAr sharing line. |

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## Baseload

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **Nominal Power (page 257)** [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.

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## Base Power Factor

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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.

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## Import Load

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 245)**.

| | |
|---|---|
| Baseload | Setpoint adjust the maximal value of import/export. Also **Import/Export Limitation (page 250)** setpoint has to be set to Enabled. |
| Import/Export | Setpoint adjust requested value of constant import/export. |

If the value of the setpoint is >0 the power is imported from the mains, if the setpoint value is <0, then the power is exported to the mains.

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## Import PF

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 246)**.

| | |
|---|---|
| Baseload | Setpoint adjust the maximal value of import. Also **Import/Export Limitation (page 250)** setpoint has to be set to Enabled. |
| Import/Export | Setpoint adjust requested value of constant import. |

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## Import/Export Limitation

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 249)** and **Import PF (page 249)**.

> **Example:** Baseload = 1000 kW, load = 700 kW, Import load = 100 kW. Then the Baseload request will be limited to 600 kW to prewent 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 prewent the Import power go below -100 kW (actually it is limitation of the export).

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## #System BaseLoad

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 32 000 [kW] | | |
| **Default value** | 1 000 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 247)** = Baseload).

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## #System Power Factor

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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. | | | |

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## Subgroup: Neutral Contactor

### #Neutral Contactor Control

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 727)** 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.<br>▶ The output is always opened while the gen-set is not running<br>▶ The output is always opened while the MCB is closed<br>▶ 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<br>▶ 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 727)** 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.<br>▶ The output is always opened while the gen-set is not running<br>▶ The output is always opened while the MCB is closed<br>▶ 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 665)** has to be configured for proper functionality.*

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## Subgroup: Process Limitation

### CB Control In MAN Mode

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 353)** and **Transfer Mains To Gen (page 352)**).<br>Controller performs synchronization across MCB, if GCB is closed and MCB button is pushed. Load transfer is done after synchronization and GCB is opened automatically.<br>Controller performs synchronization across GCB , if MCB is closed and GCB button is pushed. Load transfer is done after synchronization and MCB is opened automatically.<br>It is also possible to open currently closed breaker and keep the load non-energized. Then it is possible to close MCB or GCB to energize the load from a healthy source.<br>***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.*<br>***Note:*** *Open transfer is performed, if the Open option is selected with **Transfer Gen To Mains (page 353)** or **Transfer Mains To Gen (page 352)*** |
| Islnd Disl | Behaves like the full manual control but the Island operation is disabled.<br>**Example:** When MCB opened and GCB pressed, controller don't go to island.<br>**Example:** In parallel operation when MCB button pressed, MCB is not opened. |

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## Subgroup: Mains Import Measurement

### Mains Import Measurement

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 593)**.

| | |
|---|---|
| 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 351)**. |
| Mains CT | The **Mains Import kW (page 593)** 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 593)** value is measured via analog input, accordingly LAI: **MAINS IMPORT MEASUREMENT (PAGE 771)**. The load transfer in direction Mains to Generator is considered to be finished when the mains is unloaded under certain level. |

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## Subgroup: Peak Shaving

### Peak Shaving

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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. |

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## Peak Shaving Start Level

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **Range [units]** | **Peak Shaving Stop Level (page 255)** .. 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 254)** = enabled | | |
| **Description** | | | |
| This setpoint starts genset, 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 256)**.<br>The gen-set is synchronized to the Mains (kept in the parallel to the Mains) and the genset power is controlled according to the settings in the Group Process Control/Load Control.<br>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 255)** and **Peak Shaving Start/Stop Delay (page 256)**. | | | |

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## Peak Shaving Stop Level

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **Peak Shaving Start Level (page 255)** [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 254)** = 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 256)**. | | | |

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## Peak Shaving Start/Stop Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Process Control | **Related FW** | 1.5.0 |
| **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 254)** = 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 255)**.
- The value of the load consumption Load kW decreases under the value given by the setpoint **Peak Shaving Stop Level (page 255)**

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# Group: Basic settings

## Subgroup: Name

### Gen-Set Name

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 15 characters [-] | | |
| **Default value** | InteliGen | **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.*

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## Subgroup: Power settings

### Nominal Power

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 304)** protection is based on this setpoint.

***Note:*** *This setpoint is used when setpoint **Connection type (page 259)** is adjusted to 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 457)**, **Nominal Power 2 (page 461)** and **Nominal Power 3 (page 465)**.*

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## Nominal Power Split Phase

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 259)** | | |
| **Description** | | | |

Nominal power of the gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 304)** protection is based on this setpoint.

***Note:*** *This setpoint is used when setpoint* ***Connection type (page 259)*** *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 457)***, ***Nominal Power Split Phase 2 (page 461)*** *and* ***Nominal Power Split Phase 3 (page 465)****.*

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### Subgroup: Current settings

## Nominal Current

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 259)**. | | |
| **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 458)***, ***Nominal Current 2 (page 462)*** *and* ***Nominal Current 3 (page 466)****.*

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## CT Ratio

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | 1 .. 5 000 [A/5A] | | |
| **Default value** | 2 000 A/5A | **Alternative config** | NO |
| **Step** | 1 A/5A | | |
| **Comm object** | 8274 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Gen-set current transformers ratio.<br>***Note:*** *Generator currents and power measurement is suppressed if current level is below 1% of CT range.* | | | |

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## Mains Import CT Ratio

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | 1 .. 2 000 [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 current transformers ratio.<br>***Note:*** *Generator currents and power measurement is suppressed if current level is below 1% of CT range.* | | | |

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### Subgroup: Voltage settings

## Connection type

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | Mono Phase / / SplitPhase / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-] | | |
| **Default value** | 3Ph4Wire | **Alternative config** | YES |
| **Step** | [-] | | |
| **Comm object** | 11628 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Connection type: | | | |

| | |
|---|---|
| Mono Phase | Single phase voltage measurement L1-N<br>1x CT (Current Transformer) |
| SplitPhase | Double Delta connection<br>Split Phase<br>Two phase voltage measurement L1,L2 with 180° phase shift<br>2x CT (Current Transformer) |
| 3Ph4Wire | Grounded Star (Grounded Wye) connection – 3PY<br>Three phase voltage measurement L1,L2,L3 with 120° phase shift<br>3x CT (Current Transformer) |
| 3Ph3Wire | Ungrounded Delta connection<br>Open Delta<br>Ungrounded Wye<br>Corner-Grounded Delta<br>Split Phase Delta<br>Three phase voltage measurement L1,L2,L3 with 120° phase shift<br>No neutral is available 3x CT (Current Transformer) |
| High Leg D | High Leg Delta connection<br>Three phase voltage measurement L1,L2,L3<br>3x CT (Current Transformer) |
| Autodetect | High Leg Delta: L1 >=100V; L1 <=160V; L2 >=160V; L3 >=100V; L3 <=160V<br>or<br>3PH3Wire or 3Ph4Wire: L1 >= 100V; L2 >= 100V; L3 >= 100V<br>or<br>SplitPhase: L1 >=100V; L2 <= 20V; L3 >=100V<br>or<br>Mono Phase: L1 >=100V; L2 <= 20V; L3 <= 20V<br>or<br>***Voltage Autodetect*** shutdown |

***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Connection Type 1 (page 455), Connection type 2 (page 459) and Connection type 3 (page 463).***

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## Nominal Voltage Ph-N

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | 80 .. 20 000 [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 259)**. | | |
| **Description** | | | |
| Nominal voltage (phase to neutral).<br>***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Voltage Ph-N 1 (page 459)***, ***Nominal Voltage Ph-N 2 (page 463)*** *and* ***Nominal Voltage Ph-N 3 (page 467)****.* | | | |

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## Nominal Voltage Ph-Ph

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | 80 .. 40 000 [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 259)**. | | |
| **Description** | | | |
| Nominal system voltage (phase to phase).<br>***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Voltage Ph-Ph 1 (page 459)***, ***Nominal Voltage Ph-Ph 2 (page 463)*** *and* ***Nominal Voltage Ph-Ph 3 (page 467)****.* | | | |

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## Gen VT Ratio

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 PTs are used, adjust the setpoint to 1. | | | |

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## Mains/Bus VT Ratio

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 244)** | | |
| **Description** | | | |
| Mains/Bus voltage potential transformers ratio. If no PTs are used, adjust the setpoint to 1. | | | |

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### Subgroup: Frequency settings

## Nominal Frequency

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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).<br>***Note:*** *To lock this setpoint against editing you also have to lock setpoint* ***Nominal Frequency 1 (page 458)****,* ***Nominal Frequency 2 (page 462)*** *and* ***Nominal Frequency 3 (page 466)****.* | | | |

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## Gear Teeth

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | FGen->RPM / 1 .. 500 [-] | | |
| **Default value** | 120 | **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.*

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## Nominal RPM

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 458)**, **Nominal RPM 2 (page 462)** and **Nominal RPM 3 (page 466)**.*

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## Subgroup: Controller settings

### Controller mode

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | OFF / MAN / AUTO[-] | | |
| **Default value** | OFF | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 8315 | **Related applications** | MINT, SPtM |
| **Config level** | Advanced | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| This setpoint can be used for changing the Controller mode remotely, e.g. via MODBUS. Use the mode selector on the main screen for changing the mode from the front panel. Use mode selector in the control window for changing the mode from InteliConfig. | | | |

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### Power On Mode

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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, than is switched into last mode before power off. |
| OFF | When controller is power on, than is switched into OFF mode. |

***Note:*** *Remote modes - In case that some LBI remote mode is activated during power on of controller than this LBI has higher priority than this setpoint - controller mode is forced into mode selected via LBI. After deactivation of LBI, controller is switched into value selected via setpoint Power On Mode*

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## Reset To Manual

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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.

> **Example:** Controller is in AUTO mode and there is red inactive unconfirmed alarm and fault reset button is pressed, controller will start automatically.

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## Backlight Timeout

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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.

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## Horn Timeout

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | Disabled / 1 .. 599 [s] | | |
| **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 717)** binary output. The **HORN (PAGE 717)** output is opened when this timeout elapsed. |

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

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## Main Screen

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | PwrFactor/ATT/ [-] | | |
| **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. |

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### Subgroup: Phase rotation

## Phase Rotation

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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. | | | |

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# Group: Communication Settings

### Subgroup: Controller CAN Address

## Controller Address

| | | | |
|---|---|---|---|
| **Setpoint group** | Communication Settings | **Related FW** | 1.5.0 |
| **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.<br>***Note:*** *When opening connection to the controller it's address has to correspond with the setting in PC tool.* | | | |

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## Subgroup: RS485 Settings

### RS485 Mode

| | | | |
|---|---|---|---|
| **Setpoint group** | Communication Settings | **Related FW** | 1.5.0 |
| **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. |

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### RS485 Communication Speed

| | | | |
|---|---|---|---|
| **Setpoint group** | Communication Settings | **Related FW** | 1.5.0 |
| **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.*

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## RS485 MODBUS Speed

| | | | |
|---|---|---|---|
| **Setpoint group** | Communication Settings | **Related FW** | 1.5.0 |
| **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 468)** | | |
| **Description** | | | |
| If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here. | | | |

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# Group: Engine settings

### Subgroup: Starting

## Fuel Solenoid

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 709)**

| | |
|---|---|
| Diesel: | Output closes before binary output **STARTER (PAGE 735)**. Lead of output is adjusted via setpoint **Fuel Solenoid Lead (page 274)**. The output opens if Emergency Stop comes or gen-set is stopped and in pause between repeated starts. |
| Gas: (Gaseous) | Output closes together with binary output **IGNITION (PAGE 719)** if RPM is over the 30 RPM (fixed value). Output opens after stop command or in pause between repeated start. |

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## Cranking Attempts

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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. | | | |

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## Maximum Cranking Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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.<br>**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.** | | | |

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## Cranking Fail Pause

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 270)**. **PRESTART (PAGE 729)** output is active in this pause until Cranking Fail Pause elapses. | | | |

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## Prestart Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 600 [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 729)** output prior to the engine start. Set to zero if you want to leave the output **PRESTART (PAGE 729)** open.

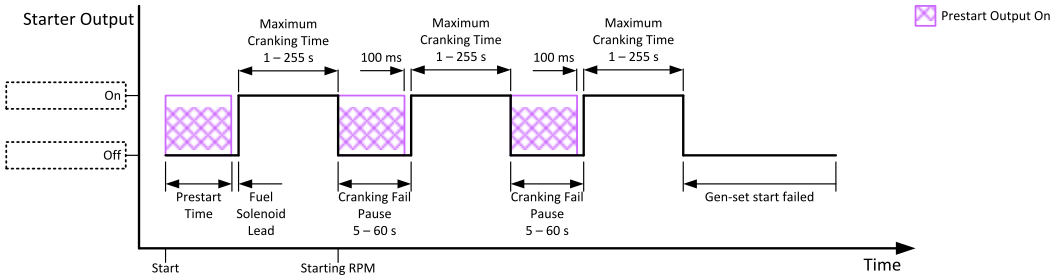



Image 8.1 Prestart Time

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## Starting RPM

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | 5 .. 50 [%] | | |
| **Default value** | 25% | **Alternative config** | NO |
| **Step** | 1 % of **Nominal RPM (page 263)** | | |
| **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 263)**. If this level is exceeded the engine is considered as started.

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## Starting Oil Pressure

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 735)** 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.**

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## D+ Function

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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. |

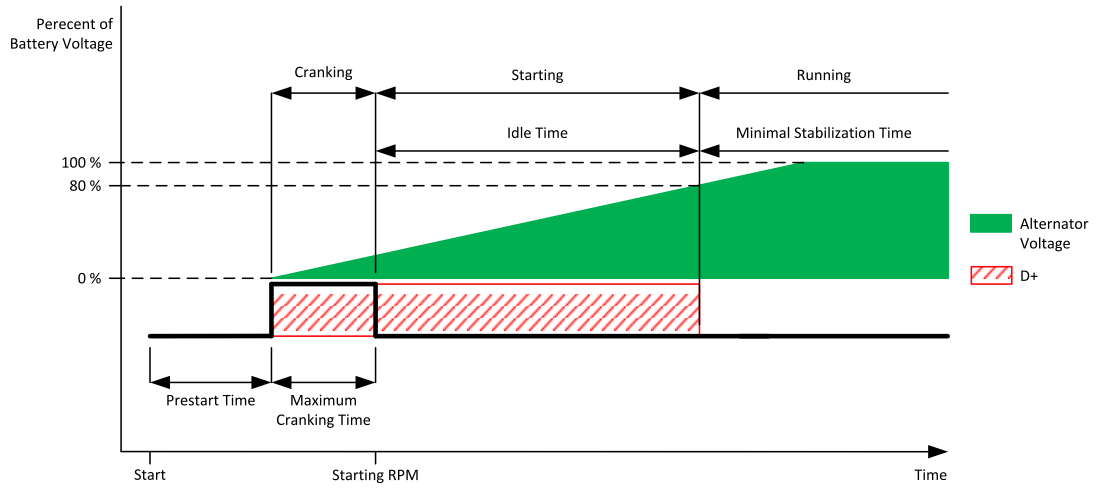



Image 8.2 D+ Function 1

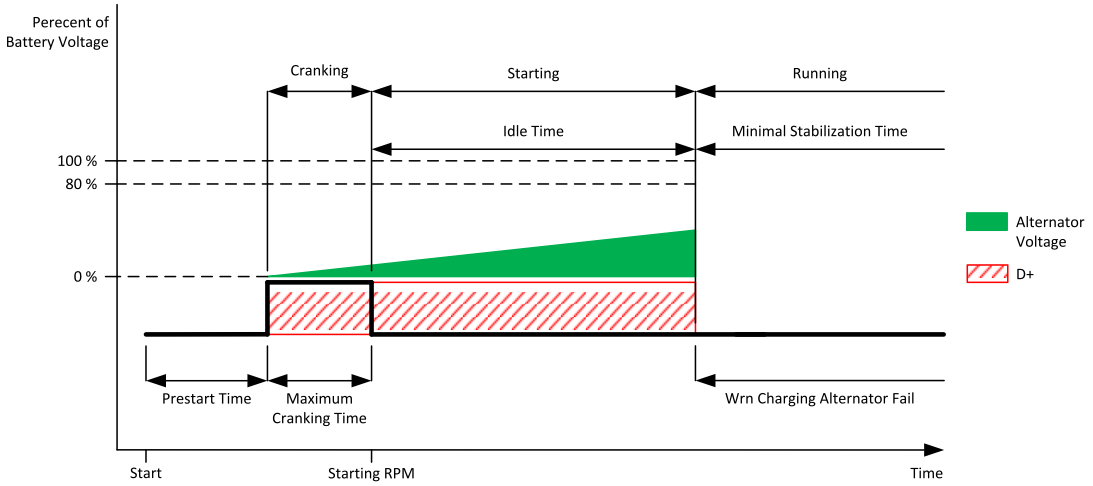



Image 8.3 D+ Function 2

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## Glow Plugs Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **Prestart Time (page 271)** [s] | | |
| **Default value** | 0 s | **Alternative config** | NO |
| **Step** | 1 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 715)** will be close. | | | |

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## Idle RPM

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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. | | | |

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### Subgroup: Starting Timers

## Fuel Solenoid Lead

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 709)** and **STARTER (PAGE 735)** logical binary outputs.**FUEL SOLENOID (PAGE 709)** is closed before **STARTER (PAGE 735)**. Lead time is adjusted via this setpoint.

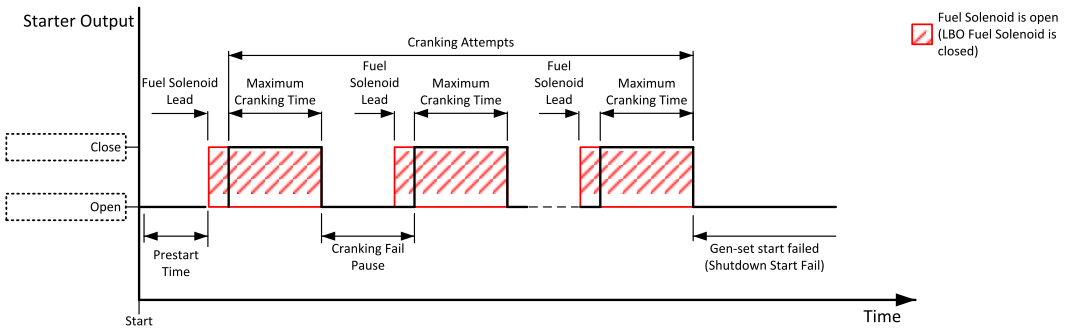



Image 8.4 Fuel Solenoid Lead

***Note:*** *LBO **PRESTART (PAGE 729)** goes to logical zero when Fuel Solenoid Lead goes to logical one.*

***Note:*** *This setpoint is used only for diesel **Fuel Solenoid (page 269)***

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## Idle Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 271)**. Start fail is detected when during Idle state RPM decreases below 2 RPM.
The output **IDLE/NOMINAL (PAGE 718)** remains inactive during the idle period. Binary output Idle/Nominal opens during Cooling period again. This output can be used for switching the governor between idle and nominal speed.

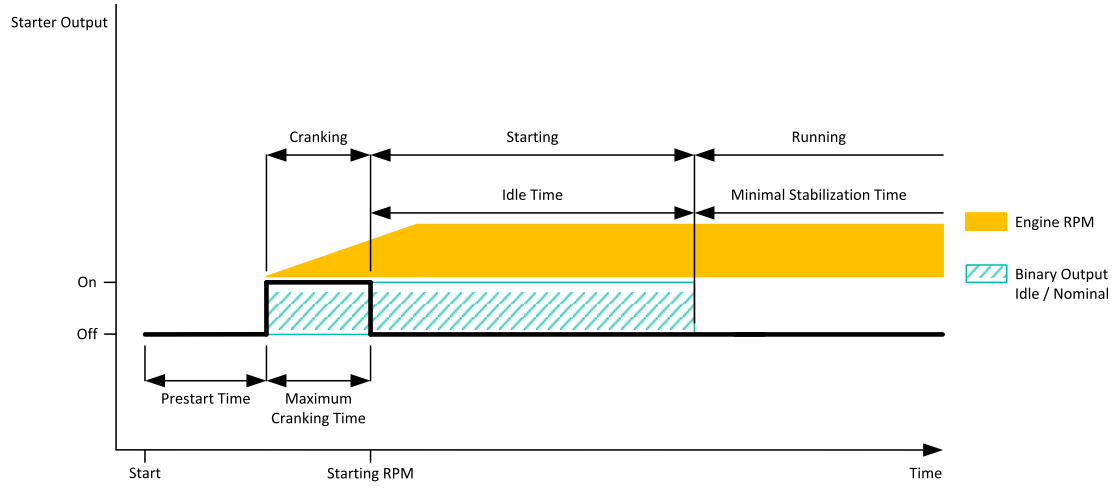



Image 8.5 Idle Time 1

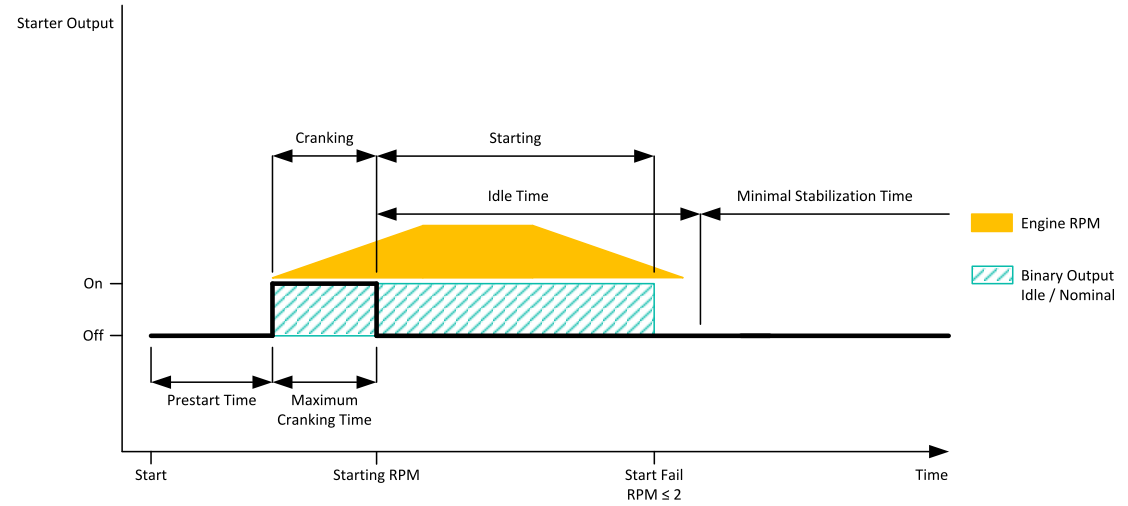



Image 8.6 Idle Time 2

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## Minimal Stabilization Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | 1 .. **Maximal Stabilization Time (page 278)** [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.

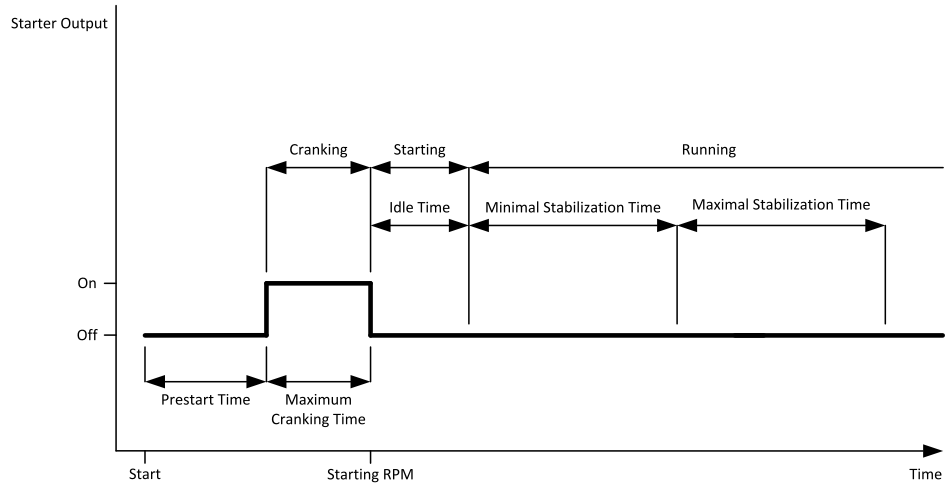



Image 8.7 Minimal Stabilization Time

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## Maximal Stabilization Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Minimal Stabilization Time (page 277)** .. 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. | | | |

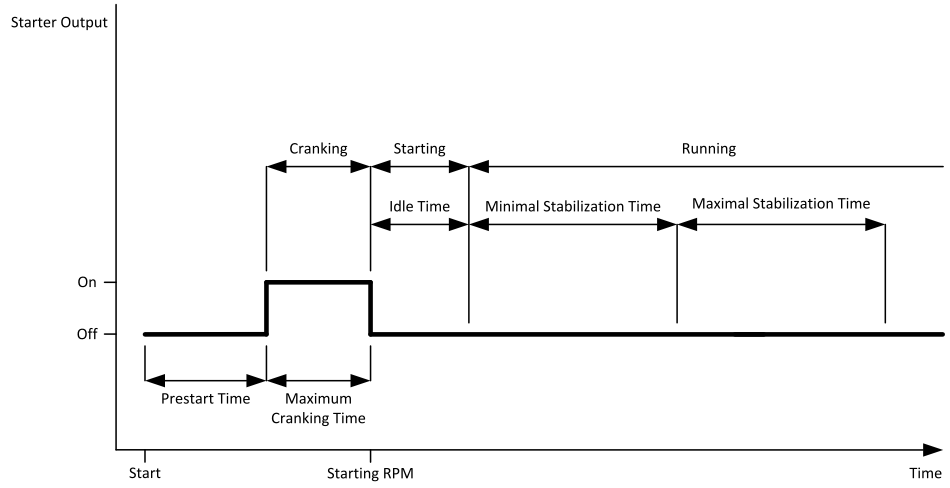



Image 8.8 Maximal Stabilization Time

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## Protection Hold Off

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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. | | | |

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## Sd Ventilation Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 269)** is set to GAS, the Sd Ventilation Time adjusts the time of the starter to be switched on for engine pre-ventilation in the case of a first start attempt after shutdown or controller switch-on. | | | |

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### Subgroup: Stopping

## Cooling Speed

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 718)** 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 718)** must be configured and connected to speed governor. Engine Idle speed must be adjusted on speed governor.*

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## Subgroup: Stopping Timers

### Cooling Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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. | | | |

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### Stop Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 709)** has been de-energized and the **STOP SOLENOID (PAGE 736)** energized. The Stop Solenoid output is deactivated 12 s after last running engine indication went off. | | | |

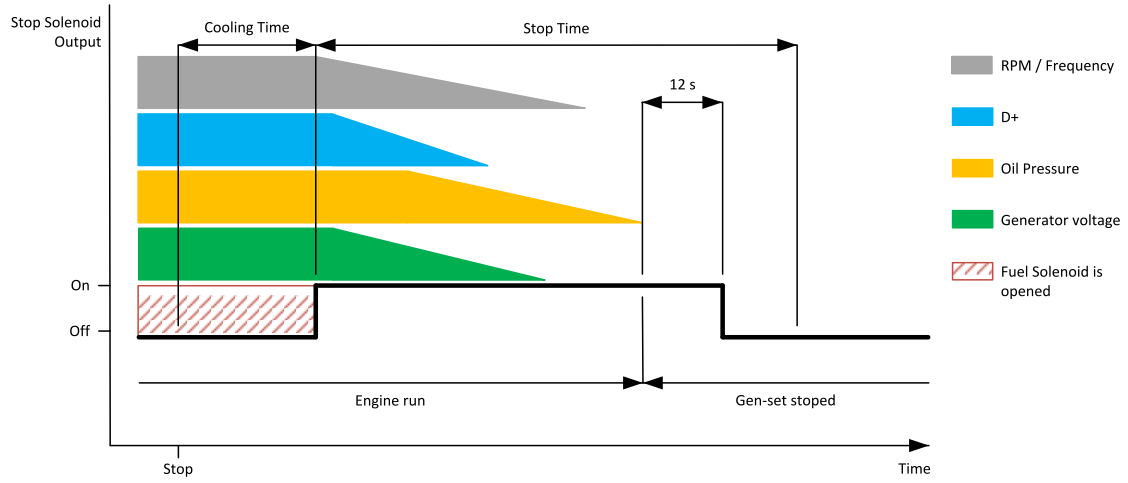



Image 8.9 Stop Time 1

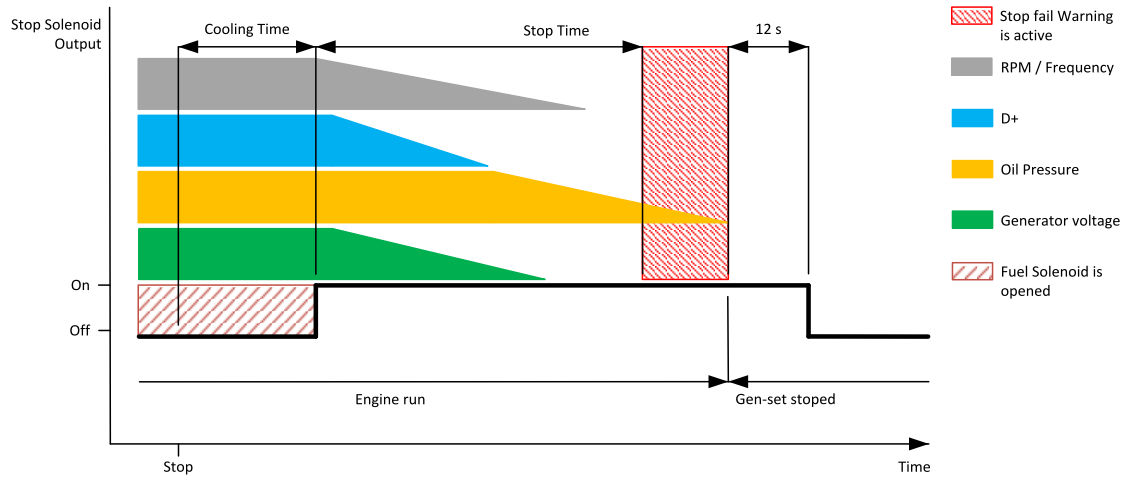



Image 8.10 Stop Time 2

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## After Cooling Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 is closed when the engine starts and opens AfterCool time delayed after gen-set stops. | | | |

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### Subgroup: Power switch

## Power Switch On

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 729)** is configured. | | |
| **Description** | | | |
| Threshold level for switching the binary output **POWER SWITCH (PAGE 729)** on. | | | |

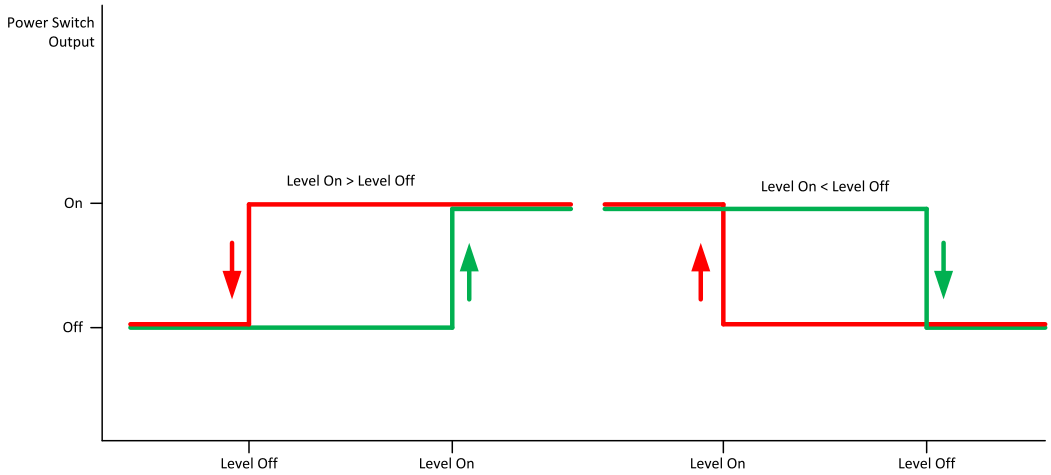



Image 8.11 Power Switch Level On < Level Off

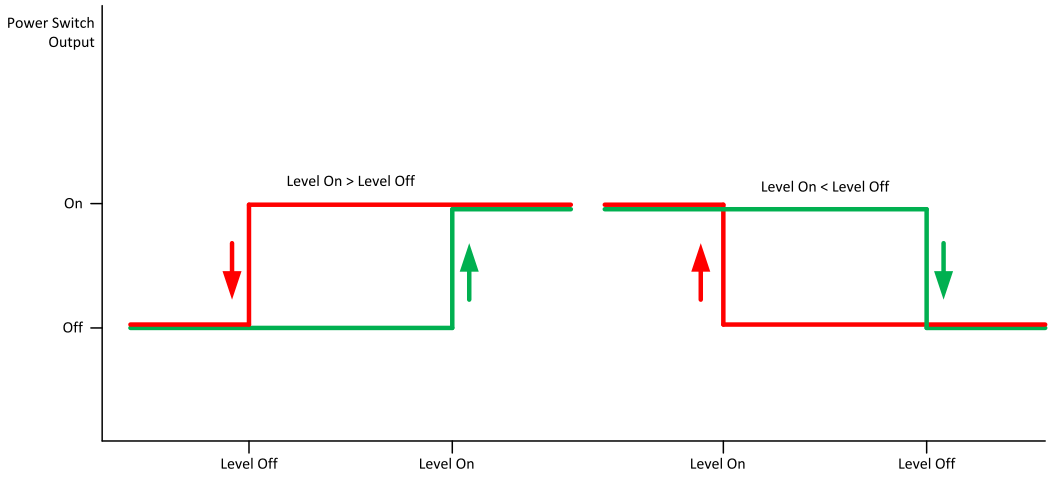



Image 8.12 Power Switch Level On > Level Off

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## Power Switch Off

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 729)** is configured. | | |

## Description

Threshold level for switching the binary output **POWER SWITCH (PAGE 729)** on.




Image 8.13 Power Switch Level On < Level Off

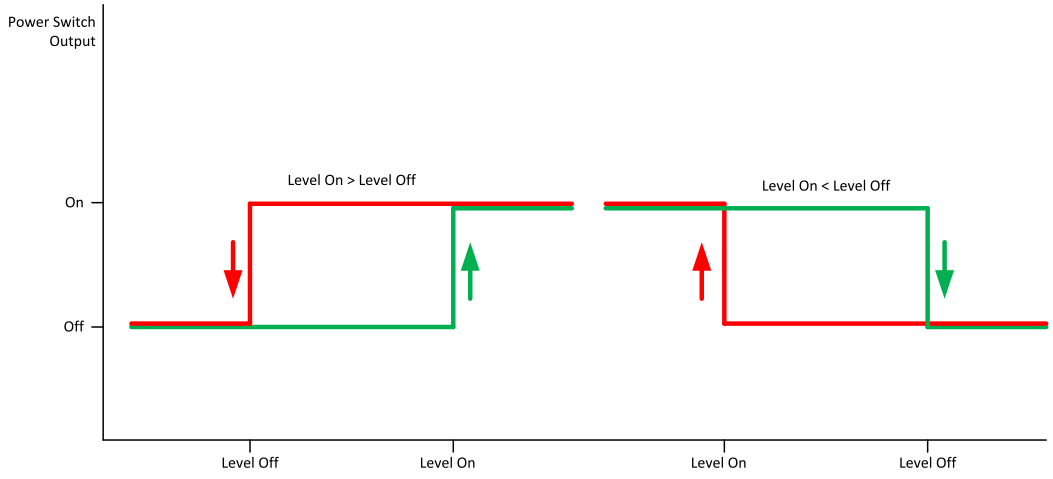



Image 8.14 Power Switch Level On > Level Off

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## Subgroup: Engine Protections

### Overspeed Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | 50 .. 200 [%] | | |
| **Default value** | 115% | **Alternative config** | NO |
| **Step** | 1 % of **Nominal RPM (page 263)** | | |
| **Comm object** | 8263 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Threshold for over speed protection. Relative to the nominal speed. | | | |

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## Starting Overspeed Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 286)**. This period starts to be counted once the RPM exceeds the value **Starting RPM (page 271)**. The threshold **Overspeed Sd (page 284)** starts to be valid once this period elapsed.

The type of reaction of the overspeed protection within the **Starting Overspeed Time (page 286)** is defined by the setpoint **Starting Overspeed Protection (page 286)**, 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.

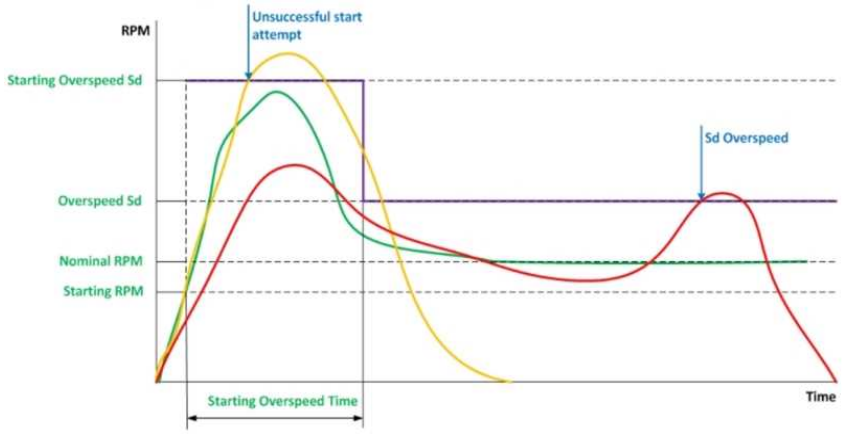



Image 8.15 Staring speed overshoot › Ovespeed Sd

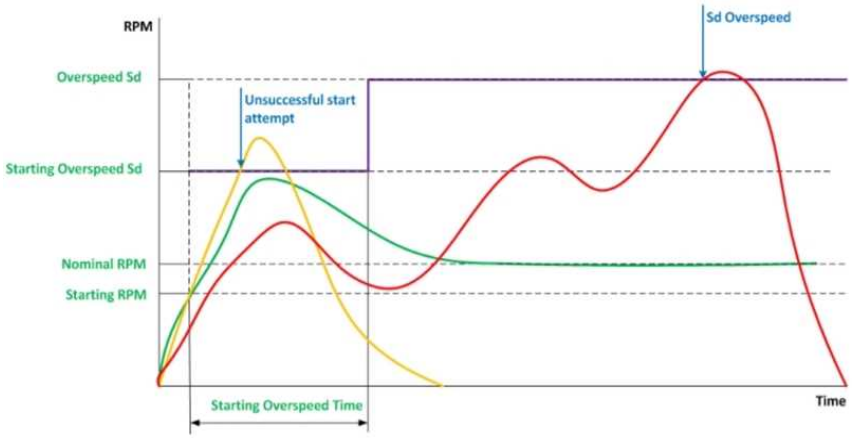



Image 8.16 Staring speed overshoot ‹ Ovespeed Sd

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## Starting Overspeed Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 285)** level is used for overspeed protection. This time starts countdown when starting RPM are reached. | | | |

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## Starting Overspeed Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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** | | | |
| Time of protection of the overspeed in **Starting Overspeed Time (page 286)** | | | |

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## Oil Pressure Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 12895 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **OIL PRESSURE (PAGE 772)** is configured | | |
| **Description** | | | |
| Warning or history threshold level for **OIL PRESSURE (PAGE 772)**. | | | |

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## Oil Pressure Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 12779 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **OIL PRESSURE (PAGE 772)** is configured | | |
| **Description** | | | |
| Shutdown threshold level for **OIL PRESSURE (PAGE 772)**. | | | |

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## Oil Pressure Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 772)** is configured or logical binary input **OIL PRESSURE (PAGE 666)** is configured | | |
| **Description** | | | |
| Delay for **OIL PRESSURE (PAGE 772)**. | | | |

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## ECU Oil Pressure Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by ECU sensor curve | | |
| **Default value** | the value is defined by ECU sensor curve | **Alternative config** | YES |
| **Step** | the step is defined by 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. | | | |

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## ECU Oil Pressure Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by ECU sensor curve | | |
| **Default value** | the value is defined by ECU sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by 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. | | | |

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## ECU Oil Pressure Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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. | | | |

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## Coolant Temperature Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 12896 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **COOLANT TEMP (PAGE 769)** is configured | | |
| **Description** | | | |
| Warning or history threshold level for **COOLANT TEMP (PAGE 769)**. | | | |

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## Coolant Temperature Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 12780 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **COOLANT TEMP (PAGE 769)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **COOLANT TEMP (PAGE 769)**. | | | |

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## Coolant Temperature Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 769)** is configured or logical binary input **COOLANT TEMP (PAGE 655)** is configured | | |
| **Description** | | | |
| Delay for **COOLANT TEMP (PAGE 769)**. | | | |

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## ECU Coolant Temperature Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by ECU sensor curve | | |
| **Default value** | the value is defined by ECU sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by 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. | | | |

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## ECU Coolant Temperature Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by ECU sensor curve | | |
| **Default value** | the value is defined by ECU sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by 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. | | | |

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## ECU Coolant Temperature Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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. | | | |

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## Oil Temp Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 15747 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **OIL TEMP (PAGE 773)** is configured | | |
| **Description** | | | |
| Warning or history threshold level for **OIL TEMP (PAGE 773)**. | | | |

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## Oil Temp Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 15748 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **OIL TEMP (PAGE 773)** is configured | | |
| **Description** | | | |
| Shutdown threshold level for **OIL TEMP (PAGE 773)**. | | | |

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## Oil Temp Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 773)** is configured | | |
| **Description** | | | |
| Delay for **OIL TEMP (PAGE 773)**. | | | |

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## ECU Oil Temp Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by ECU sensor curve | | |
| **Default value** | the value is defined by ECU sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by 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. | | | |

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## ECU Oil Temp Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by ECU sensor curve | | |
| **Default value** | the value is defined by ECU sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by 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. | | | |

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## ECU Oil Temp Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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. | | | |

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## Temperature Switch On

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is define by sensor curve (analog or ECU) | | |
| **Default value** | the value is defined by sensor curve (analog or ECU) | **Alternative config** | NO |
| **Step** | the step is defined by 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 739)** is configured. | | |
| **Description** | | | |

Threshold level for switching the binary output **TEMPERATURE SWITCH (PAGE 739)** on.

***Note:*** *Value from analog input has higher priority than ECU.*

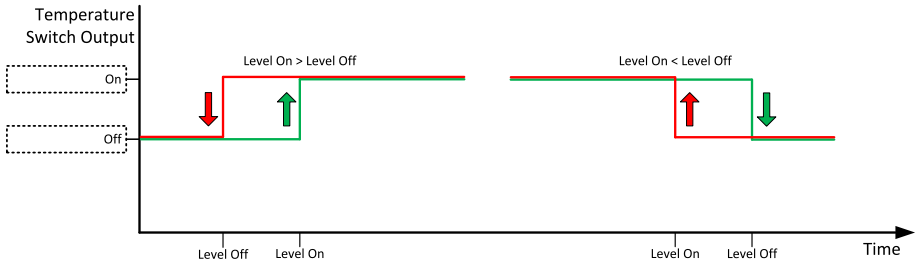



Image 8.17 Temperature Switch

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## Temperature Switch Off

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is define by sensor curve (analog or ECU) | | |
| **Default value** | the value is defined by sensor curve (analog or ECU) | **Alternative config** | NO |
| **Step** | the step is defined by 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 739)** is configured. | | |
| **Description** | | | |
| Threshold level for switching the binary output **TEMPERATURE SWITCH (PAGE 739)** off.<br>***Note:*** *Value from analog input has higher priority than ECU.* | | | |

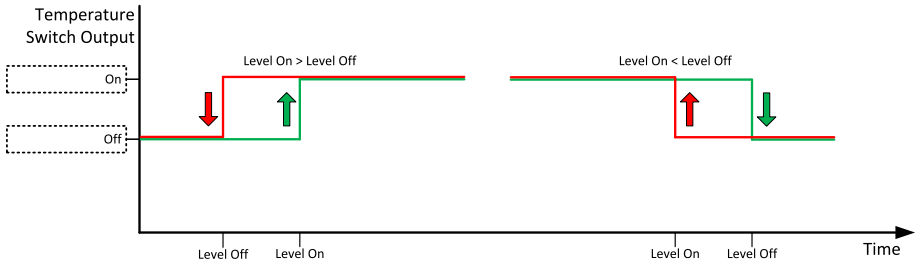



Image 8.18 Temperature Switch

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## Coolant Temperature Low Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | YES |
| **Step** | the step is defined by 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 769)** is configured | | |
| **Description** | | | |
| Threshold level for lower limit of **COOLANT TEMP (PAGE 769)**. | | | |

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## Coolant Temperature Low Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 769)** is configured | | |
| **Description** | | | |
| Delay for **Coolant Temperature Low Wrn (page 294)**. | | | |

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## Fuel Level Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 12897 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **FUEL LEVEL (PAGE 770)** is configured | | |
| **Description** | | | |
| Warning or history threshold level for **FUEL LEVEL (PAGE 770)**. | | | |

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## Fuel Level Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 12898 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **FUEL LEVEL (PAGE 770)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **FUEL LEVEL (PAGE 770)**. | | | |

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## Fuel Level Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 770)** is configured or logical binary input **FUEL LEVEL (PAGE 659)** is configured | | |
| **Description** | | | |
| Delay for **FUEL LEVEL (PAGE 770)**. | | | |

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## ECU Fuel Level Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by ECU sensor curve | | |
| **Default value** | the value is defined by ECU sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by 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. | | | |

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## ECU Fuel Level Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by ECU sensor curve | | |
| **Default value** | the value is defined by ECU sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by 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. | | | |

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## ECU Fuel Level Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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. | | | |

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## Fuel Tank Volume

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 770)** is or ECU is configured | | |
| **Description** | | | |
| Define a capacity of gen-set fuel tank. | | | |

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## Maximal Fuel Drop

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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. | | | |

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## Maximal Fuel Drop Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 297)** this delay starts count down. After count down of this delay alarm **Wrn Fuel Theft (page 800)** is activated. | | | |

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## Fuel Pump On

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **Fuel Pump Off (page 299)** [%] | | |
| **Default value** | 20 % | **Alternative config** | NO |
| **Step** | 1 % | | |
| **Comm object** | 10100 | **Related applications** | MINT, SPtM |
| **Config level** | Advanced | | |
| **Setpoint visibility** | Visible only if the logical binary output **FUEL PUMP (PAGE 709)** is configured and logical binary input **FUEL PUMP ON/OFF (PAGE 659)** isn't configured | | |
| **Description** | | | |
| Threshold level for switching the binary output **FUEL PUMP (PAGE 709)** on. | | | |

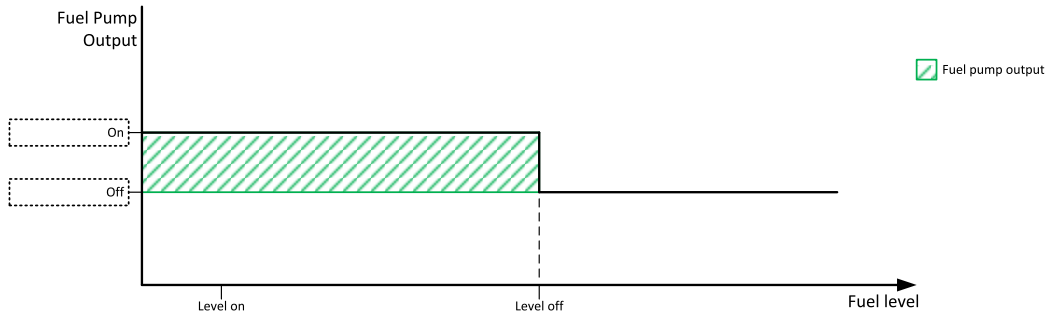



Image 8.19 Fuel Pump On

**IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 659) is configured then binary output FUEL PUMP (PAGE 709) is control by this binary input. Setpoints Fuel Pump On and Fuel Pump Off (page 299) 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 709) is configured.*

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## Fuel Pump Off

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Fuel Pump On (page 298)** .. 100 [%] | | |
| **Default value** | 90 % | **Alternative config** | NO |
| **Step** | 1 % | | |
| **Comm object** | 10101 | **Related applications** | MINT, SPtM |
| **Config level** | Advanced | | |
| **Setpoint visibility** | Visible only if the logical binary output **FUEL PUMP (PAGE 709)** is configured and logical binary input **FUEL PUMP ON/OFF (PAGE 659)** isn't configured | | |
| **Description** | | | |

Threshold level for switching the binary output **FUEL PUMP (PAGE 709)** off.

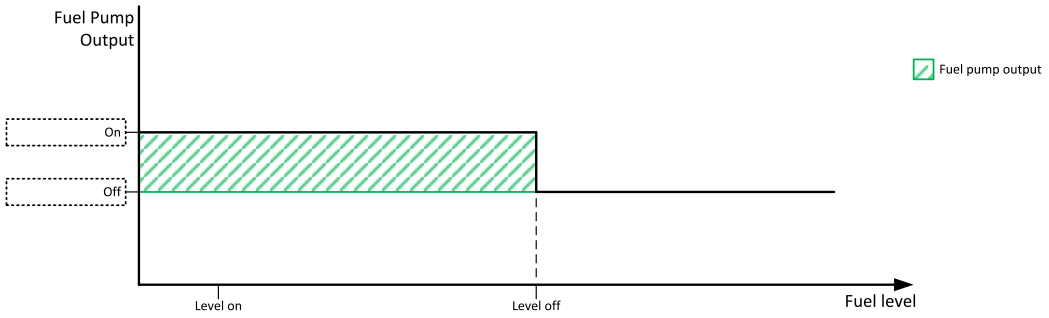



Image 8.20 Fuel Pump Off

> **IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 659) is configured then binary output FUEL PUMP (PAGE 709) is control by this binary input. Setpoints Fuel Pump On (page 298) 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 709) is configured.*

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## Transfer Wrn Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 709)** is configured | | |
| **Description** | | | |
| If the controller does not see the fuel increase during fuel transfer within this time alarm **Wrn Fuel Transfer Failed (page 814)** will be displayed and the **FUEL PUMP (PAGE 709)** will be turned off. Alarm **Wrn Fuel Transfer Failed (page 814)** 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. | | | |

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### Subgroup: Battery Protections

## Battery Undervoltage

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | 8,0 V .. **Battery Overvoltage (page 300)** [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. | | | |

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## Battery Overvoltage

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Battery Undervoltage (page 300)** .. 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. | | | |

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## Battery <> Voltage Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 300)** and **Battery Overvoltage (page 300)** protection. | | | |

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## Battery Charger Fail Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **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 635)** | | |
| **Description** | | | |
| Delay for LBI **BATTERY CHARGER (PAGE 635)**. | | | |

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### Subgroup: Maintenance

## Maintenance Timer 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | -10 000 ... 9 999 [h] / Disabled | | |
| **Default value** | 1 000 h | **Alternative config** | NO |
| **Step** | 1 h | | |
| **Comm object** | 10528 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Maintenance timer 1 counts down when engine is running. If reaches zero, an alarm appears, but the timer still counting down into negative values. When the value 10000 is set, than the Maintenance function is disabled and counter does not count. Counter value disappear from controllers statistics. | | | |

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## Maintenance Timer 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | -10 000 ... 9 999 [h] / Disabled | | |
| **Default value** | 1 000 h | **Alternative config** | NO |
| **Step** | 1 h | | |
| **Comm object** | 10529 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Maintenance timer 2 counts down when engine is running. If reaches zero, an alarm appears, but the timer still counting down into negative values. When the value 10000 is set, than the Maintenance function is disabled and counter does not count. Counter value disappear from controllers statistics. | | | |

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## Maintenance Timer 3

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | -10 000 ... 9 999 [h] / Disabled | | |
| **Default value** | 1 000 h | **Alternative config** | NO |
| **Step** | 1 h | | |
| **Comm object** | 10530 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Maintenance timer 3 counts down when engine is running. If reaches zero, an alarm appears, but the timer still counting down into negative values. When the value 10000 is set, than the Maintenance function is disabled and counter does not count. Counter value disappear from controllers statistics. | | | |

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## Maintenance Timer 4

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | [DD/MM/YYYY] | | |
| **Default value** | 01/01/2015 | **Alternative config** | NO |
| **Step** | 1 day | | |
| **Comm object** | 16384 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| This maintenance timer is based on date. At the midnight of the last day the alarm Wrn Maintenance 4 (page 805) appears in alarmlist.<br>**IMPORTANT: To disable this maintenance timer, set date to 01/01/2015.** | | | |

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## Maintenance Timer 5

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | [DD/MM/YYYY] | | |
| **Default value** | 01/01/2015 | **Alternative config** | NO |
| **Step** | 1 day | | |
| **Comm object** | 16385 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |

This maintenance timer is based on date. At the midnight of the last day the alarm **Wrn Maintenance 5 (page 805)** appears in alarmlist.

> **IMPORTANT: To disable this maintenance timer, set date to 01/01/2015.**

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## Maintenance Timer 6

| | | | |
|---|---|---|---|
| **Setpoint group** | Engine settings | **Related FW** | 1.5.0 |
| **Range [units]** | [DD/MM/YYYY] | | |
| **Default value** | 01/01/2015 | **Alternative config** | NO |
| **Step** | 1 day | | |
| **Comm object** | 16386 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |

This maintenance timer is based on date. At the midnight of the last day the alarm **Wrn Maintenance 6 (page 806)** appears in alarmlist.

> **IMPORTANT: To disable this maintenance timer, set date to 01/01/2015.**

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# Group: Generator settings

## Subgroup: Overload Protection

### Overload BOC

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Overload Wrn (page 304)** .. 200 [%] | | |
| **Default value** | 120 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Power (page 257)** | | |
| **Comm object** | 8280 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Threshold level for generator overload (in % of Nominal power) protection. Protection is BOC (Breaker Open and gen-set Cooldown).<br>***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.* | | | |

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### Overload Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **Overload BOC (page 304)** [%] | | |
| **Default value** | 120 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Power (page 257)** | | |
| **Comm object** | 9685 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Threshold level for generator overload (in % of Nominal power) protection. This is only warning. | | | |

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### Overload Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **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 **Overload BOC (page 304)****Overload BOC (page 304)** and **Overload Wrn (page 304)** protection. | | | |

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## Subgroup: Underload Protection

### Minimal Power PTM

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 100 [%] | | |
| **Default value** | 5 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Power (page 257)** | | |
| **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 245)**. | | | |

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## Subgroup: Current Protection

### Short Circuit BOC

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | 100 .. 500 [%] | | |
| **Default value** | 250 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Current (page 258)** | | |
| **Comm object** | 8282 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| BOC occurs when generator current reaches this preset threshold.<br>***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.* | | | |

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### Short Circuit BOC Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **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 305)** protection. | | | |

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## IDMT Overcurrent Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **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 Overcurrent Delay is a reaction time of IDMT protection for 200% overcurrent $I_{gen}$ =2***Nominal Current (page 258)**

IDMT is “very inverse” over current protection. Reaction time is not constant but depends on over current level according to the following formula:

$$\text{Reaction } \hat{\square}?\hat{\square} \quad \text{time} = \frac{Overcurrent\ \ IDMT\hat{\square}?\hat{\square}\ \ Delay^{*}\ Nominal\hat{\square}?\hat{\square}\ \ \hat{\square}?\hat{\square}\ \ Current}{I_{gen}\hat{\square}?\hat{\square}\ Nominal\hat{\square}?\hat{\square}\ \ Current}$$

***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 |

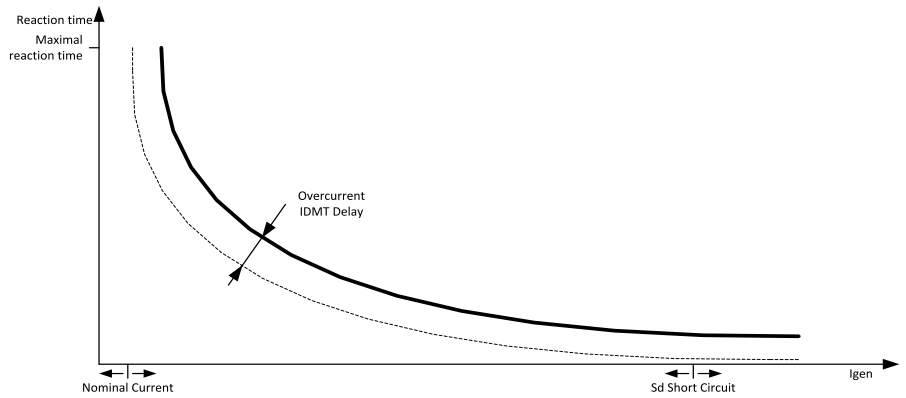



Image 8.21 IDMT Overcurrent Delay

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## Current Unbalance BOC

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | 1 .. 200 [%] of **Nominal Current (page 258)** | | |
| **Default value** | 50 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Current (page 258)** | | |
| **Comm object** | 8284 | **Related applications** | MINT, SPtM |
| **Config level** | Advanced | | |
| **Setpoint visibility** | Conditioned by the setpoint **Connection type (page 259)** | | |
| **Description** | | | |
| Threshold for generator current asymmetry (unbalance).<br>Protection is BOC (Breaker Open and genset Cooldown).<br>***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.* | | | |

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## Current Unbalance BOC Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **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 259)** | | |
| **Description** | | | |
| Delay for **Current Unbalance BOC (page 307)** protection. | | | |

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### Subgroup: Voltage Protection

## Generator Overvoltage Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Generator Overvoltage Wrn (page 308)** .. 200 [%] | | |
| **Default value** | 110 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Voltage Ph-N (page 261)** or **Nominal Voltage Ph-Ph (page 261)** | | |
| **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.<br>***Note:*** *Phase to phase and phase to neutral voltages are used for this protection.* | | | |

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## Generator Overvoltage Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Generator Undervoltage Wrn (page 309)** .. **Generator Overvoltage Sd (page 307)** [%] | | |
| **Default value** | 110 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Voltage Ph-N (page 261)** or **Nominal Voltage Ph-Ph (page 261)** | | |
| **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.* | | | |

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## Generator Undervoltage BOC

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **Generator Undervoltage Wrn (page 309)** [%] | | |
| **Default value** | 70 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Voltage Ph-N (page 261)** or **Nominal Voltage Ph-Ph (page 261)** | | |
| **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.* | | | |

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## Generator Undervoltage Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Generator Undervoltage BOC (page 308)** .. **Generator Overvoltage Wrn (page 308)** [%] | | |
| **Default value** | 70 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Voltage Ph-N (page 261)** or **Nominal Voltage Ph-Ph (page 261)** | | |
| **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.<br>***Note:*** *Phase to phase and phase to neutral voltages are used for this protection.* | | | |

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## Generator <> Voltage Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **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 307)**, **Generator Overvoltage Wrn (page 308)**, **Generator Undervoltage BOC (page 308)** and **Generator Undervoltage Wrn (page 309)** protection. | | | |

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## Voltage Unbalance BOC

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | 1 .. 200 [%] of **Nominal Voltage Ph-Ph (page 261)** | | |
| **Default value** | 10 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Voltage Ph-Ph (page 261)** | | |
| **Comm object** | 8288 | **Related applications** | MINT, SPtM |
| **Config level** | Advanced | | |
| **Setpoint visibility** | Conditioned by the setpoint **Connection type (page 259)** | | |
| **Description** | | | |
| Threshold for generator voltage unbalance alarm.<br>***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.* | | | |

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## Voltage Unbalance BOC Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **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 259)** | | |
| **Description** | | | |
| Delay for **Voltage Unbalance BOC (page 309)** protection. | | | |

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### Subgroup: Frequency Protection

## Generator Overfrequency BOC

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Generator Overfrequency Wrn (page 310)** .. 200,0 [%] | | |
| **Default value** | 110,0 % | **Alternative config** | NO |
| **Step** | 0,1 % of **Nominal Frequency (page 262)** | | |
| **Comm object** | 8296 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Threshold for generator phase L1 overfrequency.<br>***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.* | | | |

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## Generator Overfrequency Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Generator Underfrequency Wrn (page 311)** .. **Generator Overfrequency BOC (page 310)** [%] | | |
| **Default value** | 110,0 % | **Alternative config** | NO |
| **Step** | 0,1 % of **Nominal Frequency (page 262)** | | |
| **Comm object** | 9688 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Threshold for generator phase L1 overfrequency. | | | |

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## Generator Underfrequency BOC

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | 0,0 .. **Generator Underfrequency Wrn (page 311)** [%] | | |
| **Default value** | 85,0 % | **Alternative config** | NO |
| **Step** | 0,1 % of **Nominal Frequency (page 262)** | | |
| **Comm object** | 8298 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Threshold for generator phase L1 underfrequency.<br>***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.* | | | |

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## Generator Underfrequency Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Generator Underfrequency BOC (page 311)** .. **Generator Overfrequency Wrn (page 310)** [%] | | |
| **Default value** | 85,0 % | **Alternative config** | NO |
| **Step** | 0,1 % of **Nominal Frequency (page 262)** | | |
| **Comm object** | 9689 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Threshold for generator phase L1 underfrequency. | | | |

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## Generator <> Frequency Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **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 310)**, **Generator Overfrequency Wrn (page 310)**, **Generator Underfrequency Wrn (page 311)** and **Generator Underfrequency BOC (page 311)** protection. | | | |

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## Subgroup: Reverse Power Protection

### Reverse Power Level

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 50 [%] | | |
| **Default value** | 10 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Power (page 257)** | | |
| **Comm object** | 8486 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Conditioned by the setpoint **Reverse Power Protection (page 318)**. | | |
| **Description** | | | |
| Level for generator **Reverse Power Protection (page 318)**. | | | |

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### Reverse Power Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **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 318)**. | | |
| **Description** | | | |
| Delay for generator **Reverse Power Protection (page 318)**. | | | |

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## Subgroup: Excitation Loss Protection

### Excitation Loss Level

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 150 [%] | | |
| **Default value** | 30 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Power (page 257)** | | |
| **Comm object** | 12486 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Conditioned by the setpoint **Excitation Loss Protection (page 319)**. | | |
| **Description** | | | |
| Level for generator **Excitation Loss Protection (page 319)**. | | | |

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## Excitation Loss Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Generator settings | **Related FW** | 1.5.0 |
| **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 319)**. | | |
| **Description** | | | |
| Delay for generator **Excitation Loss Protection (page 319)**. | | | |

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# Group: Protections

### Subgroup: Overload Protection

## Overload Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Protections | **Related FW** | 1.5.0 |
| **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 304)**, **Overload Wrn (page 304)** and **Overload Delay (page 304)**. |
| Disabled: | Protection is disabled. |
| ExtDisable: | Protection is enabled or disabled by the state of LBI **Force Protection Disable (page 658)** |

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## Subgroup: Current Protection

### IDMT Overcurrent Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Protections | **Related FW** | 1.5.0 |
| **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 306)**. |
| Disabled: | Protection is disabled. |

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### Current Unbalance Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Protections | **Related FW** | 1.5.0 |
| **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 307)** and **Current Unbalance BOC Delay (page 307)**. |
| Disabled: | Protection is disabled. |
| ExtDisable: | Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 658)** |

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## Subgroup: Voltage Protection

### Generator <> Voltage Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Protections | **Related FW** | 1.5.0 |
| **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 307)**, **Generator Overvoltage Wrn (page 308)**, **Generator Undervoltage BOC (page 308)**, **Generator Undervoltage Wrn (page 309)** and **Generator <> Voltage Delay (page 309)**. |
| Disabled: | Protection is disabled. |
| ExtDisable: | Protection is enabled or disabled by the state of LBI **Force Protection Disable (page 658)** |

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 LB I**Force Protection Disable (page 658)** is active.

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### Voltage Unbalance Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Protections | **Related FW** | 1.5.0 |
| **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 309)** and **Voltage Unbalance BOC Delay (page 310)**. |
| Disabled: | Protection is disabled. |
| ExtDisable: | Protection is enabled or disabled by the state of LBI **Force Protection Disable (page 658)** |

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## Bus Measurement Error Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Protections | **Related FW** | 1.5.0 |
| **Range [units]** | Enabled / Disabled / ExtDisable [-] | | |
| **Default value** | Enabled | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 10558 | **Related applications** | MINT, |
| **Config level** | Advanced | | |
| **Setpoint visibility** | Always | | |

**Description**

This setpoint adjusts the behavior of bus measurement error protection.

| | |
|---|---|
| Enabled: | Bus Measurement error is detected when the voltage on controller's bus terminals is out of limits 20 seconds after:<br>▶ GCB (own) was closed in MAN or AUTO mode.<br>▶ MCB (feedback) was closed in AUTO mode.<br>▶ Any other GCB in power management group (on CAN bus) was closed.<br>The alarm is activated after 20s. However, the GCB (own) closing is blocked immediately for safety reasons. |
| Disabled: | Protection is disabled. |
| ExtDisable: | Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 658)** |

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## Generator Frequency Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Protections | **Related FW** | 1.5.0 |
| **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 310)**, **Generator Overfrequency Wrn (page 310)**, **Generator Underfrequency BOC (page 311)**, **Generator Underfrequency Wrn (page 311)**, and **Generator <> Frequency Delay (page 311)**. |
| Disabled: | Protection is disabled. |
| ExtDisable: | Protection is enabled or disabled by the state of LBI **FORCE PROTECTION DISABLE (PAGE 658)** |

GCB closing, generator frequency regulation and synchronization are disabled (blocked), if the parameter is set to Disabled. It is blocked as well, if the parameter is set to ExtDisable and LBI **FORCE PROTECTION DISABLE (PAGE 658)** is active.

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## Subgroup: Reverse Power Protection

### Reverse Power Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Protections | **Related FW** | 1.5.0 |
| **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 312)** for time longer than the value of setpoint **Reverse Power Delay (page 312)**.

This setpoint adjusts behavior of generator Reverse power protection.

| | |
|---|---|
| Enabled: | Protection is enabled. Behavior of protection is adjusted via setpoints **Reverse Power Level (page 312)**, **Reverse Power Delay (page 312)** |
| Disabled: | Protection is disabled. |
| ExtDisable: | Protection is enabled or disabled by the state of LBI **Force Protection Disable (page 658)** |

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## Subgroup: Excitation Loss Protection

### Excitation Loss Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Protections | **Related FW** | 1.5.0 |
| **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 312)** for time longer than the value of setpoint **Excitation Loss Delay (page 313)**.

| | |
|---|---|
| Enabled: | Protection is enabled. Behavior of protection is adjusted via setpoints **Excitation Loss Level (page 312)**, **Excitation Loss Delay (page 313)** |
| Disabled: | Protection is disabled. |
| ExtDisable: | Protection is enabled or disabled by the state of LBI **Force Protection Disable (page 658)** |

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## Subgroup: Speed Protection

### Underspeed Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Protections | **Related FW** | 1.5.0 |
| **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 658)** |

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# Group: Mains settings

## Subgroup: AMF Timers

### Emergency Start Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 244)** | | |
| **Description** | | | |
| Delay after the mains failure to the start command of the gen-set. | | | |

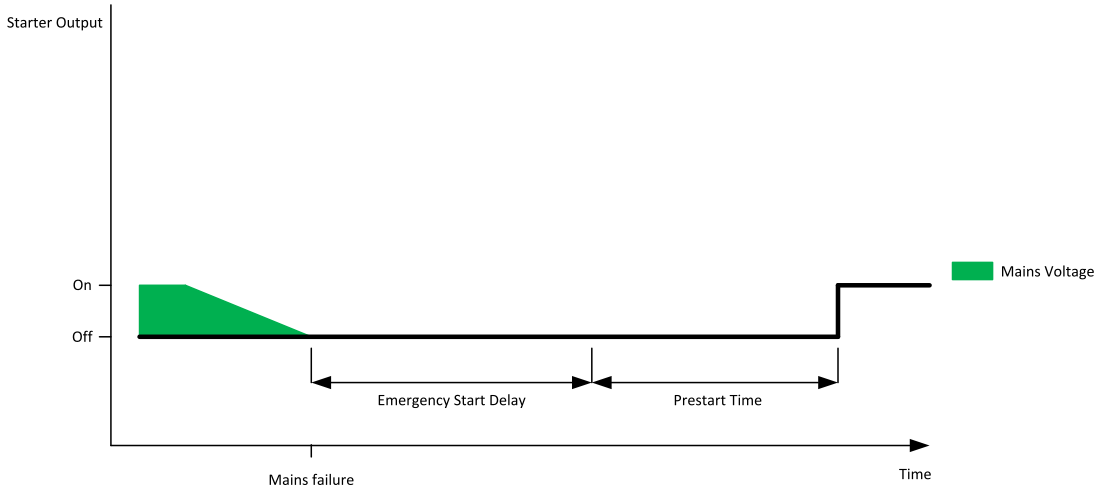



Image 8.22 Emergency Start Delay

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### Mains Return Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 244)** | | |
| **Description** | | | |
| This setpoint adjust the delay, how long mains has to be returned after mains fail to start load transfer to mains. | | | |

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## MCB Close Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 244)** | | |
| **Description** | | | |
| Delay after mains returns to MCB closing, if the gen-set is not running(e.g. is in start-up procedure) | | | |

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## AMF Start

| | | | |
|---|---|---|---|
| **Setpoint group** | Process ControlMains settings | **Related FW** | 1.5.0 |
| **Range [units]** | ENABLED / DISABLED [-] | | |
| **Default value** | ENABLED | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 9238 | **Related applications** | SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Use this setpoint to enable or disable the **AMF operation (page 115)**. | | | |

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### Subgroup: Mains Voltage Limits

## Mains Overvoltage

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Mains Undervoltage (page 322)** .. 150 [%] | | |
| **Default value** | 110 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Voltage Ph-Ph (page 261)** | | |
| **Comm object** | 8305 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Conditioned by the setpoint **Application Mode Select (page 244)** | | |
| **Description** | | | |
| Threshold for mains overvoltage. All three phases are checked. Maximum out of three is used. | | | |

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## Mains Undervoltage

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **Range [units]** | 50 .. **Mains Overvoltage (page 321)** [%] | | |
| **Default value** | 60 % | **Alternative config** | YES |
| **Step** | 1 % of **Nominal Voltage Ph-Ph (page 261)** | | |
| **Comm object** | 8307 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Conditioned by the setpoint **Application Mode Select (page 244)** | | |
| **Description** | | | |
| Threshold for mains undervoltage. All three phases are checked. Minimum voltage out of three phases is used. | | | |

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## Mains < > Voltage Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 244)** | | |
| **Description** | | | |
| Delay for **Mains Undervoltage (page 322)** and **Mains Overvoltage (page 321)** protection. | | | |

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## Mains Voltage Unbalance

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **Range [units]** | 1 .. 150 [%] of **Nominal Voltage Ph-Ph (page 261)** | | |
| **Default value** | 10 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Voltage Ph-Ph (page 261)** | | |
| **Comm object** | 8446 | **Related applications** | MINT, SPtM |
| **Config level** | Advanced | | |
| **Setpoint visibility** | Conditioned by the setpoint **Application Mode Select (page 244)** | | |
| **Description** | | | |
| Threshold for mains voltage unbalance. | | | |

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## Mains Voltage Unbalance Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 244)** | | |
| **Description** | | | |
| Delay for **Mains Voltage Unbalance (page 322)** protection. | | | |

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### Subgroup: Mains Frequency Limits

## Mains Overfrequency

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **Range [units]** | **Mains Underfrequency (page 323)** .. 150 [%] | | |
| **Default value** | 102,0 % | **Alternative config** | NO |
| **Step** | 1,0 % of **Nominal Frequency (page 262)** | | |
| **Comm object** | 8310 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Conditioned by the setpoint **Application Mode Select (page 244)** | | |
| **Description** | | | |
| Threshold for mains overfrequency. | | | |

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## Mains Underfrequency

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **Range [units]** | 50 .. **Mains Overfrequency (page 323)** [%] | | |
| **Default value** | 98,0 % | **Alternative config** | NO |
| **Step** | 1,0 % of **Nominal Frequency (page 262)** | | |
| **Comm object** | 8312 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Conditioned by the setpoint **Application Mode Select (page 244)** | | |
| **Description** | | | |
| Threshold for mains underfrequency. | | | |

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## Mains < > Frequency Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 244)** | | |
| **Description** | | | |
| Delay for **Mains Underfrequency (page 323)** and **Mains Overfrequency (page 323)** protection. | | | |

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### Subgroup: MCB Control

## MCB Logic

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 244)** | | |
| **Description** | | | |

The set point influences the behavior of the output **MCB CLOSE/OPEN (PAGE 722)**.

Close On When the output **MCB CLOSE/OPEN (PAGE 722)** is closed – MCB should be closed.

Close Off When the output **MCB CLOSE/OPEN (PAGE 722)** is closed – MCB should be opened.

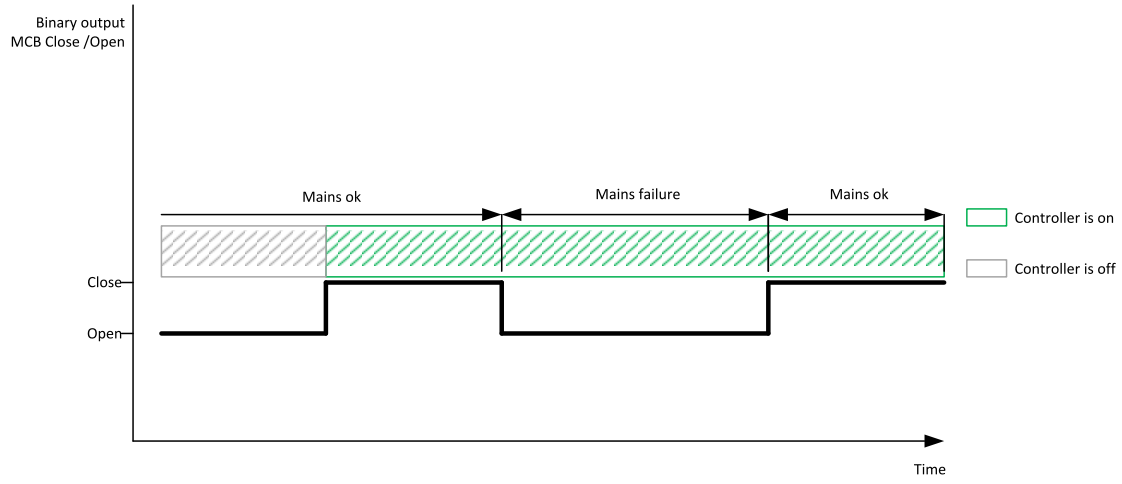



Image 8.23 MCB Logic 1

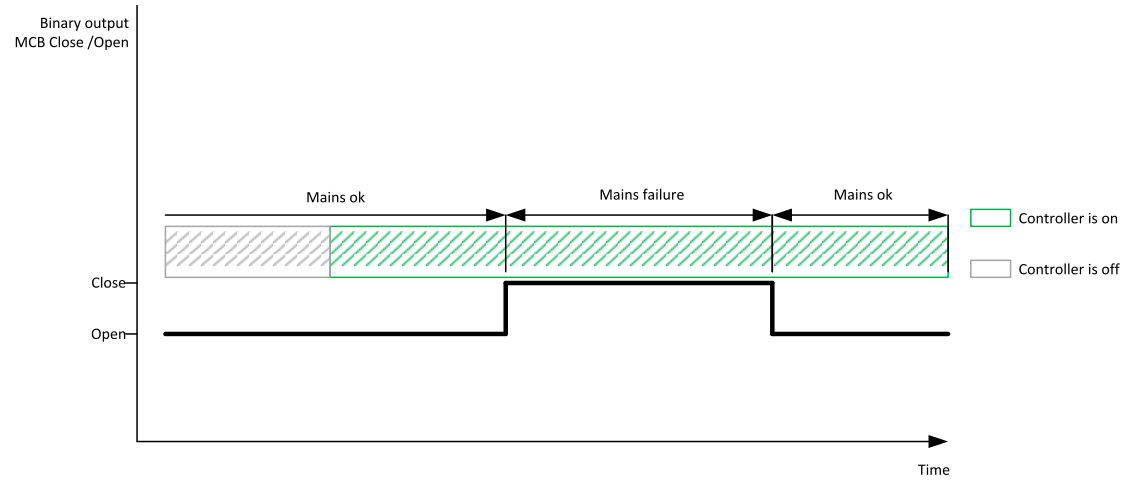



Image 8.24 MCB Logic 2

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## Subgroup: AMF Settings

## Return From Island

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **Range [units]** | Manual / Auto [-] | | |
| **Default value** | Auto | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 9590 | **Related applications** | MINT, SPtM |
| **Config level** | Advanced | | |
| **Setpoint visibility** | Conditioned by the setpoint **Application Mode Select (page 244)** | | |
| **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 812)** message is displayed in alarmlist to notify operator - it will disappear automatically after MCB close button is pushed.<br>***Note:*** *Select MANUAL in case you need to manually control the moment when the load is transferred back to the mains.* |
| Auto | No automatic mode change is performed. |

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## MCB Opens On

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 244)** | | |
| **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 321)** is applied before MCB closing.

Gen Run — MCB will be opened when engine will be running and it will be possible to transfer load from Mains to gen-set (after stabilisation phase).

***Note:*** *This option should be used for MCBs using 230V control and not equipped with the undervoltage coil.*

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## Subgroup: Mains Decoupling Protection

### Vector Shift Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 329)****. 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 320)****, as the mains is evaluated as healthy.*

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### Vector Shift Limit

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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* ***Max Vector Shift (page 594)****. 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 °.*

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## ROCOF Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 329)****. 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 320)****, as the mains is evaluated as healthy.*

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## ROCOF Windows Length

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 328)**. It defines number of periods of the mains voltage in which the ROCOF protection is evaluated. The higher length of ROCOF window means less sensitive protection for short oscillations of the frequency to both directions from the nominal value. Also delay of evaluation is higher.

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## ROCOF df/dt

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 328)** (Rate Of Change Of Frequency). | | | |

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## Vector Shift CB Selector

| | | | |
|---|---|---|---|
| **Setpoint group** | Mains settings | **Related FW** | 1.5.0 |
| **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 327)** or **ROCOF Protection (page 328)** protection is detected.<br>***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.* | | | |

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# Group: Load Shedding

## Load Shedding Active

| | | | |
|---|---|---|---|
| **Setpoint group** | Load Shedding | **Related FW** | 1.5.0 |
| **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** | Visible always | | |

**Description**

This setpoint is used for adjustment when the load shedding function is active.

| | |
|---|---|
| Disabled | The Load shedding function is disabled. All the outputs are open. |
| Island only | In Island operation (e.g. MCB is open and (M)GCB is closed) Load shedding outputs are controlled by load shedding function.<br>▶ Load shedding outputs are activated/Deactivated one by one in island operation<br>▶ All Loadshedding outputs are tripped once the genset comes into the island operation from "NO LOAD" operation (MCB and (M)GCB were opened -> Genset 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.<br>▶ Load shedding outputs are activated/Deactivated one by one in island operation.<br>▶ All Loadshedding outputs are tripped at once when the genset comes into the island operation from "NO LOAD" operation (MCB and (M)GCB were opened -> Genset started and (M)GCB closed).<br>▶ All Loadshedding outputs are tripped at once when the genset comes from Parallel operation (MCB, (M)GCB closed) to island operation (MCB opens, (M)GCB stays closed). This scenario is also valid when Test On Load is taken. |
| All the time | Load shedding Outputs are controlled by the load shedding function regardless of breaker positions.<br>▶ Loadshedding is active in island operation, in parallel operation too.<br>▶ All Loadshedding outputs are never tripped at once. |

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## Load Shedding Level

| | | | |
|---|---|---|---|
| **Setpoint group** | Load Shedding | **Related FW** | 1.5.0 |
| **Range [units]** | Load Reconnection Level .. 200 [%] of **Nominal Power (page 257)** | | |
| **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 330)** is disabled | | |
| **Description** | | | |
| This setpoint is used to proceeds the next Load shedding stage.When gen-set load exceeds this level for more than **Load Shedding Delay (page 331)** time | | | |

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## Load Shedding Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Load Shedding | **Related FW** | 1.5.0 |
| **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 330)** is disabled | | |
| **Description** | | | |
| This setpoint is used to proceeds the next Load shedding stage.When gen-set load exceeds this level for more than **Load Shedding Level (page 331)** time | | | |

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## Load Reconnection Level

| | | | |
|---|---|---|---|
| **Setpoint group** | Load Shedding | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **Load Shedding Level (page 331)** | | |
| **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 330)** is disabled | | |
| **Description** | | | |
| This setpoint is used to proceeds the next Load shedding stage.When gen-set load exceeds this level for more than **Load Shedding Delay (page 331)** time | | | |

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## Load Reconnection Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Load Shedding | **Related FW** | 1.5.0 |
| **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 330)** is disabled | | |
| **Description** | | | |
| This setpoint is used to proceeds the lower Load shedding stage. When gen-set load drops under **Load Reconnection Level (page 331)**l for more than this delay time. The binary output for higher stage is opened. Automatic load reconnection works only when **Auto Load Reconnection (page 332)** = Enabled | | | |

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## Auto Load Reconnection

| | | | |
|---|---|---|---|
| **Setpoint group** | Load Shedding | **Related FW** | 1.5.0 |
| **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 330)** is disabled | | |
| **Description** | | | |

Switch between manual and automatic reconnection of shedded load..

| | |
|---|---|
| Disabled | Rising edge on binary input MANUAL LD RECON resets controller to the lower stage, but only if the load is under the **Load Reconnection Level (page 331)**. **Load Reconnection Delay (page 332)** is not taken into account in this case. |
| Enabled | Load reconnection is automatic depend on setpoints **Load Reconnection Level (page 331)** and **Load Reconnection Delay (page 332)**. Binary input **MANUAL LOAD RECONNECTION (PAGE 663)** has no function. |

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# Group: Power Management

## Subgroup: Power Management Control

### Power Management

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | Enabled / Disabled [-] | | |
| **Default value** | Enabled | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 8551 | **Related applications** | MINT |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| This setpoint is used to enable or disable the **Power management (page 117)** 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 669)** i.e. if the input is active the gen-set is running and vice versa. | | | |

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### Power Management Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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** | Always | | |
| **Description** | | | |

Setpoint defines delay of the **Power management (page 117)**. When **REMOTE START/STOP (PAGE 669)** signal is activated and the gen-sets should start, all the engines (where **Power Management (page 333)** 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 360s (6 minutes) and activating **REMOTE START/STOP (PAGE 669)** 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.*

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## #Power Management Mode

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | ABS [kW] / REL [%] | | |
| **Default value** | ABS | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 9874 | **Related applications** | MINT |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |

This setpoint is used to select the **Power management (page 117)** 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 808)** 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 %. |

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## Priority

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 1 .. 32 [-] | | |
| **Default value** | 1 | **Alternative config** | NO |
| **Step** | 1 | | |
| **Comm object** | 8488 | **Related applications** | MINT |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **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 672)** 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 334) = ABS).**

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## #Priority Auto Swap

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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** | Always | | |
| **Description** | | | |

This setpoint adjusts priority auto swapping.

| | |
|---|---|
| Disabled | Optimalization is disabled. Priorities are given directly by the values adjusted in the setpoints **Priority (page 334)**. |
| 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 343)**). |
| 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.<br>**IMPORTANT: This priority swapping function is only for absolute mode of power management (#Power Management Mode (page 334) = ABS).**<br>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 672) can be used only if #Priority Auto Swap = Disabled.**

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## #System Start Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 600 [-] | | |
| **Default value** | 5 | **Alternative config** | NO |
| **Step** | 1 | | |
| **Comm object** | 8549 | **Related applications** | MINT |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |

This setpoint adjusts the delay of the system activation after the binary input **REMOTE START/STOP (PAGE 669)** has been activated.

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## #System Stop Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 600 [-] | | |
| **Default value** | 30 | **Alternative config** | NO |
| **Step** | 1 | | |
| **Comm object** | 8550 | **Related applications** | MINT |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| This setpoint adjusts the delay of the system deactivation after the binary input **REMOTE START/STOP (PAGE 669)** has been deactivated. | | | |

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### Subgroup: Load Reserve Set 1

## #Starting Load Reserve 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **#Stopping Load Reserve 1 (page 337)** [kW] | | |
| **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 334)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 662) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

***Note:*** *See **Power management (page 117)** chapter for more information.*

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## #Stopping Load Reserve 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | **#Starting Load Reserve 1 (page 336)** .. 32 000 [kW] | | |
| **Default value** | 110 kW | **Alternative config** | NO |
| **Step** | 1 kW | | |
| **Comm object** | 8491 | **Related applications** | MINT |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **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 334)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 662) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

> ***Note:*** *See **Power management (page 117)** chapter for more information.*

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## #Starting Rel Load Reserve 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **#Stopping Rel Load Reserve 1 (page 338)** [%] | | |
| **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 334)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 662) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

> ***Note:*** *See **Power management (page 117)** chapter for more information.*

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## #Stopping Rel Load Reserve 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | **#Starting Rel Load Reserve 1 (page 337)** .. 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 334)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 662) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

> ***Note:*** *See **Power management (page 117)** chapter for more information.*

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### Subgroup: Load Reserve Set 2

## #Starting Load Reserve 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **#Stopping Load Reserve 2 (page 339)** [kW] | | |
| **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 334)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 662) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.**

> ***Note:*** *See **Power management (page 117)** chapter for more information.*

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## #Stopping Load Reserve 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | **#Starting Load Reserve 2 (page 338)** .. 32 000 [kW] | | |
| **Default value** | 460 kW | **Alternative config** | NO |
| **Step** | 1 kW | | |
| **Comm object** | 8633 | **Related applications** | MINT |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **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 334)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 662) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.**

***Note:*** *See **Power management (page 117)** chapter for more information.*

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## #Starting Rel Load Reserve 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. **#Stopping Rel Load Reserve 2 (page 340)** [%] | | |
| **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 334)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 662) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.**

***Note:*** *See **Power management (page 117)** chapter for more information.*

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## #Stopping Rel Load Reserve 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | **#Starting Rel Load Reserve 2 (page 339)** .. 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 334)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 662) has to be activated, otherwise setpoints of Load Reserve Set 1 are used.**

***Note:*** *See **Power management (page 117)** chapter for more information.*

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### Subgroup: Minimal Running Power

## #Min Run Power

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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 665)**), 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 665)** needs to be activated on all gen-sets in the same time.*

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## Subgroup: Start/Stop Timing

### #Next Engine Start Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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. | | | |

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### #Next Engine Stop Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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. | | | |

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### #Slow Stop Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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.<br>***Note:*** *If there isn't any available gen-set to start, the alarm is not suppressed.* | | | |

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## Subgroup: Over Load Next Start Protection

### #Overload Next Start Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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 342)** right after the delay **#Overload Next Start Delay (page 342)**. | | | |

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### #Overload Next Start Level

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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 342)**. | | | |

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### #Overload Next Start Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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 342)**. | | | |

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## Subgroup: Run Hours Equalization

### Run Hours Base

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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.

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### #Run Hours Max Difference

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **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 335)** = 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.

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## Subgroup: Efficient Mode

### #Power Band Change Up Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 3 600 [s] | | |
| **Default value** | 10 s | **Alternative config** | NO |
| **Step** | [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 335)** = Efficient. | | | |

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### #Power Band Change Down Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 3 600 [s] | | |
| **Default value** | 10 s | **Alternative config** | NO |
| **Step** | [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 335)** = Efficient. | | | |

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## Subgroup: Group Settings

### Control Group

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 1,2 .. 32 [-] | | |
| **Default value** | 1 s | **Alternative config** | NO |
| **Step** | 1 s | | |
| **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 136)** to which the particular gen-set belongs. If there aren't logical groups at the site, adjust the setpoint to 1. | | | |

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### Group Link L

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 1,2 .. 32 [-] | | |
| **Default value** | 1 s | **Alternative config** | NO |
| **Step** | 1 s | | |
| **Comm object** | 10590 | **Related applications** | MINT |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| If the input **GROUP LINK (PAGE 661)** 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 136)**), then this setpoint is used to select which group is located at the left side of the group link breaker (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1. | | | |

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## Group Link R

| | | | |
|---|---|---|---|
| **Setpoint group** | Power Management | **Related FW** | 1.5.0 |
| **Range [units]** | 1,2 .. 32 [-] | | |
| **Default value** | 1 s | **Alternative config** | NO |
| **Step** | 1 s | | |
| **Comm object** | 10591 | **Related applications** | MINT |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| If the input **GROUP LINK (PAGE 661)** 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 136)**), then this setpoint is used to select which group is located at the right side of the group link breaker (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1. | | | |

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# Group: Speed/Load Control

### Subgroup: Speed Control

## Speed Regulator Character

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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. |

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## Speed Governor Bias

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **Range [units]** | -10,00 .. 10,00 [V] | | |
| **Default value** | 0,00 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.*

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## Speed Governor Low Limit

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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.

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## Speed Governor High Limit

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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.

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## Speed Governor PWM Rate

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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. | | | |

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## Tau Speed Governor Actuator

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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 734)** and **SPEED DOWN (PAGE 733)**. Adjust the setpoint to the pulse duration which is needed for the speed control device to travel from minimal position to the maximal position. | | | |

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### Subgroup: Regulation Loops

## Frequency Gain

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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.<br>***Note:*** *See the chapter **Regulation loops (page 140)** for more information.* | | | |

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## Frequency Int

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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 140)*** *for more information.*

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## Angle Gain

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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 140)*** *for more information.*

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## Load Gain

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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:*** *See the chapter* ***Regulation loops (page 140)*** *for more information.*

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## Load Int

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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 140)*** *for more information.* | | | |

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## Load Sharing Gain

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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** | Always | | |
| **Description** | | | |
| This setpoint adjusts the gain factor (P-factor) of the load sharing control PI loop. | | | |
| ***Note:*** *See the chapter* ***Regulation loops (page 140)*** *for more information.* | | | |

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## Load Sharing Int

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 100 [%] | | |
| **Default value** | 50 % | **Alternative config** | NO |
| **Step** | 1 % | | |
| **Comm object** | 9035 | **Related applications** | MINT |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| This setpoint adjusts the relative integration factor (I-factor) of the load sharing control PI loop. | | | |
| ***Note:*** *See the chapter* ***Regulation loops (page 140)*** *for more information.* | | | |

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## Subgroup: Load Transfer

### Close Transfer Max Duration

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **Range [units]** | 0,1 .. **Load Ramp (page 354)** [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. | | | |

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### Open Transfer Min Break

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **Range [units]** | 0,1 .. 600,0 [s] | | |
| **Default value** | 1,0 s | **Alternative config** | NO |
| **Step** | 0,1 s | | |
| **Comm object** | 8303 | **Related applications** | SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Minimal duration of break in open transition when **Transfer Gen To Mains (page 353)** or **Transfer Mains To Gen (page 352)** is chosen as open transfer. | | | |

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## Transfer Mains To Gen

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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 351)** 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 351)**.<br>In case of synchronization fail, MCB stays close and gen-set is stopped. |
| Close Primarily | Transfer of the load from mains to generator with synchronization and parallel work. The time of parallel work is given by setpoint **Close Transfer Max Duration (page 351)**.<br>In case of synchronization fail, open transfer is done. |
| Soft Transfer | Transfer of the load from mains to generator with parallel work and soft loading of the gen-set. This function is proceeded like the closed transfer, but there is time limitation of loading of the gen-set adjusted via setpoint **Load Ramp (page 354)**. 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 **Mains Unload MCB Open Window (page 354)**). |

***Note:*** *Close transfer of load is also affected by setpoint **Mains Import Measurement (page 254)**.*

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## Transfer Gen To Mains

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **Range [units]** | Open / Close Only / Close Primarily / Soft Transfer [-] | | |
| **Default value** | Soft Interchange | **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 351)** 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 351)**.<br>In case of synchronization fail, MCB stays close and gen-set is stopped. |
| Close Primarily | Transfer of the load from generator to mains with synchronization and parallel work. The time of parallel work is given by setpoint **Close Transfer Max Duration (page 351)**.<br>In case of synchronization fail, open transfer is done. |
| Soft Transfer | Transfer of the load from generator to mains with parallel work and soft unloading of the gen-set. This function is proceeded like the closed transfer, but there is time limitation of unloading of the gen-set adjusted via setpoint **Load Ramp (page 354)**. 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 353)**). |

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## Generator Unload GCB Open Level

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 100 [%] | | |
| **Default value** | 10 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Power (page 257)** | | |
| **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.*

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## Mains Unload MCB Open Window

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **Range [units]** | 0 .. 100 [%] | | |
| **Default value** | 10 % | **Alternative config** | NO |
| **Step** | 1 % of **Nominal Power (page 257)** | | |
| **Comm object** | 14694 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| This setpoint adjusts the value which defines the level where the mains is considered as unloaded.<br>***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.* | | | |

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## Load Ramp

| | | | |
|---|---|---|---|
| **Setpoint group** | Speed/Load Control | **Related FW** | 1.5.0 |
| **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** | | | |
| The max duration of soft transition(time for gen-set loading / unloading). | | | |

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# Group: Voltage/PF Control

## Subgroup: Voltage Control

### Voltage Regulator Character

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **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. |

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### Voltage Regulator Bias

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **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.

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## Voltage Regulator Low Limit

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **Range [units]** | -10,00 .. 10,00 [V] | | |
| **Default value** | 0,00 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. | | | |

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## Voltage Regulator High Limit

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **Range [units]** | -10,00 .. 10,00 [V] | | |
| **Default value** | 0,00 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. | | | |

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## Tau Voltage Governor Actuator

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **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 699)** and **AVR Down (page 699)**. Adjust the setpoint to the pulse duration which is needed for the voltage control device to travel from minimal position to the maximal position. | | | |

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## Subgroup: Regulation Loops

### Voltage Gain

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **Range [units]** | 0,0 .. 200,0 [%] | | |
| **Default value** | 10,0 % | **Alternative config** | NO |
| **Step** | 0,1 % | | |
| **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 140)*** *for more information.* | | | |

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### Voltage Int

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **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 140)*** *for more information.* | | | |

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### PF Gain

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **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 140)*** *for more information.* | | | |

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## PF Int

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **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 140)*** *for more information.*

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## VAr Sharing Gain

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **Range [units]** | 0,0 .. 200,0 [%] | | |
| **Default value** | 10,0 % | **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 140)*** *for more information.*

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## VAr Sharing Int

| | | | |
|---|---|---|---|
| **Setpoint group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **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 140)*** *for more information.*

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# Group: Synchronisation

## Synchronization Type

| | | | |
|---|---|---|---|
| **Setpoint group** | Synchronisation | **Related FW** | 1.5.0 |
| **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 360)** and **Phase Window (page 360)**. When voltage and phase shift are match, **Dwell Time (page 361)** 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 361)** (Mains frequency in SPtM, Bus frequency in MINT application). When this frequency is reached, **Dwell Time (page 361)** 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 362)** and **MCB Latency (page 362)**).<br>***Note:*** *Condition of **Voltage Window (page 360)** has to be also fulfilled.*<br>***Note:*** *Slip synchronization can not be used for synchronization of Mains to Mains.*<br>***Note:*** *Synchronization is not allowed if there is already synchronized any Mains CU in the control group.* |

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## Synchronization Timeout

| | | | |
|---|---|---|---|
| **Setpoint group** | Synchronisation | **Related FW** | 1.5.0 |
| **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 180s. This method helps to synchronize successfully even in difficult conditions.*

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## Voltage Window

| | | | |
|---|---|---|---|
| **Setpoint group** | Synchronisation | **Related FW** | 1.5.0 |
| **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.

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## Phase Window

| | | | |
|---|---|---|---|
| **Setpoint group** | Synchronisation | **Related FW** | 1.5.0 |
| **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 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.

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## Dwell Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Synchronisation | **Related FW** | 1.5.0 |
| **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 that the phase angle difference must be within **Phase Window (page 360)** and voltage difference within **Voltage Window (page 360)** before the breaker is closed. | | | |

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## Slip Frequency

| | | | |
|---|---|---|---|
| **Setpoint group** | Synchronisation | **Related FW** | 1.5.0 |
| **Range [units]** | -0,50 .. 0,50 [Hz] | | |
| **Default value** | -0,25 Hz | **Alternative config** | NO |
| **Step** | 0,01 Hz | | |
| **Comm object** | 14798 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |
| Slip frequency for slip synchronization (**Synchronization Type (page 359)** = Slip Synchro). | | | |

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## Slip Frequency Window

| | | | |
|---|---|---|---|
| **Setpoint group** | Synchronisation | **Related FW** | 1.5.0 |
| **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 359)** = Slip Synchro). | | | |

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## GCB Latency

| | | | |
|---|---|---|---|
| **Setpoint group** | Synchronisation | **Related FW** | 1.5.0 |
| **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 359) has Split Synchro value**

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## MCB Latency

| | | | |
|---|---|---|---|
| **Setpoint group** | Synchronisation | **Related FW** | 1.5.0 |
| **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 359) has Split Synchro value**

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# Group: Droop Settings

## Subgroup: Droop Settings

### Load/Var Sharing Regulation Type

| | | | |
|---|---|---|---|
| **Setpoint group** | Droop Settings | **Related FW** | 1.5.0 |
| **Range [units]** | Isochronous / Droop / Emergency Droop [-] | | |
| **Default value** | Isonchronous | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 13212 | **Related applications** | MINT |
| **Config level** | Advanced | | |
| **Setpoint visibility** | Visible only if ECU is configured | | |
| **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.<br>The speed request is correlative to active power and the voltage request is correlative to reactive power. |
| Emrg Droop | Regulation of active and reactive power is based on standard isochronous regulation based on intercontroller communication but it can be conditionally turned to droop |

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## Dead Bus GCB Close Master

| | | | |
|---|---|---|---|
| **Setpoint group** | Droop Settings | **Related FW** | 1.5.0 |
| **Range [units]** | Disabled / Enabled [-] | | |
| **Default value** | Disabled | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 13952 | **Related applications** | MINT |
| **Config level** | Advanced | | |
| **Setpoint visibility** | Always | | |
| **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. |

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### Subgroup: Frequency Droop

## Frequency Droop Slope

| | | | |
|---|---|---|---|
| **Setpoint group** | Droop Settings | **Related FW** | 1.5.0 |
| **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 262)**) on the range of the requested power from 0 to 100% of Basic settings: **Nominal Power (page 257)**.

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## Frequency Droop Offset

| | | | |
|---|---|---|---|
| **Setpoint group** | Droop Settings | **Related FW** | 1.5.0 |
| **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 262)**). Allows to shift the droop correlation line up or down. | | | |

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### Subgroup: Voltage Droop

## Voltage Droop Slope

| | | | |
|---|---|---|---|
| **Setpoint group** | Droop Settings | **Related FW** | 1.5.0 |
| **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: **Nominal Voltage Ph-N (page 261)**) 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 **Nominal Power (page 257)** whilst the PF=0,8). | | | |

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## Voltage Droop Offset

| | | | |
|---|---|---|---|
| **Setpoint group** | Droop Settings | **Related FW** | 1.5.0 |
| **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: **Nominal Voltage Ph-N (page 261)**). Allows to shift the droop correlation line up or down. | | | |

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### Subgroup: Emergency Droop Settings

## #Number Of Controller On CAN

| | | | |
|---|---|---|---|
| **Setpoint group** | Droop Settings | **Related FW** | 1.5.0 |
| **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 367)**. 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 367)**.

> ***Note:*** *This function is available only when **Load/Var Sharing Regulation Type (page 363)** = Emergency Droop.*

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## #Emergency Droop On Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Droop Settings | **Related FW** | 1.5.0 |
| **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 isochronou 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 366)**.

> ***Note:*** *This function is available only when* ***Load/Var Sharing Regulation Type (page 363)*** *= Emergency Droop.*

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## #Emergency Droop Off Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Droop Settings | **Related FW** | 1.5.0 |
| **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 366)**.

> ***Note:*** *This function is available only when* ***Load/Var Sharing Regulation Type (page 363)*** *= Emergency Droop.*

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# Group: General Analog Inputs

## General Analog Input 1

### Analog Protection 1 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9259 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT01 (PAGE 742)** is configured | | |
| **Description** | | | |
| Warning or history threshold level for **AIN PROT01 (PAGE 742)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT01 (PAGE 742)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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### Analog Protection 1 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9260 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT01 (PAGE 742)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT01 (PAGE 742)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT01 (PAGE 742)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 1 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 742)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT01 (PAGE 742)**.<br>***Note:*** *These setpoints are used only if LAI **AIN PROT01 (PAGE 742)** is adjusted to required protection type. Otherwise these setpoints are useless.* | | | |

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## Analog Switch 1 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 11407 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH01 (PAGE 688)** is configured | | |
| **Description** | | | |
| Threshold level for switching the binary output **AIN SWITCH01 (PAGE 688)** on. The value is measured from **AIN SWITCH 01 (PAGE 762)** analog input. | | | |

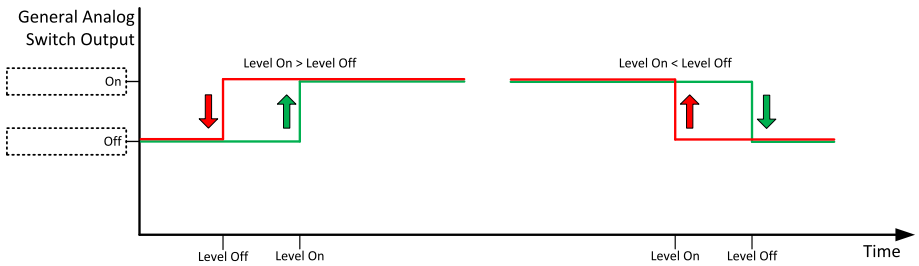



Image 8.25 General analog input 1 switch

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## Analog Switch 1 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 11410 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH01 (PAGE 688)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH01 (PAGE 688)** off. The value is measured from **AIN SWITCH 01 (PAGE 762)** analog input.




Image 8.26 General analog input 1 switch

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### General Analog Input 2

## Analog Protection 2 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9262 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT02 (PAGE 743)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT02 (PAGE 743)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT02 (PAGE 743)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 2 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9263 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT02 (PAGE 743)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT02 (PAGE 743)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT02 (PAGE 743)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 2 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 743)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT02 (PAGE 743)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT02 (PAGE 743)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 2 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 11408 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH02 (PAGE 689)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 02 (PAGE 762)** on. The value is measured from **AIN SWITCH 02 (PAGE 762)** analog input.




Image 8.27 General analog input 2 switch

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## Analog Switch 2 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 11411 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH02 (PAGE 689)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 02 (PAGE 762)** off. The value is measured from **AIN SWITCH 02 (PAGE 762)** analog input.




Image 8.28 General analog input 2 switch

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### General Analog Input 3

## Analog Protection 3 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9265 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT03 (PAGE 744)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT03 (PAGE 744)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT03 (PAGE 744)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 3 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9266 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT03 (PAGE 744)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT03 (PAGE 744)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT03 (PAGE 744)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 3 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 744)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT03 (PAGE 744)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT03 (PAGE 744)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 3 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 11409 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH03 (PAGE 689)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 03 (PAGE 762)** on. The value is measured from **AIN SWITCH 03 (PAGE 762)** analog input.




Image 8.29 General analog input 3 switch

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## Analog Switch 3 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 11412 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH03 (PAGE 689)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 03 (PAGE 762)** off. The value is measured from **AIN SWITCH 03 (PAGE 762)** analog input.




Image 8.30 General analog input 3 switch

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### General Analog Input 4

## Analog Protection 4 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9268 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT04 (PAGE 745)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT04 (PAGE 745)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT04 (PAGE 745)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 4 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9269 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT04 (PAGE 745)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT04 (PAGE 745)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT04 (PAGE 745)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 4 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 745)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT04 (PAGE 745)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT04 (PAGE 745)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 4 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14385 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 04 (PAGE 763)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.31 General analog input 4 switch

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## Analog Switch 4 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14386 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 04 (PAGE 763)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.32 General analog input 4 switch

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### General Analog Input 5

## Analog Protection 5 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9271 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT05 (PAGE 746)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT05 (PAGE 746)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT05 (PAGE 746)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 5 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9272 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT05 (PAGE 746)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT05 (PAGE 746)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT05 (PAGE 746)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 5 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 746)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT05 (PAGE 746)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT05 (PAGE 746)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 5 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14963 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 05 (PAGE 763)** on. The value is measured from **AIN SWITCH 05 (PAGE 763)** analog input.




Image 8.33 General analog input 4 switch

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## Analog Switch 5 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14979 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 05 (PAGE 763)** off. The value is measured from **AIN SWITCH 05 (PAGE 763)** analog input.




Image 8.34 General analog input 4 switch

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### General Analog Input 6

## Analog Protection 6 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9274 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT06 (PAGE 747)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT06 (PAGE 747)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT06 (PAGE 747)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 6 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9275 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT06 (PAGE 747)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT06 (PAGE 747)**.<br>***Note:*** *These setpoints are used only if LAI **AIN PROT06 (PAGE 747)** is adjusted to required protection type. Otherwise these setpoints are useless.* | | | |

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## Analog Protection 6 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 747)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT06 (PAGE 747)**.<br>***Note:*** *These setpoints are used only if LAI **AIN PROT06 (PAGE 747)** is adjusted to required protection type. Otherwise these setpoints are useless.* | | | |

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## Analog Switch 6 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14964 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 06 (PAGE 763)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.35 General analog input 4 switch

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## Analog Switch 6 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14980 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 06 (PAGE 763)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.36 General analog input 4 switch

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### General Analog Input 7

## Analog Protection 7 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9277 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT07 (PAGE 748)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT07 (PAGE 748)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT07 (PAGE 748)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 7 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9278 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT07 (PAGE 748)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT07 (PAGE 748)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT07 (PAGE 748)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 7 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 748)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT07 (PAGE 748)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT07 (PAGE 748)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 7 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14965 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 07 (PAGE 764)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.37 General analog input 4 switch

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## Analog Switch 7 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14981 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 07 (PAGE 764)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.38 General analog input 4 switch

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### General Analog Input 8

## Analog Protection 8 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9280 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT08 (PAGE 749)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT08 (PAGE 749)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT08 (PAGE 749)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 8 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9281 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT08 (PAGE 749)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT08 (PAGE 749)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT08 (PAGE 749)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 8 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 749)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT08 (PAGE 749)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT08 (PAGE 749)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 8 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14966 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 08 (PAGE 764)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.39 General analog input 4 switch

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## Analog Switch 8 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14982 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 08 (PAGE 764)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.40 General analog input 4 switch

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### General Analog Input 9

## Analog Protection 9 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9283 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT09 (PAGE 750)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT09 (PAGE 750)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT09 (PAGE 750)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 9 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9284 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT09 (PAGE 750)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT09 (PAGE 750)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT09 (PAGE 750)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 9 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 750)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT09 (PAGE 750)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT09 (PAGE 750)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 9 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14967 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 09 (PAGE 764)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.41 General analog input 4 switch

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## Analog Switch 9 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14983 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 09 (PAGE 764)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.42 General analog input 4 switch

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### General Analog Input 10

## Analog Protection 10 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9286 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT10 (PAGE 751)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT10 (PAGE 751)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT10 (PAGE 751)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 10 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9287 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT10 (PAGE 751)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT10 (PAGE 751)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT10 (PAGE 751)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 10 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 751)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT10 (PAGE 751)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT10 (PAGE 751)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 10 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14968 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 10 (PAGE 765)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.43 General analog input 4 switch

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## Analog Switch 10 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14984 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 10 (PAGE 765)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.44 General analog input 4 switch

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### General Analog Input 11

## Analog Protection 11 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9289 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT11 (PAGE 752)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT11 (PAGE 752)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT11 (PAGE 752)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 11 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9290 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT11 (PAGE 752)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT11 (PAGE 752)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT11 (PAGE 752)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 11 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 752)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT11 (PAGE 752)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT11 (PAGE 752)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 11 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14969 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 11 (PAGE 765)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.45 General analog input 4 switch

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## Analog Switch 11 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14985 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 11 (PAGE 765)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.46 General analog input 4 switch

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### General Analog Input 12

## Analog Protection 12 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9292 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT12 (PAGE 753)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT12 (PAGE 753)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT12 (PAGE 753)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 12 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9293 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT12 (PAGE 753)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT12 (PAGE 753)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT12 (PAGE 753)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 12 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 753)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT12 (PAGE 753)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT12 (PAGE 753)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 12 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14970 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 12 (PAGE 765)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.47 General analog input 4 switch

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## Analog Switch 12 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14986 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 12 (PAGE 765)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.48 General analog input 4 switch

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### General Analog Input 13

## Analog Protection 13 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9295 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT13 (PAGE 754)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT13 (PAGE 754)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT13 (PAGE 754)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 13 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9296 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT13 (PAGE 754)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT13 (PAGE 754)**. | | | |
| ***Note:*** *These setpoints are used only if LAI **AIN PROT13 (PAGE 754)** is adjusted to required protection type. Otherwise these setpoints are useless.* | | | |

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## Analog Protection 13 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 754)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT13 (PAGE 754)**. | | | |
| ***Note:*** *These setpoints are used only if LAI **AIN PROT13 (PAGE 754)** is adjusted to required protection type. Otherwise these setpoints are useless.* | | | |

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## Analog Switch 13 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14971 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 13 (PAGE 766)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.49 General analog input 4 switch

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## Analog Switch 13 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14987 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 13 (PAGE 766)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.50 General analog input 4 switch

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### General Analog Input 14

## Analog Protection 14 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9298 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT14 (PAGE 755)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT14 (PAGE 755)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT14 (PAGE 755)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 14 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9299 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT14 (PAGE 755)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT14 (PAGE 755)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT14 (PAGE 755)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 14 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 755)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT14 (PAGE 755)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT14 (PAGE 755)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 14 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14972 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 14 (PAGE 766)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.51 General analog input 4 switch

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## Analog Switch 14 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14988 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 14 (PAGE 766)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.52 General analog input 4 switch

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### General Analog Input 15

## Analog Protection 15 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9301 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT15 (PAGE 756)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT15 (PAGE 756)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT15 (PAGE 756)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 15 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9302 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT15 (PAGE 756)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT15 (PAGE 756)**. | | | |
| ***Note:*** *These setpoints are used only if LAI **AIN PROT15 (PAGE 756)** is adjusted to required protection type. Otherwise these setpoints are useless.* | | | |

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## Analog Protection 15 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 756)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT15 (PAGE 756)**. | | | |
| ***Note:*** *These setpoints are used only if LAI **AIN PROT15 (PAGE 756)** is adjusted to required protection type. Otherwise these setpoints are useless.* | | | |

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## Analog Switch 15 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14973 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 15 (PAGE 766)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.53 General analog input 4 switch

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## Analog Switch 15 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14989 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 15 (PAGE 766)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.54 General analog input 4 switch

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### General Analog Input 16

## Analog Protection 16 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9304 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT16 (PAGE 757)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT16 (PAGE 757)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT16 (PAGE 757)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 16 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9305 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT16 (PAGE 757)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT16 (PAGE 757)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT16 (PAGE 757)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 16 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 757)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT16 (PAGE 757)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT16 (PAGE 757)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 16 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14974 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 16 (PAGE 767)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.55 General analog input 4 switch

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## Analog Switch 16 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14990 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 16 (PAGE 767)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.56 General analog input 4 switch

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### General Analog Input 17

## Analog Protection 17 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9307 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT17 (PAGE 758)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT17 (PAGE 758)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT17 (PAGE 758)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 17 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9308 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT17 (PAGE 758)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT17 (PAGE 758)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT17 (PAGE 758)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 17 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 758)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT17 (PAGE 758)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT17 (PAGE 758)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 17 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14975 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 17 (PAGE 767)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.57 General analog input 4 switch

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## Analog Switch 17 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14991 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 17 (PAGE 767)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.58 General analog input 4 switch

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### General Analog Input 18

## Analog Protection 18 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9310 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT18 (PAGE 759)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT18 (PAGE 759)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT18 (PAGE 759)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 18 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9311 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT18 (PAGE 759)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT18 (PAGE 759)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT18 (PAGE 759)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 18 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 759)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT18 (PAGE 759)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT18 (PAGE 759)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 18 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14976 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 18 (PAGE 767)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.59 General analog input 4 switch

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## Analog Switch 18 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14992 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 18 (PAGE 767)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.60 General analog input 4 switch

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### General Analog Input 19

## Analog Protection 19 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9313 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT19 (PAGE 760)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT19 (PAGE 760)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT19 (PAGE 760)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 19 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9314 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT19 (PAGE 760)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT19 (PAGE 760)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT19 (PAGE 760)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 19 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 760)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT19 (PAGE 760)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT19 (PAGE 760)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 19 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14977 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 19 (PAGE 768)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.61 General analog input 4 switch

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## Analog Switch 19 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14993 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 19 (PAGE 768)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.62 General analog input 4 switch

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### General Analog Input 20

## Analog Protection 20 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9316 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT20 (PAGE 761)** is configured | | |
| **Description** | | | |

Warning or history threshold level for **AIN PROT20 (PAGE 761)**.

***Note:*** *These setpoints are used only if LAI **AIN PROT20 (PAGE 761)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 20 Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 9317 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical analog input **AIN PROT20 (PAGE 761)** is configured | | |
| **Description** | | | |
| Shutdown or BOC threshold level for **AIN PROT20 (PAGE 761)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT20 (PAGE 761)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Protection 20 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **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 761)** is configured | | |
| **Description** | | | |
| Delay for **AIN PROT20 (PAGE 761)**. | | | |

***Note:*** *These setpoints are used only if LAI **AIN PROT20 (PAGE 761)** is adjusted to required protection type. Otherwise these setpoints are useless.*

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## Analog Switch 20 On

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14978 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 20 (PAGE 768)** on. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.63 General analog input 4 switch

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## Analog Switch 20 Off

| | | | |
|---|---|---|---|
| **Setpoint group** | General Analog Inputs | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | the value is defined by analog sensor curve | **Alternative config** | NO |
| **Step** | the step is defined by analog sensor curve | | |
| **Comm object** | 14994 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Visible only if the logical binary output **AIN SWITCH04 (PAGE 690)** is configured | | |
| **Description** | | | |

Threshold level for switching the binary output **AIN SWITCH 20 (PAGE 768)** off. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input.




Image 8.64 General analog input 4 switch

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# Group: Scheduler

## Subgroup: Time & Date

## Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **Range [units]** | HH:MM:SS [-] | | |
| **Default value** | 0:0:0 | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 24554 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |
| **Description** | | | |

Real time clock adjustment.

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## Date

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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. | | | |

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## Time Stamp Period

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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.<br>***Note:*** *History record is made only when engine is running.* | | | |

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## Summer Time Mode

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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. |

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## Subgroup: Timer 1

### Timer 1 Setup

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)**
- **Timer 1 Repetition (page 431)**
- **Timer 1 First Occur. Date (page 431)**
- **Timer 1 First Occur. Time (page 431)**
- **Timer 1 Duration (page 432)**
- **Timer 1 Repeated (page 432)**
- **Timer 1 Repeat Day (page 435)**
- **Timer 1 Day (page 434)**
- **Timer 1 Repeated Day In Week (page 435)**
- **Timer 1 Repeat Day In Month (page 435)**
- **Timer 1 Repeat Week In Month (page 436)**
- **Timer 1 Refresh Period (page 433)**
- **Timer 1 Weekends (page 434)**

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## Timer 1 Function

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **Range [units]** | Disable / No Func / TEST / Test OnLd / MFail Blk / Mode OFF [-] | | |
| **Default value** | Disable | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 15358 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |

**Description**

It is possible to choose from following timer functions. Binary output **EXERCISE TIMER 1 (PAGE 707)** is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.

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

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. |
| Auto Run | When this option is chosen then the binary output of timer is internally connected to the **REMOTE START/STOP (PAGE 669)** binary input. |
| TEST | When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST. |
| TEST OnLd | When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input. |
| MFail Blk | When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input. |
| Mode OFF | When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input. |

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## Timer 1 Repetition

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |
| **Description** | | | |

Defines repetition of **Timer 1 Function (page 430)**.

| | |
|---|---|
| Off | **Timer 1 Function (page 430)** will not be activated. |
| Once | **Timer 1 Function (page 430)** will be activated only one time. |
| Repeated | **Timer 1 Function (page 430)** will be repeatedly activated. |

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## Timer 1 First Occur. Date

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |
| **Description** | | | |

Date of first occurrence of **Timer 1 Function (page 430)**.

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## Timer 1 First Occur. Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |
| **Description** | | | |

Time of first occurrence of **Timer 1 Function (page 430)**.

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## Timer 1 Duration

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |
| **Description** | | | |
| **Timer 1 Function (page 430)** duration time. | | | |

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## Timer 1 Repeated

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |
| **Description** | | | |

Repeated interval of **Timer 1 Function (page 430)**.

| | |
|---|---|
| Daily | **Timer 1 Function (page 430)** is repeated every day. |
| Weekly | **Timer 1 Function (page 430)** is repeated every week in chosen days. |
| Monthly | **Timer 1 Function (page 430)** is repeated in chosen day every month or in chosen days of chosen week of month |
| Short Period | **Timer 1 Function (page 430)** is repeated in adjusted period. |

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## Timer 1 Refresh Period

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |

**Description**

Refresh period of **Timer 1 Function (page 430)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 1 Repeated (page 432)**.

| | |
|---|---|
| Daily | Range [units]: 1 .. 1000 [day]. This setpoint adjust that every X day the timer will be activated.<br>**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 430)**, the **Timer 1 Function (page 430)** will be activated. |
| Weekly | Range [units]: 1 .. 60 [week]. This setpoint adjust that every X week the timer will be activated.<br>**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 430)**, the **Timer 1 Function (page 430)** will be activated in selected days adjusted by **Timer 1 Day (page 434)**. |
| Monthly | Range [units]: 1 .. 12 [month]. This setpoint adjust that every X month the timer will be activated.<br>**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 430)**, the **Timer 1 Function (page 430)** will be activated in selected day of month adjusted by **Timer 1 Repeat Day In Month (page 435)** or in selected days of week of month adjusted by **Timer 1 Day (page 434)** and **Timer 1 Repeat Week In Month (page 436)**. |
| Short Period | Range [units]: [HH:MM]. This setpoint adjust that every X short period the timer will be activated.<br>**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 430)**, the **Timer 1 Function (page 430)** will be activated. |

**back to List of setpoints**

## Timer 1 Weekends

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |
| **Description** | | | |

Behavior of **Timer 1 Function (page 430)** on weekends.

| | |
|---|---|
| Including | **Timer 1 Function (page 430)** counter is running on the weekends and **Timer 1 Function (page 430)** can be active. |
| Skip | **Timer 1 Function (page 430)** counter is running on the weekends but **Timer 1 Function (page 430)** isn't active. |
| Postpone | **Timer 1 Function (page 430)** counter isn't running on the weekends and **Timer 1 Function (page 430)** isn't active. If the activation of timer is counted on the weekend, than timer will be activated after weekend. Another activation of timer is counted from original date of first occurrence date. |

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## Timer 1 Day

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |
| **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** | 1.5.0 |
| **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 430)** | | |
| **Description** | | | |
| Use this setpoint to adjust behavior of monthly repetition of the **Timer 1 Function (page 430)**. | | | |
| Repeated Day | Chose one day in month when **Timer 1 Function (page 430)** will be activated. | | |
| Repeated Day In Week | Chose days in one week when **Timer 1 Function (page 430)** will be activated. | | |

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## Timer 1 Repeated Day In Week

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |
| **Description** | | | |
| Use this setpoint to select the day of week when timer will be activated. | | | |
| ***Note:*** *More day can be selected. Timer will be activated on the day which happened like the first.* | | | |

List of setpoints (page 237)

## Timer 1 Repeat Day In Month

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |
| **Description** | | | |
| Use this setpoint to chose the day in month when the **Timer 1 Function (page 430)** will be activated. | | | |

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## Timer 1 Repeat Week In Month

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 430)** | | |
| **Description** | | | |
| This setpoint adjust the week of month in which the **Timer 1 Function (page 430)** will be activated. | | | |

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### Subgroup: Timer 2

## Timer 2 Setup

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)**
- **Timer 2 Repetition (page 438)**
- **Timer 2 First Occur. Date (page 438)**
- **Timer 2 First Occur. Time (page 438)**
- **Timer 2 Duration (page 439)**
- **Timer 2 Repeated (page 439)**
- **Timer 2 Repeat Day (page 442)**
- **Timer 2 Day (page 441)**
- **Timer 2 Repeated Day In Week (page 442)**
- **Timer 2 Repeat Day In Month (page 442)**
- **Timer 2 Repeat Week In Month (page 443)**
- **Timer 2 Refresh Period (page 440)**
- **Timer 2 Weekends (page 441)**

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## Timer 2 Function

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **Range [units]** | Disable / No Func / TEST / Test OnLd / MFail Blk / Mode OFF [-] | | |
| **Default value** | No Func | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 15359 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Always | | |

**Description**

It is possible to choose from following Timer functions. Binary output **EXERCISE TIMER 2 (PAGE 708)** is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.

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

Timer 1 has the highest priority. Timer 8 has the lowest priority. So if Timer 1 is configured for OFF mode and Timer 8 is over the same time configured for AUTO mode, controller will work in OFF mode.

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

| | |
|---|---|
| Disable | The Timer is disabled. |
| No Func | There is no any other function, only binary output of timer is activated. |
| Auto Run | When this option is chosen then the binary output of timer is internally connected to the **REMOTE START/STOP (PAGE 669)** binary input. |
| TEST | When this option is chosen then the binary output of timer is internally connected to the binary input Remote TEST. |
| TEST OnLd | When this option is chosen then the binary output of timer is internally connected to the Remote TEST On Load binary input. |
| MFail Blk | When this option is chosen then the binary output of timer is internally connected to the Mains Fail Block binary input. |
| Mode OFF | When this option is chosen then the binary output of timer is internally connected to the Remote OFF binary input. |

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## Timer 2 Repetition

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |
| Defines repetition of **Timer 2 Function (page 437)**. | | | |
| Off | **Timer 2 Function (page 437)** will not be activated. | | |
| Once | **Timer 2 Function (page 437)** will be activated only one time. | | |
| Repeated | **Timer 2 Function (page 437)** will be repeatedly activated. | | |

**List of setpoints (page 237)**

## Timer 2 First Occur. Date

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |
| Date of first occurrence of**Timer 2 Function (page 437)**. | | | |

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## Timer 2 First Occur. Time

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |
| Time of first occurrence of **Timer 2 Function (page 437)**. | | | |

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## Timer 2 Duration

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |
| **Timer 2 Function (page 437)** duration time. | | | |

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## Timer 2 Repeated

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |

Repeated interval of **Timer 2 Function (page 437)**.

| | |
|---|---|
| Daily | **Timer 2 Function (page 437)** is repeated every day. |
| Weekly | **Timer 2 Function (page 437)** is repeated every week in chosen days. |
| Monthly | **Timer 2 Function (page 437)** is repeated in chosen day every month or in chosen days of chosen week of month |
| Short Period | **Timer 2 Function (page 437)** is repeated in adjusted period. |

**List of setpoints (page 237)**

## Timer 2 Refresh Period

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |

**Description**

Refresh period of **Timer 2 Function (page 437)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 2 Repeated (page 439)**.

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 437)**, the **Timer 2 Function (page 437)** 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 437)**, the **Timer 2 Function (page 437)** will be activated in selected days adjusted by **Timer 2 Day (page 441)**.

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 437)**, the **Timer 2 Function (page 437)** will be activated in selected day of month adjusted by **Timer 2 Repeat Day In Month (page 442)** or in selected days of week of month adjusted by **Timer 2 Day (page 441)** and **Timer 2 Repeat Week In Month (page 443)**.

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 437)**, the **Timer 2 Function (page 437)** will be activated.

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## Timer 2 Weekends

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |

Behavior of **Timer 2 Function (page 437)** on weekends.

| | |
|---|---|
| Including | **Timer 2 Function (page 437)** counter is running on the weekends and **Timer 2 Function (page 437)** can be active. |
| Skip | **Timer 2 Function (page 437)** counter is running on the weekends but **Timer 2 Function (page 437)** isn't active. |
| Postpone | **Timer 2 Function (page 437)** counter isn't running on the weekends and **Timer 2 Function (page 437)** isn't active. If the activation of timer is counted on the weekend, than timer will be activated after weekend. Another activation of timer is counted from original date of first occurrence date. |

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## Timer 2 Day

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |

Use this setpoint to include or exclude individual days of week. To select the day use Up and Down buttons. To change the value of day use Enter button.

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## Timer 2 Repeat Day

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |
| Use this setpoint to adjust behavior of monthly repetition of the **Timer 2 Function (page 437)**. | | | |
| Repeated Day | Chose one day in month when **Timer 2 Function (page 437)** will be activated. | | |
| Repeated Day In Week | Chose days in one week when **Timer 2 Function (page 437)** will be activated. | | |

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## Timer 2 Repeated Day In Week

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |
| Use this setpoint to select the day of week when timer will be activated. | | | |
| ***Note:*** *More day can be selected. Timer will be activated on the day which happened like the first.* | | | |

List of setpoints (page 237)

## Timer 2 Repeat Day In Month

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |
| Use this setpoint to chose the day in month when the **Timer 2 Function (page 437)** will be activated. | | | |

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## Timer 2 Repeat Week In Month

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 437)** | | |
| **Description** | | | |
| This setpoint adjust the week of month in which the **Timer 2 Function (page 437)** will be activated. | | | |

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### Subgroup: Rental Timers

## Rental Timer 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 795)** will be recorded in alarm list and the binary output **AL RENTAL TIMER 1 (PAGE 686)** will close.

> **IMPORTANT: To reset Rental Timer 1 (page 443) we have to set up Rental Timer 1 (page 443) again. It means go to setpoint group Scheduler and to the setpoint Rental Timer 1 (page 443). Then press enter button ↵, change the value if it is necessary and press enter button ↵ again.**

When the **Rental Timer 1 (page 443)** elapsed during engine run the gen-set will not stop immediately. The adjustable **Rental Timer BOC (page 447)**timer will start in this moment. The engine will be cooled and stopped when the **Rental Timer BOC (page 447)** time elapsed.

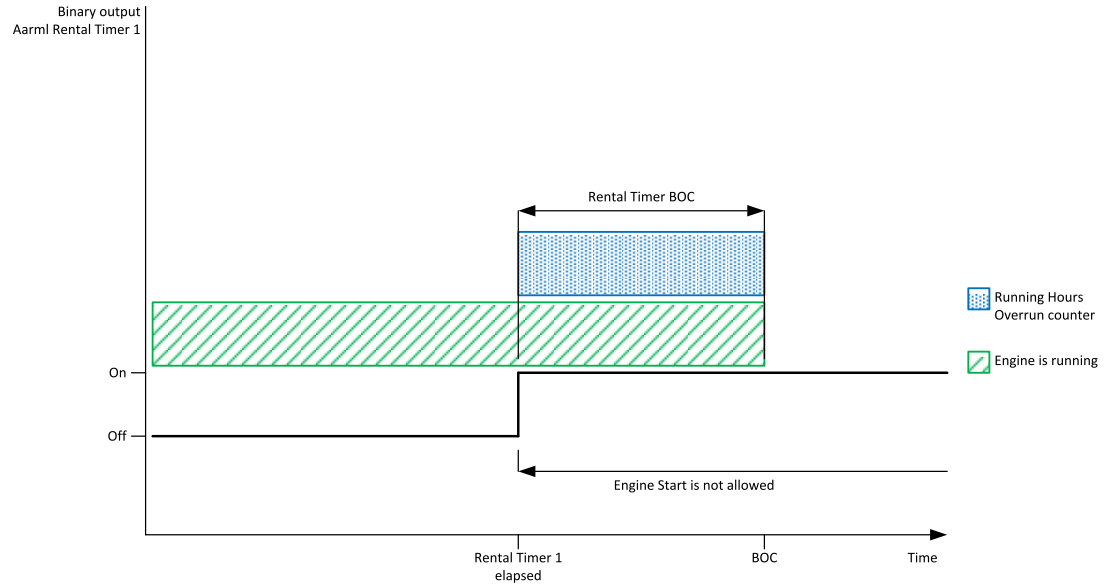



Image 8.65 Rental Timer 1

The Running Hours Overrun counter will start increment when the engine is continue running after the **Rental Timer 1 (page 443)** elapsed.

> ***Note:*** *There is no priority between Rental Timer 1 and Rental Timer 2. The sooner timer will activated the **Rental Timer BOC (page 447)** protection.*

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## Rental Timer 1 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **Range [units]** | Disabled / 1.. **Rental Timer 1 (page 443)** [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 443)** | | |
| **Description** | | | |

Alarm **Wrn Rental Timer 1 (page 807)** comes up after xx running hours from adjusting the **Rental Timer 1 (page 443)**. Hours are adjusted by this setpoint.

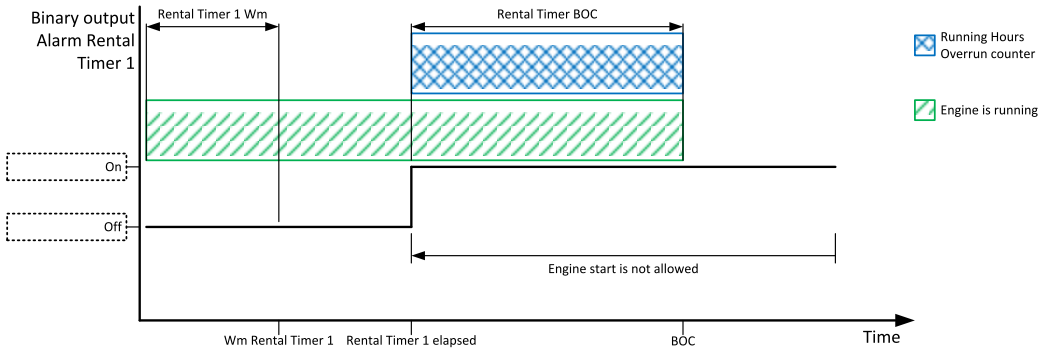



Image 8.66 Rental Timer 1 Wrn

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## Rental Timer 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 795)** will be recorded in alarm list and the binary output **AL RENTAL TIMER 2 (PAGE 687)** will close.

> **IMPORTANT: To reset Rental Timer 2 (page 445) we have to set up Rental Timer 2 (page 445) again. It means go to setpoint group Scheduler and to the setpoint Rental Timer 2 (page 445). Then press enter button ↵, change the value if it is necessary and press enter button ↵ again.**

> **IMPORTANT: To disable Rental Timer 2 (page 445) set date to 01/01/2015.**

When the **Rental Timer 2 (page 445)** elapsed during engine run the gen-set will not stop immediately. The adjustable **Rental Timer BOC (page 447)** timer will start in this moment. The engine will be cooled and stopped when the **Rental Timer BOC (page 447)** time elapsed.

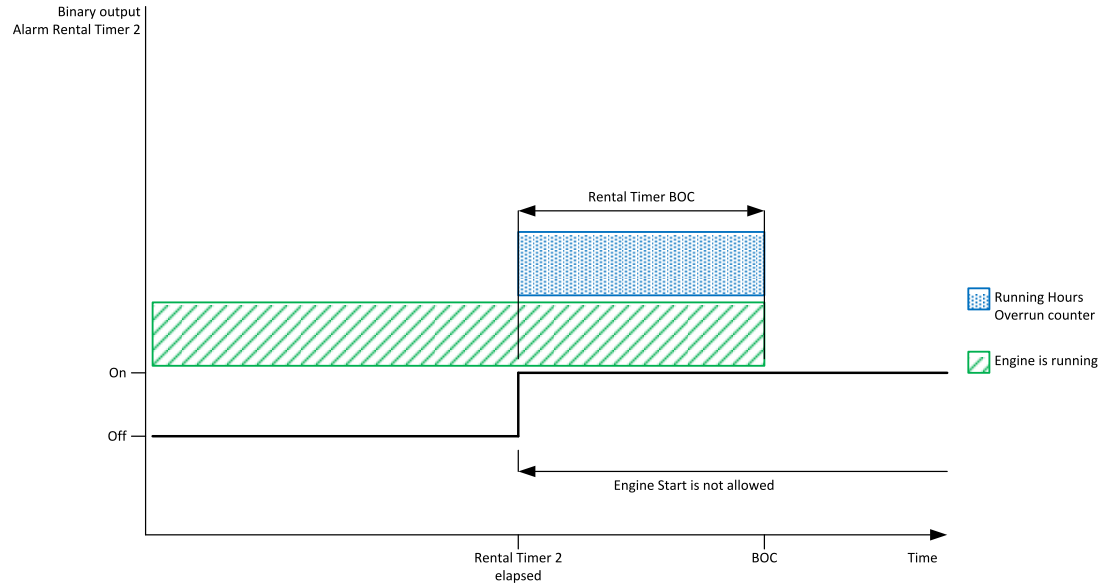



Image 8.67 Rental Timer 2

The Running Hours Overrun counter will start increment when the engine is continue running after the **Rental Timer 2 (page 445)** elapsed.

***Note:*** *There is no priority between Rental Timer 1 and Rental Timer 2. The sooner timer will activated the* ***Rental Timer BOC (page 447)*** *protection.*

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## Rental Timer 2 Wrn

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **Range [units]** | Disabled / 01/01/2015 .. **Rental Timer 2 (page 445)** [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 445)** | | |
| **Description** | | | |

Alarm **Wrn Rental Timer 2 (page 807)** comes up xx days before the **Rental Timer 2 (page 445)**. Days are adjusted by this setpoint.

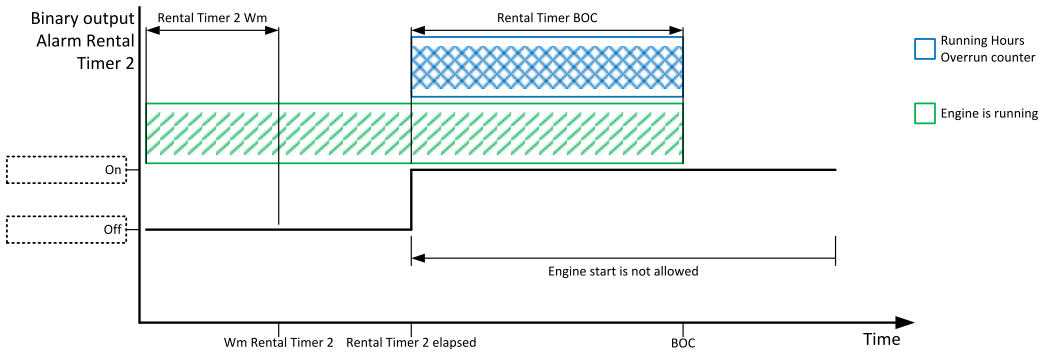



Image 8.68 Rental Timer 2 Wrn

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## Rental Timer BOC

| | | | |
|---|---|---|---|
| **Setpoint group** | Scheduler | **Related FW** | 1.5.0 |
| **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 443)** and **Rental Timer 2 (page 445)** | | |
| **Description** | | | |

This timer will start after **Rental Timer 1 (page 443)** or **Rental Timer 2 (page 445)** elapsed in case that the engine is still running. When this timer elapsed the engine is cooled and stopped.

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# Group: Geo-Fencing

## Home Latitude

| | | | |
|---|---|---|---|
| **Setpoint group** | Geo-Fencing | **Related FW** | 1.5.0 |
| **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 448)*** *are used for counting* ***Fence Radius 1 (page 449)*** *and* ***Fence Radius 2 (page 449)****.*

***Note:*** *This value can be also obtained automatically via logical binary input* ***GEO HOME POSITION (PAGE 660)****. In case of activation of this binary input for at least 2 seconds, setpoint will be adjusted automatically from actual coordinates from GPS signal.*

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## Home Longitude

| | | | |
|---|---|---|---|
| **Setpoint group** | Geo-Fencing | **Related FW** | 1.5.0 |
| **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 448)*** *are used for counting* ***Fence Radius 1 (page 449)*** *and* ***Fence Radius 2 (page 449)****.*

***Note:*** *This value can be also obtained automatically via logical binary input* ***GEO HOME POSITION (PAGE 660)****. In case of activation of this binary input for at least 2 seconds, setpoint will be adjusted automatically from actual coordinates from GPS signal.*

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## Fence Radius 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Geo-Fencing | **Related FW** | 1.5.0 |
| **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 451)** is activated after **Fence 1 Delay (page 449)**.<br>***Note:*** *The center of this circle area is defined by "Home" position - setpoints* ***Home Longitude (page 448)*** *and* ***Home Latitude (page 448)****.* | | | |

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## Fence Radius 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Geo-Fencing | **Related FW** | 1.5.0 |
| **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 452)** is activated after **Fence 2 Delay (page 450)**.<br>***Note:*** *The center of this circle area is defined by "Home" position - setpoints* ***Home Longitude (page 448)*** *and* ***Home Latitude (page 448)****.* | | | |

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## Fence 1 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Geo-Fencing | **Related FW** | 1.5.0 |
| **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 451)**. | | | |

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## Fence 2 Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | Geo-Fencing | **Related FW** | 1.5.0 |
| **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 452)**. | | | |

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## Geo-Fencing

| | | | |
|---|---|---|---|
| **Setpoint group** | Geo-Fencing | **Related FW** | 1.5.0 |
| **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 451)** and **Fence 2 Protection (page 452)** are disabled. |
| Enabled | **Fence 1 Protection (page 451)** and **Fence 2 Protection (page 452)** are enabled. |
| LBI Enable | **Fence 1 Protection (page 451)** and **Fence 2 Protection (page 452)** are enabled only when logical binary input .**GEO-FENCING ENABLED (PAGE 661)** is active. |

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## Fence 1 Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Geo-Fencing | **Related FW** | 1.5.0 |
| **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 449)**. Delay for protection is adjusted by setpoint **Fence 1 Delay (page 449)**.

### 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 449)**. |
| 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 449)**. |
| 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 449)**. |
| 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 449)**. |

***Note:*** *Protection is activated also when GPS signal is lost for* ***Fence 1 Delay (page 449)****.*

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## Fence 2 Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | Geo-Fencing | **Related FW** | 1.5.0 |
| **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 449)**. Delay for protection is adjusted by setpoint **Fence 2 Delay (page 450)**.

### 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 449)**. |
| 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 449)**. |
| 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 449)**. |
| 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 449)**. |

***Note:*** *Protection is activated also when GPS signal is lost for **Fence 2 Delay (page 450)**.*

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# Group: Plug-In Modules

## Slot A

| | | | |
|---|---|---|---|
| **Setpoint group** | Plug-In Modules | **Related FW** | 1.5.0 |
| **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.

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### Slot B

| | | | |
|---|---|---|---|
| **Setpoint group** | Plug-In Modules | **Related FW** | 1.5.0 |
| **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. | | | |

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## Group: Sensors Spec

### Subgroup: Analog Input 1

### Analog Input 1 CalibrationCU AIN1 Calibration

| | | | |
|---|---|---|---|
| **Setpoint group** | Sensors Spec | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | 0 (number of decimal is given by sensor curve) | **Alternative config** | NO |
| **Step** | the step is defined by 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.<br>***Note:*** *Unit is adjusted via InteliConfig in configuration of analog input 1.* | | | |

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## Subgroup: Analog Input 2

### Analog Input 2 CalibrationCU AIN2 Calibration

| | | | |
|---|---|---|---|
| **Setpoint group** | Sensors Spec | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | 0 (number of decimal is given by sensor curve) | **Alternative config** | NO |
| **Step** | the step is defined by 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.<br>***Note:*** *Unit is adjusted via InteliConfig in configuration of analog input 2.* | | | |

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## Subgroup: Analog Input 3

### Analog Input 3 CalibrationCU AIN3 Calibration

| | | | |
|---|---|---|---|
| **Setpoint group** | Sensors Spec | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | 0 (number of decimal is given by sensor curve) | **Alternative config** | NO |
| **Step** | the step is defined by 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.<br>***Note:*** *Unit is adjusted via InteliConfig in configuration of analog input 3.* | | | |

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### Subgroup: Analog Input 4

## Analog Input 4 CalibrationCU AIN4 Calibration

| | | | |
|---|---|---|---|
| **Setpoint group** | Sensors Spec | **Related FW** | 1.5.0 |
| **Range [units]** | the range is defined by analog sensor curve | | |
| **Default value** | 0 (number of decimal is given by sensor curve) | **Alternative config** | NO |
| **Step** | the step is defined by 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.<br>***Note:*** *Unit is adjusted via InteliConfig in configuration of analog input 4.* | | | |

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# Group: Alternate Config

### Subgroup: Basic settings

## Connection Type 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | Mono Phase / / SplitPhase / 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<br>1x CT (Current Transformer) |
| SplitPhase | Double Delta connection<br>Split Phase<br>Two phase voltage measurement L1,L2 with 180° phase shift<br>2x CT (Current Transformer) |
| 3Ph4Wire | Grounded Star (Grounded Wye) connection – 3PY<br>Three phase voltage measurement L1,L2,L3 with 120° phase shift<br>3x CT (Current Transformer) |
| 3Ph3Wire | Ungrounded Delta connection |

<table>
<tr><td></td><td>Open Delta<br>Ungrounded Wye<br>Corner-Grounded Delta<br>Split Phase Delta<br>Three phase voltage measurement L1,L2,L3 with 120° phase shift<br>No neutral is available 3x CT (Current Transformer)</td></tr>
<tr><td>High Leg D</td><td>High Leg Delta connection<br>Three phase voltage measurement L1,L2,L3<br>3x CT (Current Transformer)</td></tr>
<tr><td>Autodetect</td><td>High Leg Delta<br>L1 >=100V; L1 <=140V<br>L2 >=140V<br>L3 >=100V; L3 <=140V<br>or<br>3PH3Wire or 3Ph4Wire<br>L1 >=100V<br>L2 >=100V<br>L3 >=100V<br>or<br>SplitPhase<br>L1 >=100V<br>L2 <= 20V<br>L3 >=100V<br>or<br>Mono Phase<br>L1 >=100V<br>L2 <= 20V<br>L3 <= 20V<br>or<br>Voltage Autodetect shutdown</td></tr>
</table>

***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 634)*** *is active.*

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## Nominal Power 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 304)** protection is based on this setpoint.

***Note:*** *This setpoint is used when setpoint **Connection type (page 259)** 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.*

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## Nominal Power Split Phase 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 259)** | | |
| **Description** | | | |

Nominal power of the gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 304)** protection is based on this setpoint.

***Note:*** *This setpoint is used when setpoint **Connection type (page 259)** 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.*

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## Nominal Current 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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.*

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## Nominal Frequency 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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.*

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## Nominal RPM 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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.*

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## Nominal Voltage Ph-N 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 1 (page 455)**. | | |
| **Description** | | | |
| Nominal system voltage (phase to neutral).<br>***Note:*** *This value is used when any other alternate configuration is not active.* | | | |

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## Nominal Voltage Ph-Ph 1

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 455)**. | | |
| **Description** | | | |
| Nominal system voltage (phase to phase).<br>***Note:*** *This value is used when any other alternate configuration is not active.* | | | |

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## Connection type 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | Mono Phase / / SplitPhase / 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<br>1x CT (Current Transformer) |
| SplitPhase | Double Delta connection |

| | |
|---|---|
| | Split Phase<br>Two phase voltage measurement L1,L2 with 180° phase shift<br>2x CT (Current Transformer) |
| 3Ph4Wire | Grounded Star (Grounded Wye) connection – 3PY<br>Three phase voltage measurement L1,L2,L3 with 120° phase shift<br>3x CT (Current Transformer) |
| 3Ph3Wire | Ungrounded Delta connection<br>Open Delta<br>Ungrounded Wye<br>Corner-Grounded Delta<br>Split Phase Delta<br>Three phase voltage measurement L1,L2,L3 with 120° phase shift<br>No neutral is available 3x CT (Current Transformer) |
| High Leg D | High Leg Delta connection<br>Three phase voltage measurement L1,L2,L3<br>3x CT (Current Transformer) |
| Autodetect | High Leg Delta: L1 >=100V; L1 <=140V; L2 >=140V; L3 >=100V; L3 <=140V<br>or<br>3PH3Wire or 3Ph4Wire: L1 >=100V; L2 >=100V; L3 >=100V<br>or<br>SplitPhase: L1 >=100V; L2 <= 20V; L3 >=100V<br>or<br>Mono Phase: L1 >=100V; L2 <= 20V; L3 <= 20V<br>or<br>***Voltage Autodetect*** shutdown |

***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 634)*** *is active.*

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## Nominal Power 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 304)** protection is based on this setpoint.

***Note:*** *This setpoint is used when setpoint **Connection type (page 259)** 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 634)** is active.*

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## Nominal Power Split Phase 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 (page 259)** | | |
| **Description** | | | |

Nominal power of the gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 304)** protection is based on this setpoint.

***Note:*** *This setpoint is used when setpoint **Connection type (page 259)** 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 634)** is active.*

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## Nominal Current 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 634****) is active.*

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## Nominal Frequency 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 634****) is active.*

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## Nominal RPM 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 634****) is active.*

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## Nominal Voltage Ph-N 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 459)**. | | |
| **Description** | | | |
| Nominal system voltage (phase to neutral).<br>***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 634)*** *is active.* | | | |

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## Nominal Voltage Ph-Ph 2

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 459)**. | | |
| **Description** | | | |
| Nominal system voltage (phase to phase).<br>***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 2 (PAGE 634)*** *is active.* | | | |

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## Connection type 3

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **Range [units]** | Mono Phase / / SplitPhase / 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<br>1x CT (Current Transformer) |
| SplitPhase | Double Delta connection |

| | |
|---|---|
| | Split Phase<br>Two phase voltage measurement L1,L2 with 180° phase shift<br>2x CT (Current Transformer) |
| 3Ph4Wire | Grounded Star (Grounded Wye) connection – 3PY<br>Three phase voltage measurement L1,L2,L3 with 120° phase shift<br>3x CT (Current Transformer) |
| 3Ph3Wire | Ungrounded Delta connection<br>Open Delta<br>Ungrounded Wye<br>Corner-Grounded Delta<br>Split Phase Delta<br>Three phase voltage measurement L1,L2,L3 with 120° phase shift<br>No neutral is available 3x CT (Current Transformer) |
| High Leg D | High Leg Delta connection<br>Three phase voltage measurement L1,L2,L3<br>3x CT (Current Transformer) |
| Autodetect | High Leg Delta: L1 >=100V; L1 <=140V; L2 >=140V; L3 >=100V; L3 <=140V<br>or<br>3PH3Wire or 3Ph4Wire: L1 >=100V; L2 >=100V; L3 >=100V<br>or<br>SplitPhase: L1 >=100V; L2 <= 20V; L3 >=100V<br>or<br>Mono Phase: L1 >=100V; L2 <= 20V; L3 <= 20V<br>or<br>***Voltage Autodetect*** shutdown |

***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 634)*** *is active.*

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## Nominal Power 3

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 304)** protection is based on this setpoint.

***Note:*** *This setpoint is used when setpoint **Connection type (page 259)** 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 634)** is active.*

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## Nominal Power Split Phase 3

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 (page 259)** | | |
| **Description** | | | |

Nominal power of the gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 304)** protection is based on this setpoint.

***Note:*** *This setpoint is used when setpoint **Connection type (page 259)** 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 634)** is active.*

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## Nominal Current 3

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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.<br>***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 634)*** *is active.* | | | |

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## Nominal Frequency 3

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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).<br>***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 634)*** *is active.* | | | |

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## Nominal RPM 3

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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).<br>***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 634)*** *is active.* | | | |

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## Nominal Voltage Ph-N 3

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 463)**. | | |
| **Description** | | | |
| Nominal system voltage (phase to neutral).<br>***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 634)*** *is active.* | | | |

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## Nominal Voltage Ph-Ph 3

| | | | |
|---|---|---|---|
| **Setpoint group** | Basic settings | **Related FW** | 1.5.0 |
| **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 463)**. | | |
| **Description** | | | |
| Nominal system voltage (phase to phase).<br>***Note:*** *This value is used when binary input* ***ALTERNATE CONFIG 3 (PAGE 634)*** *is active.* | | | |

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# Group: CM-RS232-485

## COM1 Mode

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-RS232-485 | **Related FW** | 1.5.0 |
| **Range [units]** | Direct / MODBUS [-] | | |
| **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.<br>Direct — InteliConfig communication protocol via serial cable.<br>MODBUS — MODBUS protocol. | | | |

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## COM1 Communication Speed

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-RS232-485 | **Related FW** | 1.5.0 |
| **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 468)** | | |
| **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.<br>***Note:*** *Winscope supports only 19200, 38400, 57600 speeds.* | | | |

List of setpoints (page 237)

## COM1 MODBUS Communication Speed

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-RS232-485 | **Related FW** | 1.5.0 |
| **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 468)** | | |
| **Description** | | | |
| If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here. | | | |

**List of setpoints (page 237)**

## COM2 Mode

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-RS232-485 | **Related FW** | 1.5.0 |
| **Range [units]** | Direct / MODBUS [-] | | |
| **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.<br>Direct — InteliConfig communication protocol via serial cable.<br>MODBUS — MODBUS protocol. | | | |

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## COM2 Communication Speed

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-RS232-485 | **Related FW** | 1.5.0 |
| **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 469)** | | |
| **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.<br>***Note:*** *Winscope supports only 19200, 38400, 57600 speeds.* | | | |

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## COM2 MODBUS Communication Speed

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-RS232-485 | **Related FW** | 1.5.0 |
| **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 469)** | | |
| **Description** | | | |
| If the MODBUS mode is selected on COM2 channel, the MODBUS communication speed can be adjusted here. | | | |

List of setpoints (page 237)

# Group: CM-GPRS

## Mode

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 483)** 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.**

List of setpoints (page 237)

## APN Name

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **Range [units]** | 0..31 characters [-] | | |
| **Default value** | [-] | **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 482)** | | |
| **Description** | | | |
| APN (Access Point Name) of the GPRS/4G network, provided by GSM operator. | | | |

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## APN User Name

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** | | |
| **Description** | | | |
| User name for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank. | | | |

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## APN User Password

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** | | |
| **Description** | | | |
| User password for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank. | | | |

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## Email Address 1

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Email Address 2

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Email Address 3

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Email Address 4

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Message Language

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **Range [units]** | [-] | | |
| **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.<br>***Note:*** *Numbers correspond with languages in language list. See the chapter for* ***Language selection (page 93)*** *more information.*<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## SMTP User Name

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **Range [units]** | 0..31 characters [-] | | |
| **Default value** | [-] | **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 482)** | | |
| **Description** | | | |
| Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication. | | | |

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## SMTP User Password

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **Range [units]** | 0..15 characters [-] | | |
| **Default value** | [-] | **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 482)** | | |
| **Description** | | | |
| Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication. | | | |

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## SMTP Server Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** | | |
| **Description** | | | |

This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information.

> ***Note:*** *You may use also any public SMTP server which does not require connection over SSL/TLS channels. If the device is connected to AirGate the AirGate SMTP server at "airgate.comap.cz" may be used. Ports 25 and 9925 are supported. After controller connects to AirGate for the first time (or with new public IP address), it may not be able to send emails for first 5-10 minutes.*

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## SMTP Sender Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** (CM-GPRS module) | | |
| **Description** | | | |

Enter an existing email address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller.

> ***Note:*** *It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.*

> **IMPORTANT: This item is obligatory when emails are configured.**

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## Time Zone

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.*

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## Event Message

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## Wrn Message

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## BOC Message

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## Sd Messages

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## Telephone Number 1

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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.<br>**IMPORTANT: Telephone number has to be entered without spaces.** | | | |

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## Telephone Number 2

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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.**

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## Telephone Number 3

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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.**

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## Telephone Number 4

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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.<br>**IMPORTANT: Telephone number has to be entered without spaces.** | | | |

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## DNS IP Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** | | |
| **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. | | | |

List of setpoints (page 237)

## AirGate Connection

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** | | |
| **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 507)**. |

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

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## AirGate Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (CM-GPRS module) | | |
| **Description** | | | |

This setpoint is used for entering the domain name or IP address of the AirGate server. Use the free AirGate server provided by ComAp at airgate.comap.cz.

> ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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## ComAp TCP Port

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.*

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# Group: CM-4G-GPS

## Mode

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 483)** has to be adjusted. |
| SMS Only | Only SMS are sent. Internet-enabled SIM card is not required. |

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

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## Required Connection Type

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-4G-GPS | **Related FW** | 1.5.0 |
| **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. | | | |

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## APN Name

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **Range [units]** | 0..31 characters [-] | | |
| **Default value** | [-] | **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 482)** | | |
| **Description** | | | |
| APN (Access Point Name) of the GPRS/4G network, provided by GSM operator. | | | |

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## APN User Name

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** | | |
| **Description** | | | |
| User name for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank. | | | |

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## APN User Password

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** | | |
| **Description** | | | |
| User password for the GPRS/4G Access Point if authentication is required. But mostly it is not required and should be left blank. | | | |

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## Email Address 1

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Email Address 2

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Email Address 3

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Email Address 4

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Message Language

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **Range [units]** | [-] | | |
| **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.<br>***Note:*** *Numbers correspond with languages in language list. See the chapter for* ***Language selection (page 93)*** *more information.*<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## SMTP User Name

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **Range [units]** | 0..31 characters [-] | | |
| **Default value** | [-] | **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 482)** | | |
| **Description** | | | |
| Use this setpoint to enter the username for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication. | | | |

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## SMTP User Password

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **Range [units]** | 0..15 characters [-] | | |
| **Default value** | [-] | **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 482)** | | |
| **Description** | | | |
| Use this setpoint to enter the password for the SMTP server. Leave the setpoint blank if the SMTP server does not require authentication. | | | |

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## SMTP Server Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** | | |
| **Description** | | | |

This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information.

> ***Note:*** *You may use also any public SMTP server which does not require connection over SSL/TLS channels. If the device is connected to AirGate the AirGate SMTP server at "airgate.comap.cz" may be used. Ports 25 and 9925 are supported. After controller connects to AirGate for the first time (or with new public IP address), it may not be able to send emails for first 5-10 minutes.*

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## SMTP Sender Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** (CM-GPRS module) | | |
| **Description** | | | |

Enter an existing email address into this setpoint. This address will be used as sender address in active e-mails that will be sent from the controller.

> ***Note:*** *It is not needed to enter an existing email address, nevertheless valid email format needs to be followed.*

> **IMPORTANT: This item is obligatory when emails are configured.**

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## Time Zone

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.*

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## Event Message

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.

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## Wrn Message

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## BOC Message

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## Sd Messages

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## Telephone Number 1

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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.**

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## Telephone Number 2

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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.**

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## Telephone Number 3

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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.<br>**IMPORTANT: Telephone number has to be entered without spaces.** | | | |

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## Telephone Number 4

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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.<br>**IMPORTANT: Telephone number has to be entered without spaces.** | | | |

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## AirGate Connection

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS | **Related FW** | 1.5.0 |
| **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 482)** | | |
| **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 507)**. |

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

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## AirGate Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (CM-GPRS module) | | |
| **Description** | | | |

This setpoint is used for entering the domain name or IP address of the AirGate server. Use the free AirGate server provided by ComAp at airgate.comap.cz.

> ***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.*

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## ComAp TCP Port

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.*

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# Group: CM-Ethernet

## Email Address 1

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.*

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## Email Address 2

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Email Address 3

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Email Address 4

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Message Language

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **Range [units]** | [-] | | |
| **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.<br>***Note:*** *Numbers correspond with languages in language list. See the chapter for* ***Language selection (page 93)*** *more information.*<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## Time Zone

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>***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.*<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Event Message

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## Wrn Message

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## BOC Message

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## Sd Messages

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules. | | | |

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## SMTP UserName

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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. | | | |

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## SMTP User Password

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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. | | | |

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## SMTP Server Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **Range [units]** | 0..31 characters [-] | | |
| **Default value** | airgate.comap.cz:9925 | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 24368 | **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.*

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## SMTP Sender Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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.**

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## IP Address Mode

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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.

DISABLED: The Ethernet connection is fixed by means of the setpoints IP Addr, NetMask, GateIP, DNS IP Address.

This method should be used for a classic Ethernet or internet connection. When this type of connection opens, the controller is specified by its IP address. This means that it would be inconvenient if the IP address were not fixed (static).

ENABLED: The Ethernet connection setting is obtained **automatically from the DHCP server**. The obtained settings are then copied to the related setpoints. If the process of obtaining the settings from the DHCP server is not successful, the value *000.000.000.000* is copied to the setpoint IP address and the module continues to try to obtain the settings.

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## IP Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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 501)** | | |
| **Description** | | | |

The setpoint is used to set the address when you are in static mode.

If **IP Address Mode (page 501)** 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 501)** is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server.

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## Subnet Mask

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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 501)** | | |
| **Description** | | | |
| The setpoint is used to select the method how the Subnet Mask is adjusted.<br>If **IP Address Mode (page 501)** is FIXED this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting.<br>If **IP Address Mode (page 501)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server. | | | |

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## Gateway IP

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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 501)** | | |
| **Description** | | | |
| The setpoint is used to select the method how the Gateway IP is adjusted.<br>If **IP Address Mode (page 501)** is DISABLE this setpoint is used to adjust the IP address of the gateway of the network segment where the controller is connected.<br>If **IP Address Mode (page 501)** is ENABLED this setpoint is used to display the gateway IP address which has been assigned by the DHCP server.<br>A gateway is a device which connects the respective segment with the other segments and/or Internet. | | | |

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## DNS IP Address 1

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>If **IP Address Mode (page 501)** 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.<br>If **IP Address Mode (page 501)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server. | | | |

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## DNS IP Address 2

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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.<br>If **IP Address Mode (page 501)** 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.<br>If **IP Address Mode (page 501)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server. | | | |

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## MODBUS Server

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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. | | | |

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## SNMP Trap Format

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **Range [units]** | SNMPv1 Trap / SNMPv2 Not / SNMPv2 Inf [-] | | |
| **Default value** | SNMP v1 Trap | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 24136 | **Related applications** | AMF, MRS MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Only if relevant module is installed | | |
| **Description** | | | |
| This setpoint adjusts type of SNMP traps. | | | |

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## SNMP Agent

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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. | | | |

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## SNMP RD Community String

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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 504)** | | |
| **Description** | | | |
| SNMP Community String only for reading. | | | |

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## SNMP WR Community String

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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 504)** | | |
| **Description** | | | |
| SNMP Community String for writing and reading. | | | |

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## SNMP Traps IP Address 1

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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. | | | |

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## SNMP Traps IP Address 2

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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. | | | |

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## AirGate Connection

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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 507)**. Also the standard TCP/IP is enabled. |

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## AirGate Address

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (CM-GPRS module) | | |
| **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.<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## ComAp TCP Port

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-GPRS; CM-4G-GPS; CM-Ethernet | **Related FW** | 1.5.0 |
| **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 482)** (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.<br>**IMPORTANT: If AirGate is used, this setpoint has to be adjusted to 23.**<br>***Note:*** *This setpoint is common for CM-Ethernet, CM-GPRS and CM-4G-GPS modules.* | | | |

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## Web Interface

| | | | |
|---|---|---|---|
| **Setpoint group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **Range [units]** | Disabled / Enabled [-] | | |
| **Default value** | Disabled | **Alternative config** | NO |
| **Step** | [-] | | |
| **Comm object** | 24110 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 501)** | | |
| **Description** | | | |
| The setpoint is used to enable/disable WebServer function. | | | |

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# Group: EM-BIO8-EFCP

## Earth Fault Current Protection

| | | | |
|---|---|---|---|
| **Setpoint group** | EM-BIO8-EFCP | **Related FW** | 1.5.0 |
| **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 509)**, **Earth Fault CT Ratio (page 509)**, **Earth Fault Delay (page 509)** and **Earth Fault Sd (page 510)**. |

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## Earth Fault Delay

| | | | |
|---|---|---|---|
| **Setpoint group** | EM-BIO8-EFCP | **Related FW** | 1.5.0 |
| **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. | | | |

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## Earth Fault CT Input Range

| | | | |
|---|---|---|---|
| **Setpoint group** | EM-BIO8-EFCP | **Related FW** | 1.5.0 |
| **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 508)**. Value of this setpoint has to be set on value of physical input which is presently in use. | | | |

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## Earth Fault CT Ratio

| | | | |
|---|---|---|---|
| **Setpoint group** | EM-BIO8-EFCP | **Related FW** | 1.5.0 |
| **Range [units]** | 1 .. 2000 [1/(1or5)A] | | |
| **Default value** | 500 1/(1or5)A | **Alternative config** | NO |
| **Step** | 1A/1A; 1A/5A | | |
| **Comm object** | 14339 | **Related applications** | MINT, SPtM |
| **Config level** | Standard | | |
| **Setpoint visibility** | Only if relevant module is installed | | |
| **Description** | | | |
| Earth Fault current transformer ratio.<br>***Note:*** *Type of units depends on setpoint* ***Earth Fault CT Input Range (page 509)*** *which have to be set before this setpoint.* | | | |

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## Earth Fault Sd

| | | | |
|---|---|---|---|
| **Setpoint group** | EM-BIO8-EFCP | **Related FW** | 1.5.0 |
| **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. | | | |

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# Group: PLC

## PLC Setpoint 1

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

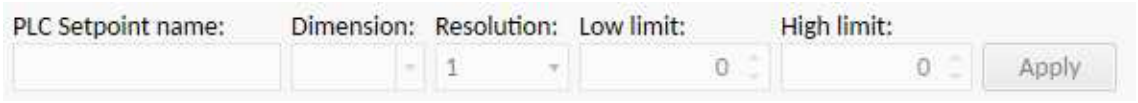



Image 8.69 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 2

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

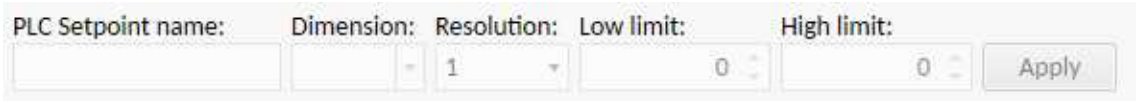



Image 8.70 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 3

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

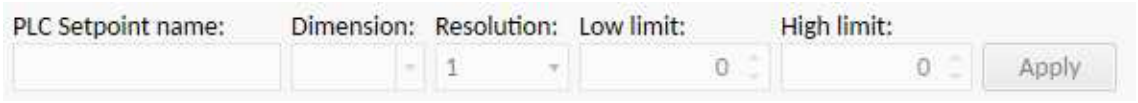



Image 8.71 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 4

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

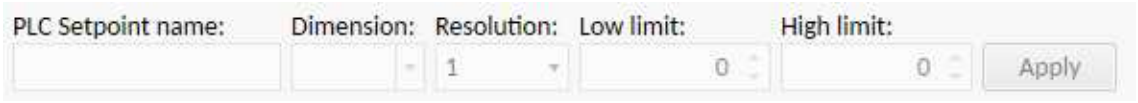



Image 8.72 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 5

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

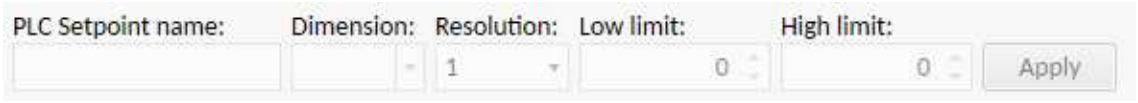



Image 8.73 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 6

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

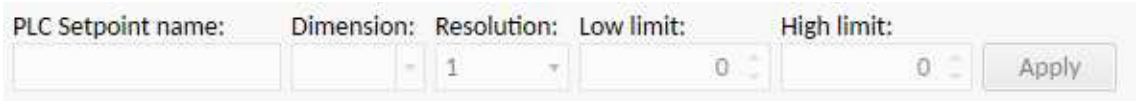



Image 8.74 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 7

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

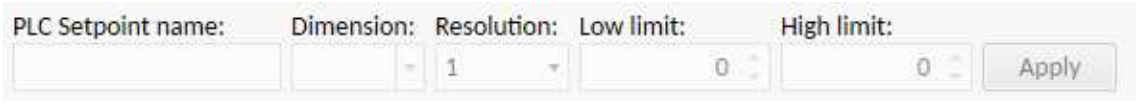



Image 8.75 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 8

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

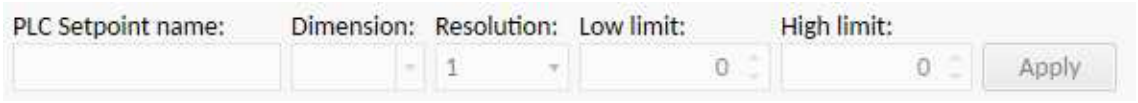



Image 8.76 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 9

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

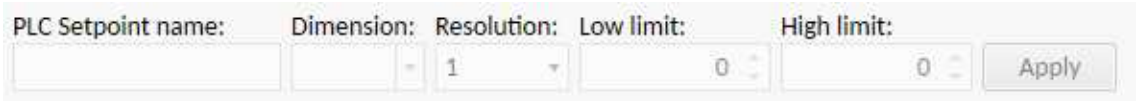



Image 8.77 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 10

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

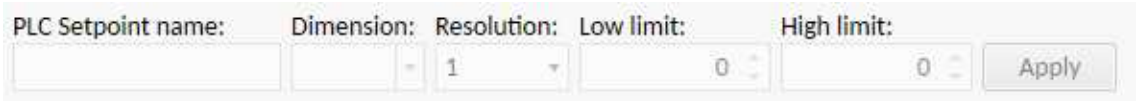



Image 8.78 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 11

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

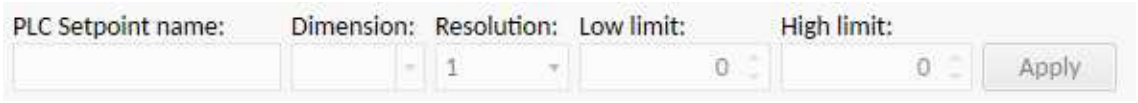



Image 8.79 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 12

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

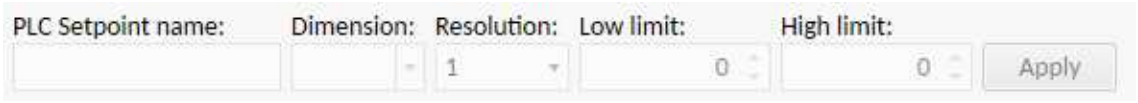



Image 8.80 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 13

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

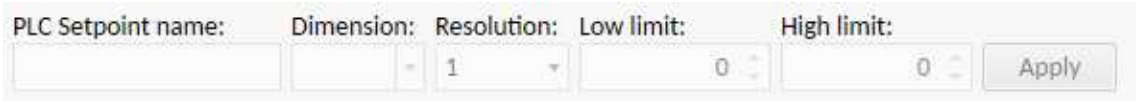



Image 8.81 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 14

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

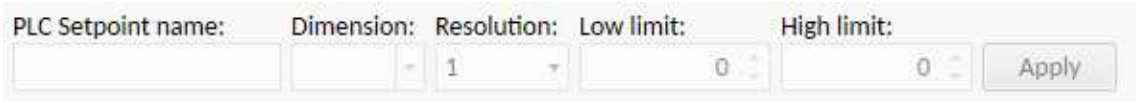



Image 8.82 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 15

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

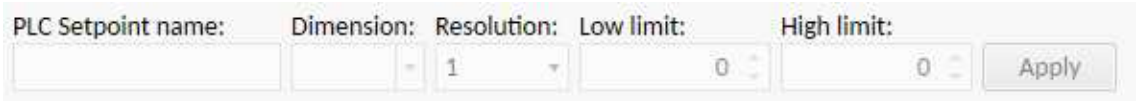



Image 8.83 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 16

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

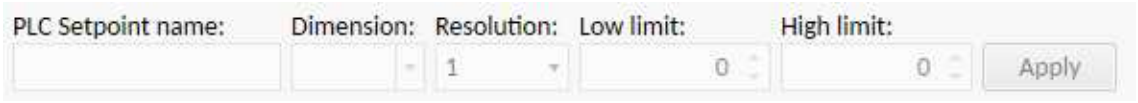



Image 8.84 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 17

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

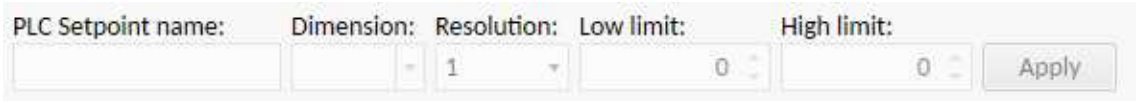



Image 8.85 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 18

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

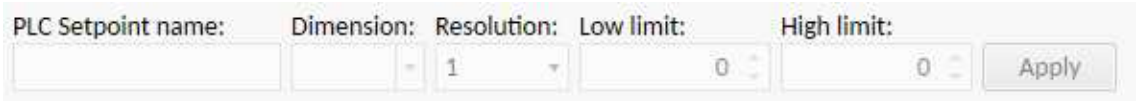



Image 8.86 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 19

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

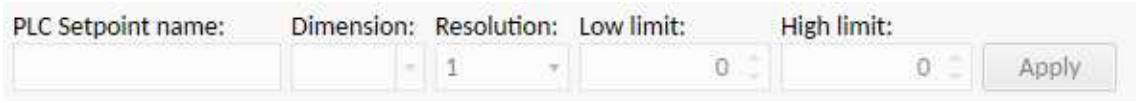



Image 8.87 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 20

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

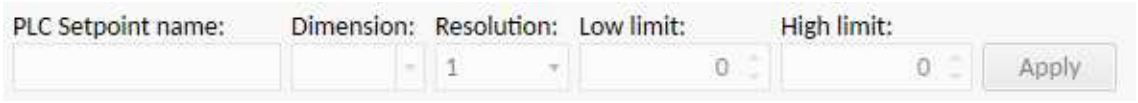



Image 8.88 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 21

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

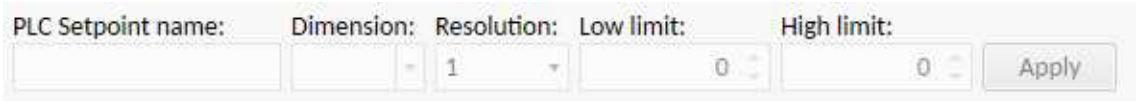



Image 8.89 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 22

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

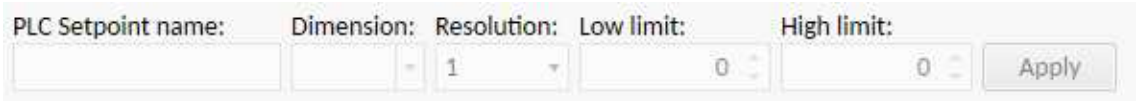



Image 8.90 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 23

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

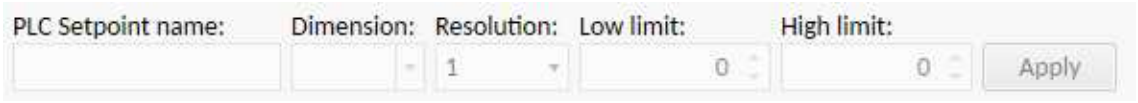



Image 8.91 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 24

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

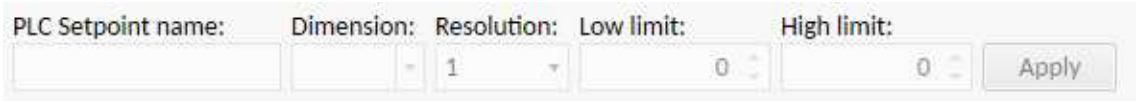



Image 8.92 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 25

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

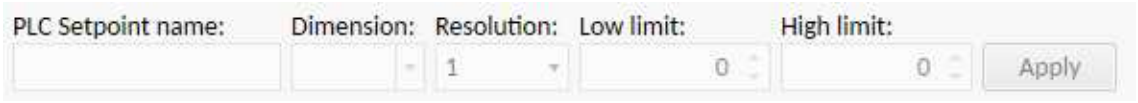



Image 8.93 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 26

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

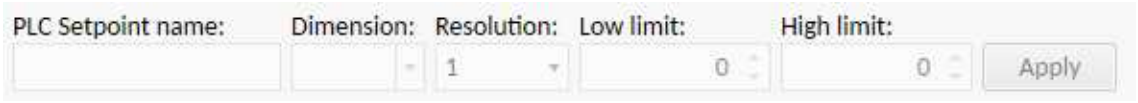



Image 8.94 Screen of configuration from InteliConfig

| | |
|---|---|
| PLC Setpoint name | Name of the setpoint (0..32 characters) |
| Dimension | Dimension of value of the setpoint. |
| Resolution | Resolution of the value of the setpoint. Resolution adjust number of decimal places in low and high limit. |
| Low limit | The lowest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |
| High limit | The highest value of setpoint. Digit place of this value can be decrease or increase by resolution of setpoint. |

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## PLC Setpoint 27

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

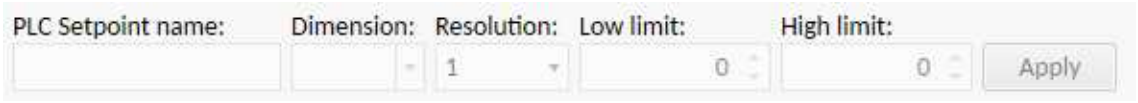



Image 8.95 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 28

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

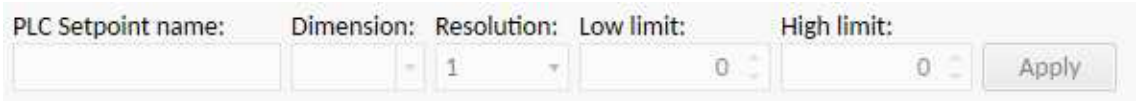



Image 8.96 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 29

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

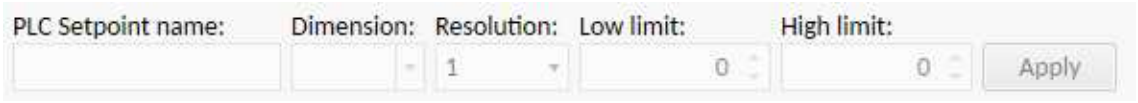



Image 8.97 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 30

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

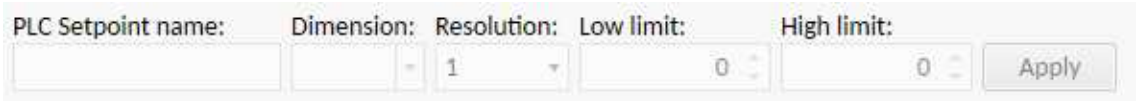



Image 8.98 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 31

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

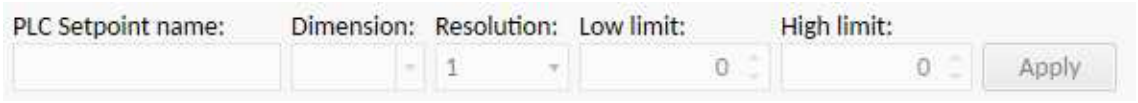



Image 8.99 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 32

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

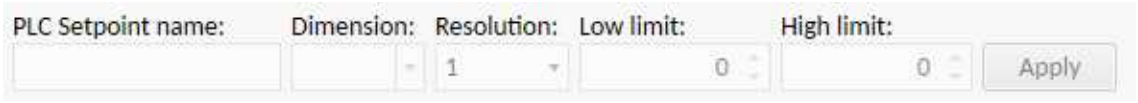



Image 8.100 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 33

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

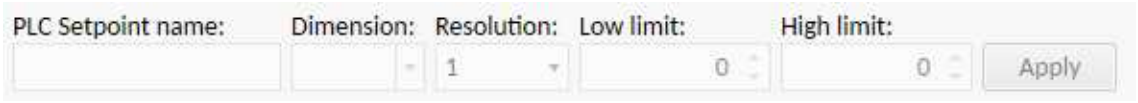



Image 8.101 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 34

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

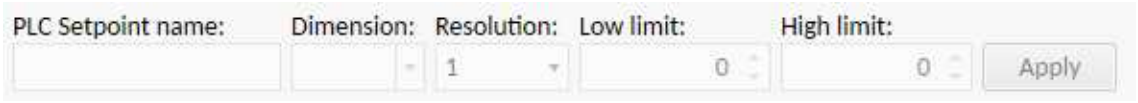



Image 8.102 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 35

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

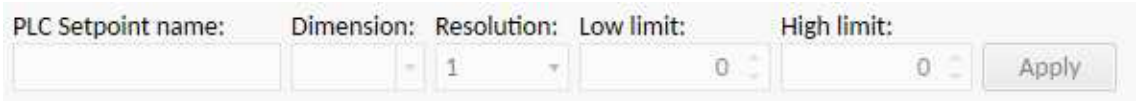



Image 8.103 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 36

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

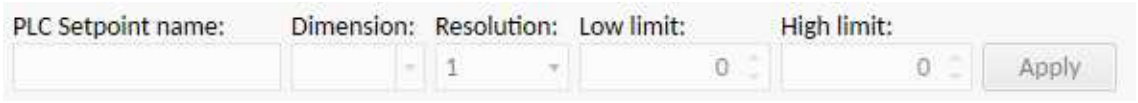



Image 8.104 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 37

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

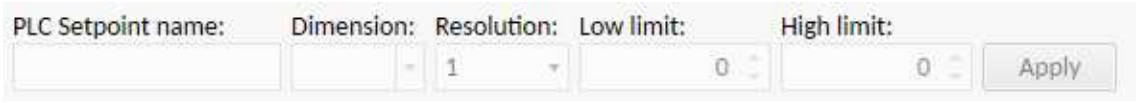



Image 8.105 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 38

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

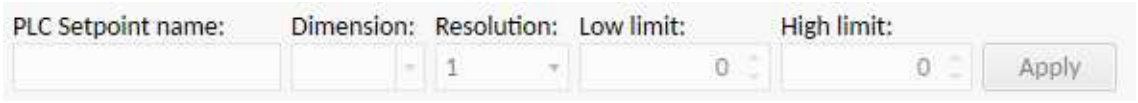



Image 8.106 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 39

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

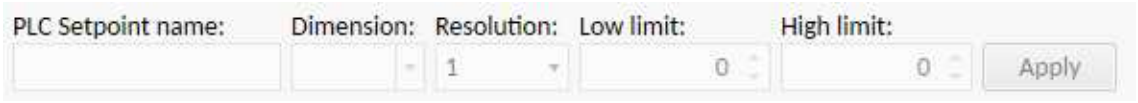



Image 8.107 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 40

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

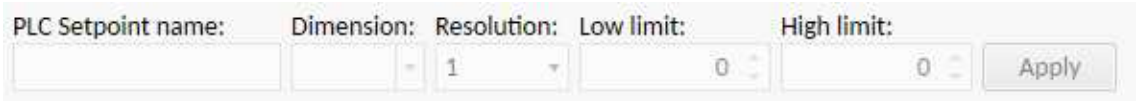



Image 8.108 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 41

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

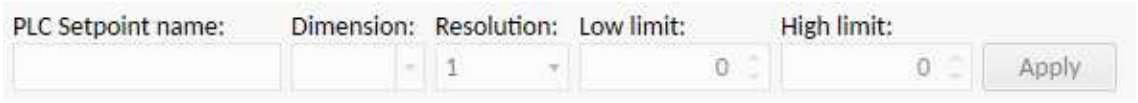



Image 8.109 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 42

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

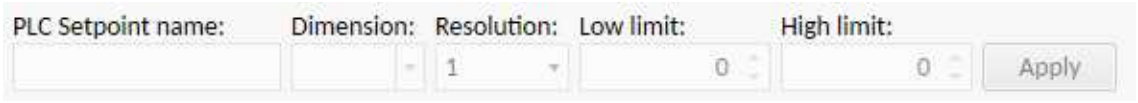



Image 8.110 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 43

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

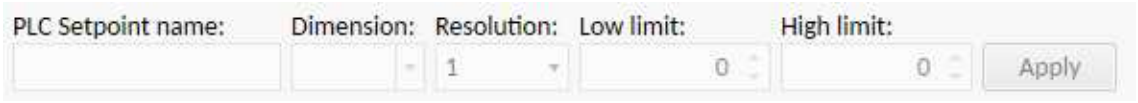



Image 8.111 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 44

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

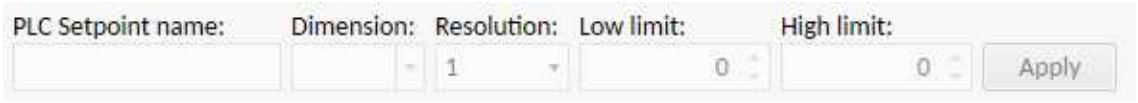



Image 8.112 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 45

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

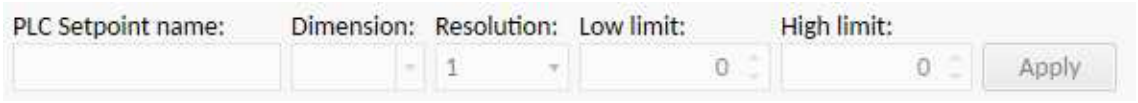



Image 8.113 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 46

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

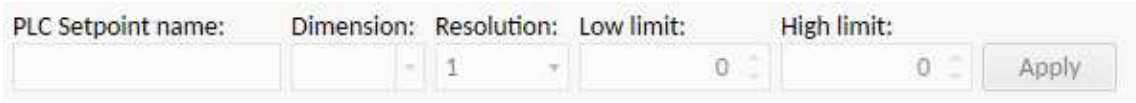



Image 8.114 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 47

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

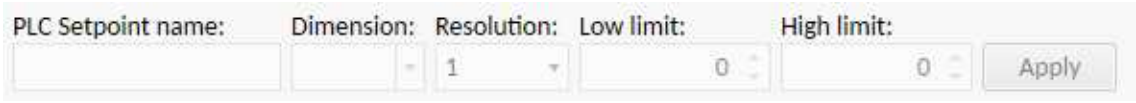



Image 8.115 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 48

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

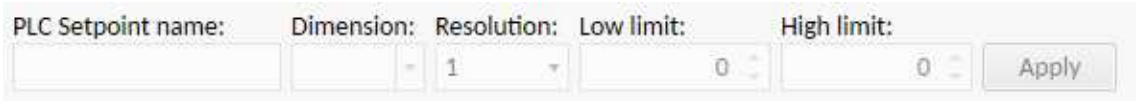



Image 8.116 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 49

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

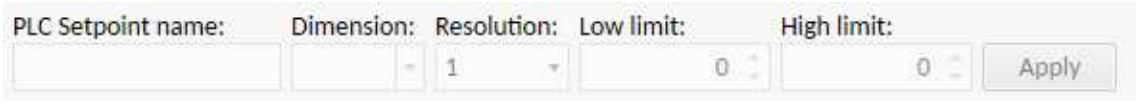



Image 8.117 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 50

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

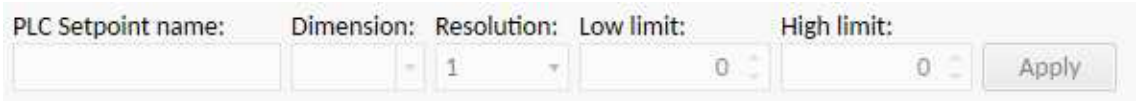



Image 8.118 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 51

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

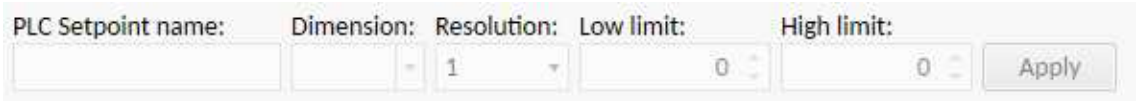



Image 8.119 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 52

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

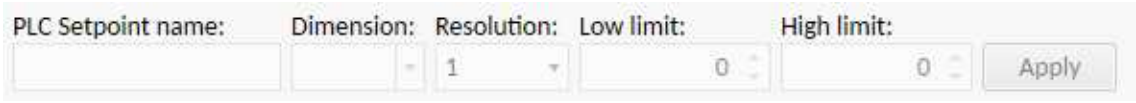



Image 8.120 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 53

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

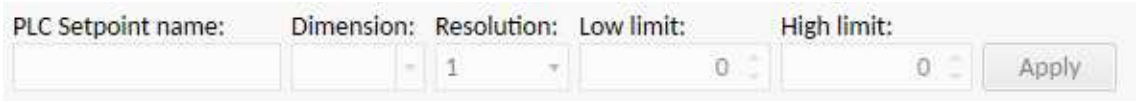



Image 8.121 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 54

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

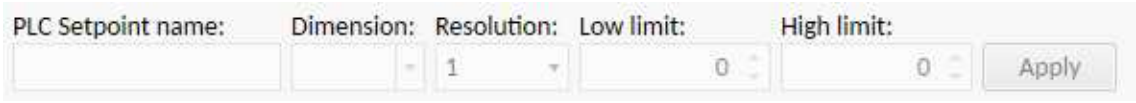



Image 8.122 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 55

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

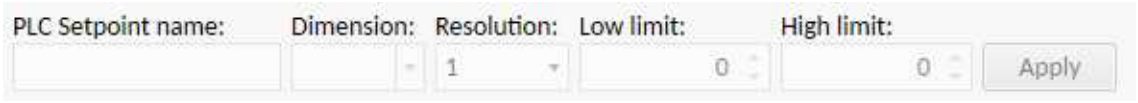



Image 8.123 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 56

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

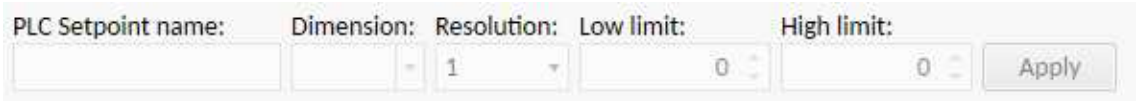



Image 8.124 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 57

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

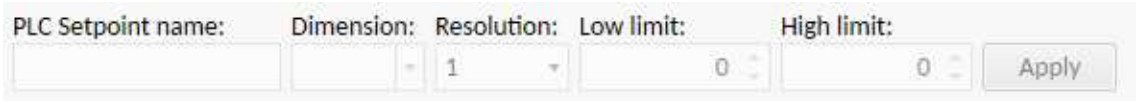



Image 8.125 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 58

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

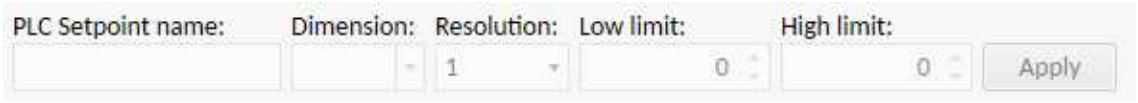



Image 8.126 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 59

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

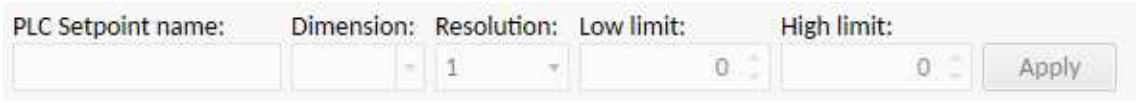



Image 8.127 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 60

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

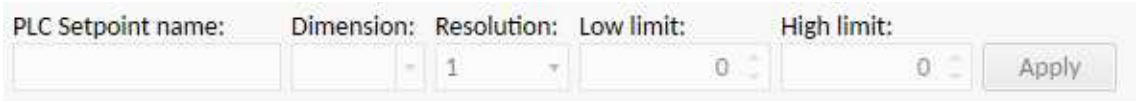



Image 8.128 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 61

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

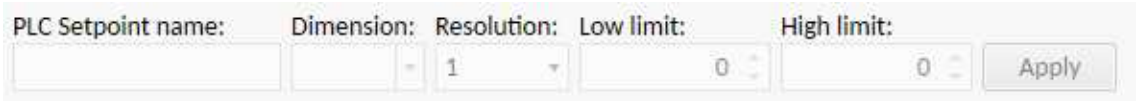



Image 8.129 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 62

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

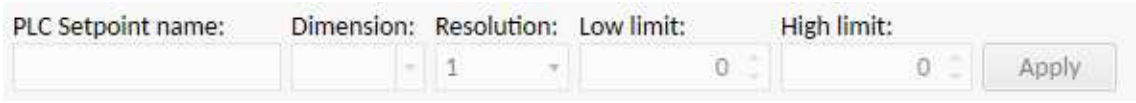



Image 8.130 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 63

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

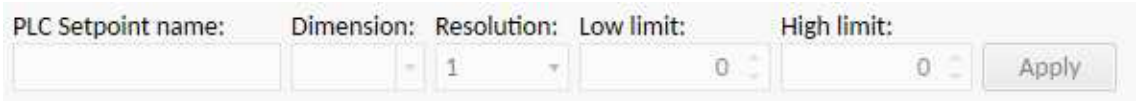



Image 8.131 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## PLC Setpoint 64

| | | | |
|---|---|---|---|
| **Setpoint group** | PLC | **Related FW** | 1.5.0 |
| **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

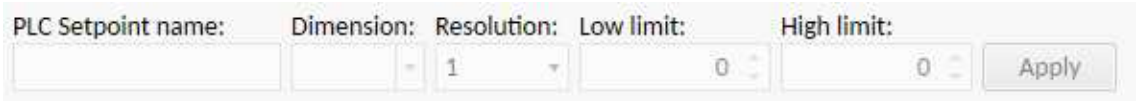



Image 8.132 Screen of configuration from InteliConfig

| | |
|---|---|
| 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. |

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## 8.1.2 Values

**What values are:**

Values (or quantities) are analog or binary data objects, measured or computed by the controller, that are intended for reading from the controller screen, PC, MODBUS, etc. Values are organized into groups according to their meaning.

### Invalid flag

If valid data is not available for a particular value, the invalid flag is set to it. This situation may be due to the following:

- The value is not being evaluated in the scope of the current application and configuration.
- Sensor fail has been detected on an analog input.
- The 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 groups


Group: Engine ..... 578
Group: Generator ..... 582
Group: Load ..... 591
Group: Mains/Bus ..... 592
Group: Power Management ..... 594
Group: Speed/Load Control ..... 598
Group: Voltage/PF Control ..... 599
Group: Controler I/O ..... 599
Group: Statistics ..... 601
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Group: CM-GPRS ..... 613
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Group: Date/Time ..... 627
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For full list of setpoints go to the chapter **List of values (page 575)**.

# List of values


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Maintenance 4 603
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Log Bout 7 612
Log Bout 8 612
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Log Bout 10 613
Log Bout 11 613

## Date/Time

Time 627
Date 627

## Plug-In I/O

EM BIO A 627
EM BIO B 628

## Log Bout

Log Bout 1 611
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Log Bout 9 613
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## Date/Time

Time ..... 627
Date ..... 627

## Plug-In I/O

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PLC-BOUT 3 ..... 630
PLC-BOUT 4 ..... 630
PLC-BOUT 5 ..... 630
PLC-BOUT 6 ..... 630
PLC-BOUT 7 ..... 631

# Group: Engine

## DEF Level

| | | | |
|---|---|---|---|
| **Value group** | Engine | **Related FW** | 1.5.0 |
| **Units** | % | | |
| **Comm object** | 14522 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| The level of diesel exhaust fluid tank. | | | |

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## DPFAshLoad

| | | | |
|---|---|---|---|
| **Value group** | Engine | **Related FW** | 1.5.0 |
| **Units** | % | | |
| **Comm object** | 12483 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| The rate of ash in DPF (Diesel particulate filter). | | | |

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## DPFSootLoad

| | | | |
|---|---|---|---|
| **Value group** | Engine | **Related FW** | 1.5.0 |
| **Units** | % | | |
| **Comm object** | 12484 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| The rate of soot in DPF (Diesel particulate filter). | | | |

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## ECU-BIN 1

| | | | |
|---|---|---|---|
| **Value group** | Engine | **Related FW** | 1.5.0 |
| **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.<br>***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.* | | | |

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## ECU-BIN 2

| Value group | Engine | Related FW | 1.5.0 |
|---|---|---|---|
| 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.<br>***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.* | | | |

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## ECU-BIN 3

| Value group | Engine | Related FW | 1.5.0 |
|---|---|---|---|
| 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.<br>***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.* | | | |

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## ECU-BIN 4

| Value group | Engine | Related FW | 1.5.0 |
|---|---|---|---|
| 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.<br>***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.* | | | |

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## ECU-BIN 5

| Value group | Engine | Related FW | 1.5.0 |
|---|---|---|---|
| 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.<br>***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.* | | | |

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## ECU-BIN 6

| | | | |
|---|---|---|---|
| **Value group** | Engine | **Related FW** | 1.5.0 |
| **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.<br>***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.* | | | |

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## ECU-BIN 7

| | | | |
|---|---|---|---|
| **Value group** | Engine | **Related FW** | 1.5.0 |
| **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.<br>***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.* | | | |

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## ECU-BIN 8

| | | | |
|---|---|---|---|
| **Value group** | Engine | **Related FW** | 1.5.0 |
| **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.<br>***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.* | | | |

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## ECU-BIN 9

| | | | |
|---|---|---|---|
| **Value group** | Engine | **Related FW** | 1.5.0 |
| **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.<br>***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.* | | | |

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## ECU-BIN-EXT-1

| Value group | Engine | Related FW | 1.5.0 |
|---|---|---|---|
| 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.<br>***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.* | | | |

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## ECU Frequency Select

| Value group | Engine | Related FW | 1.5.0 |
|---|---|---|---|
| Units | - | | |
| Comm object | 12926 | Related applications | MINT, SPtM |
| Description | | | |
| Shows selected frequency of ECU. The value is calculated from setpoint **Nominal Frequency (page 262)**<br>▶ If is **Nominal Frequency (page 262)** in range from 45 Hz to 54 Hz, is considered as 50 Hz application. The value is set to 0.<br>▶ If is **Nominal Frequency (page 262)** in range from 55 Hz to 65 Hz, is considered as 60 Hz application. The value is set to 1. | | | |

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## ECU State

| Value group | Engine | Related FW | 1.5.0 |
|---|---|---|---|
| Units | - | | |
| Comm object | 10034 | Related applications | MINT, SPtM |
| Description | | | |
| Shows binary status (0 or 1) of ECU:<br>▶ ECU Yellow Lamp<br>▶ ECU Red Lamp<br>▶ Wait To Start | | | |

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## RPM

| Value group | Engine | Related FW | 1.5.0 |
|---|---|---|---|
| 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:<br>▶ ECU, if an ECU is configured<br>▶ Pickup input<br>▶ Generator frequency | | | |

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## Speed Required RPM

| Value group | Engine | Related FW | 1.5.0 |
|---|---|---|---|
| Units | RPM | | |
| Comm object | 10006 | Related applications | MINT, SPtM |
| Description | | | |
| Requested engine speed. | | | |

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# Group: Generator

## Generator kW

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kW | | |
| Comm object | 8202 | Related applications | MINT, SPtM |
| Description | | | |
| Generator active power.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Generator kW L1

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kW | | |
| Comm object | 8524 | Related applications | MINT, SPtM |
| Description | | | |
| Generator active power in phase L1.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Generator kW L2

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kW | | |
| Comm object | 8525 | Related applications | MINT, SPtM |
| Description | | | |
| Generator active power in phase L2.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Generator kW L3

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kW | | |
| Comm object | 8526 | Related applications | MINT, SPtM |
| Description | | | |
| Generator active power in phase L3.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Generator kVA

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kVA | | |
| Comm object | 8565 | Related applications | MINT, SPtM |
| Description | | | |
| Generator apparent power.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Generator kVA L1

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kVA | | |
| Comm object | 8530 | Related applications | MINT, SPtM |
| Description | | | |
| Generator apparent power L1.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Generator kVA L2

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| 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.*

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## Generator kVA L3

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| 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.*

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## Generator kVAr

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kVAr | | |
| Comm object | 8203 | Related applications | MINT, SPtM |
| Description | | | |
| Generator 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.*

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## Generator kVAr L1

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| 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.*

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## Generator kVAr L2

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kVAr | | |
| Comm object | 8528 | Related applications | MINT, SPtM |
| Description | | | |
| Generator reactive power in phase L2.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Generator kVAr L3

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kVAr | | |
| Comm object | 8529 | Related applications | MINT, SPtM |
| Description | | | |
| Generator reactive power in phase L3.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Generator Load Character

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| 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). | | | |

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## Generator Load Character L1

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| 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). | | | |

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## Generator Load Character L2

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **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). | | | |

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## Generator Load Character L3

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **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). | | | |

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## Generator Power Factor

| | | | |
|---|---|---|---|
| **Generator** | Generator | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 8204 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator power factor. | | | |

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## Generator Power Factor L1

| | | | |
|---|---|---|---|
| **Generator** | Generator | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 8533 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator power factor in phase L1. | | | |

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## Generator Power Factor L2

| | | | |
|---|---|---|---|
| **Generator** | Generator | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 8534 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator power factor in phase L2. | | | |

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## Generator Power Factor L3

| | | | |
|---|---|---|---|
| **Generator** | Generator | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 8535 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator power factor in phase L3. | | | |

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## Generator Frequency

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | Hz | | |
| **Comm object** | 8210 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Frequency of generator. | | | |

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## Generator Voltage L1-L2

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 9628 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator phase to phase voltage between L1 and L2 phases. | | | |

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## Generator Voltage L1-N

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 8192 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator voltage on phase 1. | | | |

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## Generator Voltage L2-L3

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 9629 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator phase to phase voltage between L2 and L3 phases. | | | |

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## Generator Voltage L2-N

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 8193 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator voltage on phase 2. | | | |

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## Generator Voltage L3-L1

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 9630 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator phase to phase voltage between L3 and L1 phases. | | | |

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## Generator Voltage L3-N

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 8194 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator voltage on phase 3. | | | |

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## Generator Current L1

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | A | | |
| **Comm object** | 8198 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator current phase L1.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Generator Current L2

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | A | | |
| Comm object | 8199 | Related applications | MINT, SPtM |
| Description | | | |
| Generator current phase L2.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Generator Current L3

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | A | | |
| Comm object | 8200 | Related applications | MINT, SPtM |
| Description | | | |
| Generator current phase L3.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Slip Angle

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | ° | | |
| Comm object | 8225 | Related applications | MINT, SPtM |
| Description | | | |
| Slip angle during synchronization. | | | |

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## Slip Frequency

| Value group | Generator | Related FW | 1.5.0 |
|---|---|---|---|
| Units | Hz | | |
| Comm object | 8224 | Related applications | MINT, SPtM |
| Description | | | |
| Slip frequency during synchronization. | | | |

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## Nominal Current

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | A | | |
| **Comm object** | 9978 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator nominal current. | | | |

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## Nominal Power

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 9018 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator nominal power. | | | |

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## Nominal Voltage

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 9917 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Generator nominal voltage. | | | |

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## Earth Fault Current

| | | | |
|---|---|---|---|
| **Value group** | Generator | **Related FW** | 1.5.0 |
| **Units** | A | | |
| **Comm object** | 14325 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Measured value of fault for evaluation of earth fault protection. | | | |

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# Group: Load

## Load kW

| | | | |
|---|---|---|---|
| **Value group** | Load | **Related FW** | 1.5.0 |
| **Units** | kW | | |
| **Comm object** | 10601 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Load active power.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Load kVAr

| | | | |
|---|---|---|---|
| **Value group** | Load | **Related FW** | 1.5.0 |
| **Units** | kVAr | | |
| **Comm object** | 10644 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Load reactive power.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Load Power Factor

| | | | |
|---|---|---|---|
| **Load** | Load | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 9025 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Load power factor. | | | |

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## Load Character

| | | | |
|---|---|---|---|
| **Value group** | Load | **Related FW** | 1.5.0 |
| **Units** | A | | |
| **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).<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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# Group: Mains/Bus

## Mains/Bus Frequency

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | Hz | | |
| **Comm object** | 8211 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Frequency of mains/bus. | | | |

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## Mains/Bus Voltage L1-L2

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 9631 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Mains/Bus phase to phase voltage between L1 and L2 phases. | | | |

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## Mains/Bus Voltage L1-N

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 8195 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Mains/Bus voltage on phase 1. | | | |

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## Mains/Bus Voltage L2-L3

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 9632 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Mains/Bus phase to phase voltage between L2 and L3 phases. | | | |

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## Mains/Bus Voltage L2-N

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 8196 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Mains/Bus voltage on phase 2. | | | |

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## Mains/Bus Voltage L3-L1

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 9633 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Mains/Bus phase to phase voltage between L3 and L1 phases. | | | |

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## Mains/Bus Voltage L3-N

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 8197 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Mains/Bus voltage on phase 3. | | | |

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## Mains/Bus Current L1

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | A | | |
| **Comm object** | 8208 | **Related applications** | SPtM |
| **Description** | | | |
| Mains current in phase L1. | | | |

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## Mains Import kW

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | kW | | |
| **Comm object** | 8703 | **Related applications** | SPtM |
| **Description** | | | |
| Imported kW from mains. | | | |

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## Mains Import kVAr

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | kVAr | | |
| **Comm object** | 8704 | **Related applications** | SPtM |
| **Description** | | | |
| Imported kVAr from mains. | | | |

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## Mains Power Factor

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **Units** | Hz | | |
| **Comm object** | 8705 | **Related applications** | SPtM |
| **Description** | | | |
| Mains power factor. | | | |

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## Mains Load Character

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **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). | | | |

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## Max Vector Shift

| | | | |
|---|---|---|---|
| **Value group** | Mains | **Related FW** | 1.5.0 |
| **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). | | | |

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# Group: Power Management

## Engine Priority

| | | | |
|---|---|---|---|
| **Value group** | Power Management | **Related FW** | 1.5.0 |
| **Units** | - | | |
| **Comm object** | 8624 | **Related applications** | MINT |
| **Description** | | | |
| This value shows current priority number. It corresponds to the setpoint **Priority (page 334)** except following situations:<br>▶ If at least one of binary inputs **TOP PRIORITY (PAGE 672)** is configured on some source and is active<br>▶ **#Priority Auto Swap (page 335)** is active | | | |

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## Actual Reserve

| Value group | Power Management | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kW | | |
| Comm object | 15805 | Related applications | MINT |
| Description | | | |
| Actual absolute reserve in power management. | | | |

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## Actual Relative Reserve

| Value group | Power Management | Related FW | 1.5.0 |
|---|---|---|---|
| Units | % | | |
| Comm object | 10788 | Related applications | MINT |
| Description | | | |
| Actual relative reserve in power management. | | | |

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## Active Power Required

| Value group | Speed/Load Control | Related FW | 1.5.0 |
|---|---|---|---|
| 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. | | | |

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## Start Reserve

| Value group | Power Management | Related FW | 1.5.0 |
|---|---|---|---|
| Units | kW | | |
| Comm object | 15806 | Related applications | MINT |
| Description | | | |
| Actual absolute reserve for start. | | | |

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## Stop Reserve

| Value group | Power Management | Related FW | 1.5.0 |
|---|---|---|---|
| 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. | | | |

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## Start Relative Reserve

| | | | |
|---|---|---|---|
| **Value group** | Power Management | **Related FW** | 1.5.0 |
| **Units** | % | | |
| **Comm object** | 10786 | **Related applications** | MINT |
| **Description** | | | |
| Actual relative reserve for start. | | | |

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## Stop Relative Reserve

| | | | |
|---|---|---|---|
| **Value group** | Power Management | **Related FW** | 1.5.0 |
| **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. | | | |

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## Actual Active Power In PM

| | | | |
|---|---|---|---|
| **Value group** | Power Management | **Related FW** | 1.5.0 |
| **Units** | kW | | |
| **Comm object** | 10657 | **Related applications** | MINT |
| **Description** | | | |
| Actual value of active power from all gen-sets running in power management. | | | |

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## Actual Reactive Power In PM

| | | | |
|---|---|---|---|
| **Value group** | Power Management | **Related FW** | 1.5.0 |
| **Units** | kVAr | | |
| **Comm object** | 10656 | **Related applications** | MINT |
| **Description** | | | |
| Actual value of reactive power from all gen-sets running in power management. | | | |

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## Running Nominal Power In PM

| | | | |
|---|---|---|---|
| **Value group** | Power Management | **Related FW** | 1.5.0 |
| **Units** | kW | | |
| **Comm object** | 10658 | **Related applications** | MINT |
| **Description** | | | |
| Actual nominal power of all gen-sets in power management, which are running. | | | |

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## Running Nominal Power Of All

| | | | |
|---|---|---|---|
| **Value group** | Power Management | **Related FW** | 1.5.0 |
| **Units** | kW | | |
| **Comm object** | 10999 | **Related applications** | MINT |
| **Description** | | | |
| Actual nominal power of all gen-sets, which are running. | | | |

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## Available Nominal Power

| | | | |
|---|---|---|---|
| **Value group** | Power Management | **Related FW** | 1.5.0 |
| **Units** | kW | | |
| **Comm object** | 10998 | **Related applications** | MINT |
| **Description** | | | |
| Available nominal power of all gen-sets in power management. | | | |

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## Minimal Running Nominal Power

| | | | |
|---|---|---|---|
| **Value group** | Power Management | **Related FW** | 1.5.0 |
| **Units** | kW | | |
| **Comm object** | 10012 | **Related applications** | MINT |
| **Description** | | | |
| Actual minimal nominal power of all gen-sets, which are running. | | | |

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## Actual Power Band

| | | | |
|---|---|---|---|
| **Value group** | Power Management | **Related FW** | 1.5.0 |
| **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.<br>***Note:*** *This value is evaluated only in controller with the lowest CAN address.* | | | |

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## Next Power Band

| Value group | Power Management | Related FW | 1.5.0 |
|---|---|---|---|
| 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.<br>***Note:*** *This value is evaluated only in controller with the lowest CAN address.* | | | |

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# Group: Speed/Load Control

## Speed Regulator Output

| Value group | Speed/Load Control | Related FW | 1.5.0 |
|---|---|---|---|
| Units | V | | |
| 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 | | | |

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## Speed Request

| Value group | Speed/Load Control | Related FW | 1.5.0 |
|---|---|---|---|
| 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 %. | | | |

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## Requested RPM

| Value group | Speed/Load Control | Related FW | 1.5.0 |
|---|---|---|---|
| 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. | | | |

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# Group: Voltage/PF Control

## Reactive Power Required

| | | | |
|---|---|---|---|
| **Value group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **Units** | kVAr | | |
| **Comm object** | 12877 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Requested reactive power. | | | |

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## Voltage Regulator Output

| | | | |
|---|---|---|---|
| **Value group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 9053 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Actual voltage between the AVR OUT and AVR COM terminals. | | | |

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## Voltage Request

| | | | |
|---|---|---|---|
| **Value group** | Voltage/PF Control | **Related FW** | 1.5.0 |
| **Units** | % | | |
| **Comm object** | 14997 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Internal Voltage request of internal Voltage regulator. | | | |

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# Group: Controler I/O

## E-STOP

| | | | |
|---|---|---|---|
| **Value group** | Controler I/O | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 15780 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Shows number of E-STOP input - the same principle of visualization like binary inputs.<br>Principle of value (principle of normally close binary input):<br>▶ 1 - E-STOP has voltage - state is OK<br>▶ 0 - E-STOP has no voltage - protection is active | | | |

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## Analog Input 1

| | | | |
|---|---|---|---|
| **Value group** | Controler I/O | **Related FW** | 1.5.0 |
| **Units** | Configurable | | |
| **Comm object** | 9151 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| This is the value of the analog input 1 of the controller. | | | |

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## Analog Input 2

| | | | |
|---|---|---|---|
| **Value group** | Controler I/O | **Related FW** | 1.5.0 |
| **Units** | Configurable | | |
| **Comm object** | 9152 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| This is the value of the analog input 2 of the controller. | | | |

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## Analog Input 3

| | | | |
|---|---|---|---|
| **Value group** | Controler I/O | **Related FW** | 1.5.0 |
| **Units** | Configurable | | |
| **Comm object** | 9153 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| This is the value of the analog input 3 of the controller. | | | |

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## Analog Input 4

| | | | |
|---|---|---|---|
| **Value group** | Controler I/O | **Related FW** | 1.5.0 |
| **Units** | Configurable | | |
| **Comm object** | 9154 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| This is the value of the analog input 4 of the controller. | | | |

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## Battery Volts

| | | | |
|---|---|---|---|
| **Value group** | Controler I/O | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 8213 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Controller supply voltage. | | | |

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## Binary Inputs

| | | | |
|---|---|---|---|
| **Value group** | Controler I/O | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 8235 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| State of the binary inputs of the controller. | | | |

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## Binary Outputs

| | | | |
|---|---|---|---|
| **Value group** | Controler I/O | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 8239 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| State of the binary outputs of the controller. | | | |

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## D+

| | | | |
|---|---|---|---|
| **Value group** | Controler I/O | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **Comm object** | 10603 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| D+ terminal voltage. | | | |

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# Group: Statistics

## Genset kVArh

| | | | |
|---|---|---|---|
| **Value group** | Statistics | **Related FW** | 1.5.0 |
| **Units** | kVArh | | |
| **Comm object** | 8539 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Counter of gen-set reactive power.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Genset kWh

| | | | |
|---|---|---|---|
| **Value group** | Statistics | **Related FW** | 1.5.0 |
| **Units** | kWh | | |
| **Comm object** | 8205 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Counter of gen-set active power.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Mains kVArh

| | | | |
|---|---|---|---|
| **Value group** | Statistics | **Related FW** | 1.5.0 |
| **Units** | kVArh | | |
| **Comm object** | 11026 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Counter of mains reactive power.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Mains kWh

| | | | |
|---|---|---|---|
| **Value group** | Statistics | **Related FW** | 1.5.0 |
| **Units** | kWh | | |
| **Comm object** | 11025 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Counter of mains active power.<br>***Note:*** *This value can be also switch into one decimal power format (via InteliConfig PC tool). In this case the range of value is decrease 10 times.* | | | |

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## Maintenance 1

| | | | |
|---|---|---|---|
| **Value group** | Statistics | **Related FW** | 1.5.0 |
| **Units** | hours | | |
| **Comm object** | 10528 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Countdown until next maintenance 1. Initial value can be set in **Maintenance Timer 1 (page 301)**. | | | |

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## Maintenance 2

| Value group | Statistics | Related FW | 1.5.0 |
|---|---|---|---|
| Units | hours | | |
| Comm object | 10529 | Related applications | MINT, SPtM |
| Description | | | |
| Countdown until next maintenance 2. Initial value can be set in **Maintenance Timer 2 (page 302)**. | | | |

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## Maintenance 3

| Value group | Statistics | Related FW | 1.5.0 |
|---|---|---|---|
| Units | hours | | |
| Comm object | 10530 | Related applications | MINT, SPtM |
| Description | | | |
| Countdown until next maintenance 3. Initial value can be set in **Maintenance Timer 3 (page 302)**. | | | |

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## Maintenance 4

| Value group | Statistics | Related FW | 1.5.0 |
|---|---|---|---|
| Units | hours | | |
| Comm object | 16387 | Related applications | MINT, SPtM |
| Description | | | |
| Countdown until next maintenance 4. Initial value can be set in **Maintenance Timer 4 (page 302)**. | | | |

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## Maintenance 5

| Value group | Statistics | Related FW | 1.5.0 |
|---|---|---|---|
| Units | hours | | |
| Comm object | 16388 | Related applications | MINT, SPtM |
| Description | | | |
| Countdown until next maintenance 5. Initial value can be set in **Maintenance Timer 5 (page 303)**. | | | |

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## Maintenance 6

| Value group | Statistics | Related FW | 1.5.0 |
|---|---|---|---|
| Units | hours | | |
| Comm object | 16389 | Related applications | MINT, SPtM |
| Description | | | |
| Countdown until next maintenance 6. Initial value can be set in **Maintenance Timer 6 (page 303)**. | | | |

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## Num E-Stops

| Value group | Statistics | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 11195 | Related applications | MINT, SPtM |
| Description | | | |
| Emergency stop alarms counter. | | | |

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## Num Starts

| Value group | Statistics | Related FW | 1.5.0 |
|---|---|---|---|
| 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. | | | |

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## Rental 1

| Value group | Statistics | Related FW | 1.5.0 |
|---|---|---|---|
| Units | hours | | |
| Comm object | 14328 | Related applications | MINT, SPtM |
| Description | | | |
| Remaining hours of **Rental Timer 1 (page 443)**. | | | |

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## Rental 2

| Value group | Statistics | Related FW | 1.5.0 |
|---|---|---|---|
| Units | days | | |
| Comm object | 14369 | Related applications | MINT, SPtM |
| Description | | | |
| Remaining days of **Rental Timer 2 (page 445)**. | | | |

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## Running Hours

| Value group | Statistics | Related FW | 1.5.0 |
|---|---|---|---|
| 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.<br>***Note:*** *If an ECU is configured and it provides engine hours value, the value is taken from the ECU.* | | | |

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## Shutdowns

| | | | |
|---|---|---|---|
| **Value group** | Statistics | **Related FW** | 1.5.0 |
| **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. | | | |

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## Time Till Empty

| | | | |
|---|---|---|---|
| **Value group** | Statistics | **Related FW** | 1.5.0 |
| **Units** | days | | |
| **Comm object** | 13770 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Assessment in days when the fuel tank will be empty.<br>***Note:*** *This value is based on setpoint* ***Fuel Tank Volume (page 297)*** *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.* | | | |

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## Time Till Empty

| | | | |
|---|---|---|---|
| **Value group** | Statistics | **Related FW** | 1.5.0 |
| **Units** | hours | | |
| **Comm object** | 13771 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Assessment in hours when the fuel tank will be empty.<br>***Note:*** *This value is based on setpoint* ***Fuel Tank Volume (page 297)*** *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.* | | | |

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## Time Till Empty

| | | | |
|---|---|---|---|
| **Value group** | Statistics | **Related FW** | 1.5.0 |
| **Units** | minutes | | |
| **Comm object** | 13772 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Assessment in minutes when the fuel tank will be empty.<br>***Note:*** *This value is based on setpoint* ***Fuel Tank Volume (page 297)*** *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.* | | | |

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## Total Fuel Consumption

| | | | |
|---|---|---|---|
| **Value group** | Statistics | **Related FW** | 1.5.0 |
| **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 297)** setpoint)

***Note:*** *The accuracy of Total Fuel Consumption depends on the precision of ECU values or precision of* ***Fuel Tank Volume (page 297)*** *and fuel level sensor.*

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# Group: Info

## Application Mode

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 14446 | **Related applications** | MINT, SPtM |
| **Description** | | | |

This Value mirrors the active application in the controller.
The intend of use it to display the value of the active application in InteliConfig or at the screen of the controller.

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## Load Shedding Status

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **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 3, where 0 means no load shedding stage is active and 1, 2 or 3 means that the corresponding loadshedding stage is active.

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## Engine State

| | | | |
|---|---|---|---|
| **Value group** | Info | **Related FW** | 1.5.0 |
| **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. | | | |

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## Breaker State

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **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. | | | |

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## Timer Text

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **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.<br>The assignment of texts to the codes can be obtained using InteliConfig. Open any connection (also offline with a previously saved archive) and go to the Tools ribbon -> Generate CFG image (all). The resulting file will contain the assignment of texts to the codes. | | | |

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## Connection Type

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **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 259)**. | | | |

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## SPI Module A

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 14447 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| The name of plug-in module which is inserted in slot A. | | | |

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## SPI Module B

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 14448 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| The name of plug-in module which is inserted in slot B. | | | |

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## Timer Value

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **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. | | | |

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## ID String

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24501 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Name of controller which is used in InteliConfig in command bar. | | | |

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## FW Version

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24339 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Major and minor firmware version number. | | | |

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## Application

| Value group | IL Info | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 8480 | Related applications | MINT, SPtM |
| Description | | | |
| The value contains actual application in controller. | | | |

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## FW Branch

| Value group | IL Info | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 8707 | Related applications | MINT, SPtM |
| Description | | | |
| The value contains actual branch of firmware in controller. | | | |

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## Password Decode

| Value group | IL Info | Related FW | 1.5.0 |
|---|---|---|---|
| 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. | | | |

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## CAN16

| Value group | IL Info | Related FW | 1.5.0 |
|---|---|---|---|
| Units | V | | |
| 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. | | | |

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## CAN32

| Value group | IL Info | Related FW | 1.5.0 |
|---|---|---|---|
| Units | V | | |
| 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. | | | |

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## Reg16

| Value group | IL Info | Related FW | 1.5.0 |
|---|---|---|---|
| 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. | | | |

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## Reg32

| Value group | IL Info | Related FW | 1.5.0 |
|---|---|---|---|
| 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. | | | |

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## Gen Loaded 16

| Value group | IL Info | Related FW | 1.5.0 |
|---|---|---|---|
| Units | V | | |
| 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 plays active role in the power management. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16. | | | |

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## Gen Loaded 32

| | | | |
|---|---|---|---|
| **Value group** | IL Info | **Related FW** | 1.5.0 |
| **Units** | V | | |
| **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 plays active role in the power management. Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32. | | | |

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# Group: Log Bout

## Log Bout 1

| | | | |
|---|---|---|---|
| **Value group** | Log Bout | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 9143 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| State of binary outputs. | | | |

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## Log Bout 2

| | | | |
|---|---|---|---|
| **Value group** | Log Bout | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 9144 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| State of binary outputs. | | | |

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## Log Bout 3

| | | | |
|---|---|---|---|
| **Value group** | Log Bout | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 9145 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| State of binary outputs. | | | |

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## Log Bout 4

| Value group | Log Bout | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 9146 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs. | | | |

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## Log Bout 5

| Value group | Log Bout | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 9147 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs. | | | |

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## Log Bout 6

| Value group | Log Bout | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 9148 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs. | | | |

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## Log Bout 7

| Value group | Log Bout | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 9149 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs. | | | |

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## Log Bout 8

| Value group | Log Bout | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 9150 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs. | | | |

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## Log Bout 9

| Value group | Log Bout | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 11896 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs. | | | |

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## Log Bout 10

| Value group | Log Bout | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 11897 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs. | | | |

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## Log Bout 11

| Value group | Log Bout | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 11898 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs. | | | |

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# Group: CM-GPRS

## AirGate Status

| Value group | CM-GPRS; CM-4G-GPS (4G part) | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 24308 | 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 |

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## AirGate ID

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **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. | | | |

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## Connection Type

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24146 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| The type of data connection. | | | |

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## Cell Diag Code

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **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 |

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## Cell ErrorRate

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **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. | | | |

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## Cell Signal Lev

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **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. | | | |

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## Cell Status

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24290 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| The text of this value represents the status of the GSM modem. | | | |

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## Last Email Result

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **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. |

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## Operator

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24147 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| The name of operator which to SIM card is connected.<br>***Note:*** *If roaming service is used then prefix "R" is added before the name of operator.* | | | |

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# Group: CM-4G-GPS

## Altitude

| | | | |
|---|---|---|---|
| **Value group** | CM-4G-GPS (GPS part) | **Related FW** | 1.5.0 |
| **Units** | m | | |
| **Comm object** | 24266 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Actual GPS altitude. | | | |

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## HomePosDist

| | | | |
|---|---|---|---|
| **Value group** | CM-4G-GPS (GPS part) | **Related FW** | 1.5.0 |
| **Units** | km | | |
| **Comm object** | 11680 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Actual distance from home position. Home position is adjusted via setpoints **Home Latitude (page 448)** and **Home Longitude (page 448)** or by binary input **GEO HOME POSITION (PAGE 660)**. | | | |

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## Latitude

| | | | |
|---|---|---|---|
| **Value group** | CM-4G-GPS (GPS part) | **Related FW** | 1.5.0 |
| **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. | | | |

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## Longitude

| | | | |
|---|---|---|---|
| **Value group** | CM-4G-GPS (GPS part) | **Related FW** | 1.5.0 |
| **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. | | | |

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## Satellites

| | | | |
|---|---|---|---|
| **Value group** | CM-4G-GPS (GPS part) | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24265 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Number of available satellites for GPS location. | | | |

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## AirGate ID

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **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. | | | |

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## AirGate Status

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24308 | **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 |

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## Connection Type

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24146 | **Related applications** | MINT, SPtM |
| **Description** | | | |

The type of data connection.

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## Cell Diag Code

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **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 |

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## Cell ErrorRate

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **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. | | | |

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## Cell Signal Lev

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **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. | | | |

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## Cell Status

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24290 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| The text of this value represents the status of the GSM modem. | | | |

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## Last Email Result

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **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. |

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## Operator

| | | | |
|---|---|---|---|
| **Value group** | CM-GPRS; CM-4G-GPS (4G part) | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24147 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| The name of operator which to SIM card is connected.<br>***Note:*** *If roaming service is used then prefix "R" is added before the name of operator.* | | | |

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# Group: CM-Ethernet

## AirGate Status

| | | | |
|---|---|---|---|
| **Value group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24344 | **Related applications** | MINT, SPtM |
| **Description** | | | |

Diagnostic code for AirGate connection. Helps in troubleshooting.

| Code | Description |
|---|---|
| 0 | Ethernet cable is disconnected |
| 1 | Controller registered, waiting for authorization |
| 2 | Not possible to register, controller blacklisted |
| 3 | Not possible to register, server has no more capacity |
| 4 | Not possible to register, other reason |
| 5 | Controller registered and authorized |

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## AirGate ID

| | | | |
|---|---|---|---|
| **Value group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **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. | | | |

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## Current DNS

| | | | |
|---|---|---|---|
| **Value group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24181 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Current domain name server. | | | |

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## ETH Interface Status

| | | | |
|---|---|---|---|
| **Value group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24180 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Current status of ethernet communication. | | | |

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## Current Gateway

| | | | |
|---|---|---|---|
| **Value group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24182 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Current gateway address. | | | |

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## Current IP Address

| | | | |
|---|---|---|---|
| **Value group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24184 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Current IP address of the controller. | | | |

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## Last Email Result

| Value group | CM-Ethernet | Related FW | 1.5.0 |
|---|---|---|---|
| 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). |

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## MAC Address

| Value group | CM-Ethernet | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 24333 | Related applications | MINT, SPtM |
| Description | | | |

Current MAC address of the controller ethernet interface.

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### Current Subnet Mask

| | | | |
|---|---|---|---|
| **Value group** | CM-Ethernet | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 24183 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Current subnet mask. | | | |

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## Group: Date/Time

### Time

| | | | |
|---|---|---|---|
| **Value group** | Date/Time | **Related FW** | 1.5.0 |
| **Units** | HH:MM:SS | | |
| **Comm object** | 24554 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Shows setup time. | | | |

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### Date

| | | | |
|---|---|---|---|
| **Value group** | Date/Time | **Related FW** | 1.5.0 |
| **Units** | DD.MM.YYYY | | |
| **Comm object** | 24553 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Shows setup date. | | | |

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## Group: Plug-In I/O

### EM BIO A

| | | | |
|---|---|---|---|
| **Value group** | Plug-In I/O | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 14291 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Binary inputs from extension module in slot A. | | | |

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### EM BIO B

| | | | |
|---|---|---|---|
| **Value group** | Plug-In I/O | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 14292 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Binary inputs from extension module in slot B. | | | |

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## Group: PLC

### PLC Resource 1

| | | | |
|---|---|---|---|
| **Value group** | PLC | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 10504 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). | | | |

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### PLC Resource 2

| | | | |
|---|---|---|---|
| **Value group** | PLC | **Related FW** | 1.5.0 |
| **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** | 1.5.0 |
| **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** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 10507 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). | | | |

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## PLC Resource 5

| Value group | PLC | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 10508 | Related applications | MINT, SPtM |
| Description | | | |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). | | | |

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## PLC Resource 6

| Value group | PLC | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 10509 | Related applications | MINT, SPtM |
| Description | | | |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). | | | |

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## PLC Resource 7

| Value group | PLC | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 10510 | Related applications | MINT, SPtM |
| Description | | | |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). | | | |

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## PLC Resource 8

| Value group | PLC | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 10511 | Related applications | MINT, SPtM |
| Description | | | |
| Internal state of PLC countdowns (e.g. state of block Timer etc.). | | | |

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## PLC-BOUT 1

| Value group | PLC | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 10424 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs of PLC. | | | |

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## PLC-BOUT 2

| Value group | PLC | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 10425 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs of PLC. | | | |

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## PLC-BOUT 3

| Value group | PLC | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 10426 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs of PLC. | | | |

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## PLC-BOUT 4

| Value group | PLC | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 10427 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs of PLC. | | | |

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## PLC-BOUT 5

| Value group | PLC | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 10428 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs of PLC. | | | |

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## PLC-BOUT 6

| Value group | PLC | Related FW | 1.5.0 |
|---|---|---|---|
| Units | [-] | | |
| Comm object | 10429 | Related applications | MINT, SPtM |
| Description | | | |
| State of binary outputs of PLC. | | | |

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## PLC-BOUT 7

| | | | |
|---|---|---|---|
| **Value group** | PLC | **Related FW** | 1.5.0 |
| **Units** | [-] | | |
| **Comm object** | 10430 | **Related applications** | MINT, SPtM |
| **Description** | | | |
| State of binary outputs of PLC. | | | |

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## 8.1.3 Logical binary inputs

**What Logical binary inputs are:**

Logical binary inputs are inputs for binary values and functions.

### Alphabetical groups of Logical binary inputs


LBI: A ..... 634
LBI: B ..... 635
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# Logical binary inputs alphabetically


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# LBI: A

## Access Lock

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1 | | |
| Description | | | |

When this input is closed, no setpoints can be adjusted from controller's front panel and controller mode (OFF / MAN / AUTO / TEST) cannot be changed.

> ***Note:*** *Access Lock does not protect setpoints and mode changing from InteliConfig. To avoid unqualified changes the selected setpoints have to be password protected.*
> *Also the buttons Fault Reset and Horn Reset are not blocked at all and buttons Start and Stop in MAN mode are not blocked.*

back to Logical binary inputs alphabetically

## Alternate Config 2

| Related FW | 1.5.0 | 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 Config group are switched to the second set (setpoints with number 2).

> **IMPORTANT: If LBO ECU POWER RELAY (PAGE 706) 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 | 1.5.0 | 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 Config group are switched to the third set (setpoints with number 3).

> **IMPORTANT: If LBO ECU POWER RELAY (PAGE 706) 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 | 1.5.0 | 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

# LBI: B

## Battery Charger

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 623 | | |
| **Description** | | | |
| When binary input is active and its delay **Battery Charger Fail Delay (page 301)** is out of time then alarm **Battery Charger Fail (page 792)** is activated, written into history log and logical binary output **AL BATTERY CHARGER (PAGE 678)** is activated. | | | |

back to Logical binary inputs alphabetically

## BIN Protection 1

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. |

back to Logical binary inputs alphabetically

## BIN Protection 02

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 03

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 04

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 05

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 06

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 07

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 08

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 09

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 10

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. |

back to Logical binary inputs alphabetically

## BIN Protection 11

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. |

back to Logical binary inputs alphabetically

## BIN Protection 12

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 13

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 14

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 15

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 16

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 17

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 18

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 19

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 20

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 21

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 22

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 23

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 24

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 25

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 26

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 27

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 28

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 29

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 30

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 31

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 32

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 33

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 34

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 35

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 36

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 37

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 38

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 39

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

## BIN Protection 40

| Related FW | 1.5.0 | 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. |

back to Logical binary inputs alphabetically

# LBI: C

## Coolant Temp

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 625 | | |
| Description | | | |

Binary input for COOLANT TEMP (PAGE 769) 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 | 1.5.0 | 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 354)**.<br>***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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 951 | | |
| Description | | | |
| This binary input is used to switch on **ECU Power Relay (page 706)**, when engine start is not requested. It is intended to enable engine values reading, when engine doesn't run.<br>When this binary input is active, binary output **ECU Power Relay (page 706)** is active too.<br>When this binary input is inactive, function of **ECU Power Relay (page 706)** is not affected. | | | |

back to Logical binary inputs alphabetically

## Emergency MAN

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 45 | | |
| Description | | | |
| This input is designed to allow the gen-set or breakers to be controlled externally, not by the controller. This feature can be useful in case of some failure, which disables the gen-set or breakers to be controlled by the controller, but the gen-set itself is operational.<br>The controller behaves in the following way:<br>▶ Shows the text EmergMan in the engine status on the main screen.<br>▶ Stops all functions regarding the gen-set or breaker control, deactivates all outputs related to it.<br>▶ Stop Fail alarm is not being evaluated and stop solenoid is not activated if nonzero speed is detected.<br>▶ 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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 40 | | |
| Description | | | |
| When this binary input is activated, gen-set is immediately stopped. Also binary outputs are disconnected. Alarm Emergency Stop (page 817) is activated. | | | |

back to Logical binary inputs alphabetically

## External Mains Fail Relay

| Related FW | 1.5.0 | 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 is active, Gen-set is started when controller is in the AUT mode etc.)
- Controller displays alarm ALI External Mains Fail (page 809)

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 (page 809) automatically disappears

back to Logical binary inputs alphabetically

# LBI: F

## Fault Reset Button

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 191 | | |
| Description | | | |
| Binary input has the same function as Fault Reset button on the InteliGen 200 front panel. | | | |

back to Logical binary inputs alphabetically

## Force Droop Oper

| Related FW | 1.5.0 | 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 363)** = Droop. | | | |

back to Logical binary inputs alphabetically

## Force Island

| Related FW | 1.5.0 | Related applications | SPtM |
|---|---|---|---|
| Comm object | 787 | | |
| Description | | | |
| Activation of this logical binary input start the gen-set and go to island operation. Transition of load from mains is adjusted via setpoint **Transfer Mains To Gen (page 352)**. | | | |

back to Logical binary inputs alphabetically

## Force Parallel

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 786 | | |
| Description | | | |
| Activation of this logical binary input start the gen-set 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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 16 | | |
| Description | | | |

Selected protections are disabled, if LBI: Force Protection Disable is active..

Activation and deactivation of this binary input will create history record:

- Force Protection Disable active
- Force Protection Disable inactive

Behaviour depends on configuration of LBI - normally close or normally open.

back to Logical binary inputs alphabetically

## Fuel Level

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 626 | | |
| Description | | | |

Binary input for **FUEL LEVEL (PAGE 770)** 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 On/Off

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 694 | | |
| Description | | | |

This binary input is used for manual control of binary output **FUEL PUMP (PAGE 709)**. 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 659) is configured then binary output FUEL PUMP (PAGE 709) is control by this binary input. Setpoints Fuel Pump On (page 298) and Fuel Pump Off (page 299) are not evaluated!**

> **IMPORTANT: It is necessary to configure analog input FUEL LEVEL (PAGE 770) for proper function of this binary input.**

back to Logical binary inputs alphabetically

# LBI: G

## GCB Button

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 193 | | |
| Description | | | |

Binary input has the same function as GCB button I/O on the InteliGen 200 front panel. It is evaluated in MAN mode only.

back to Logical binary inputs alphabetically

## GCB Feedback

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 63 | | |
| Description | | | |

Use this input for indication whether the generator circuit breaker is open or closed.

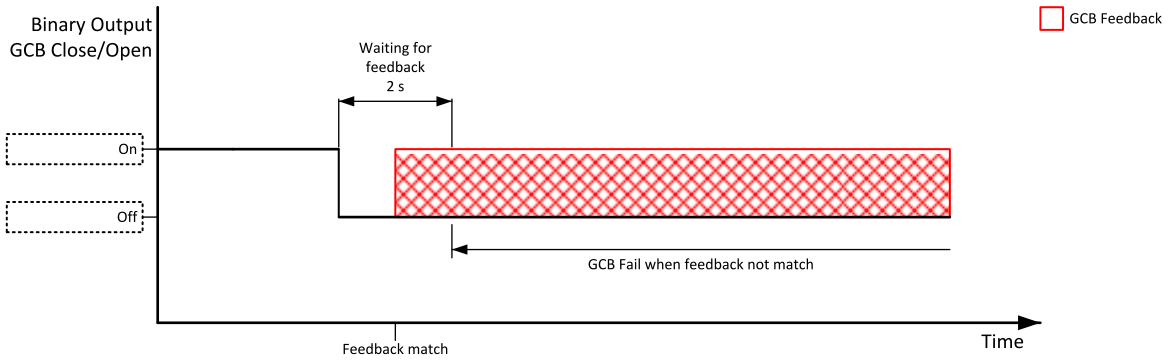



Image 8.133 GCB Feedback 1

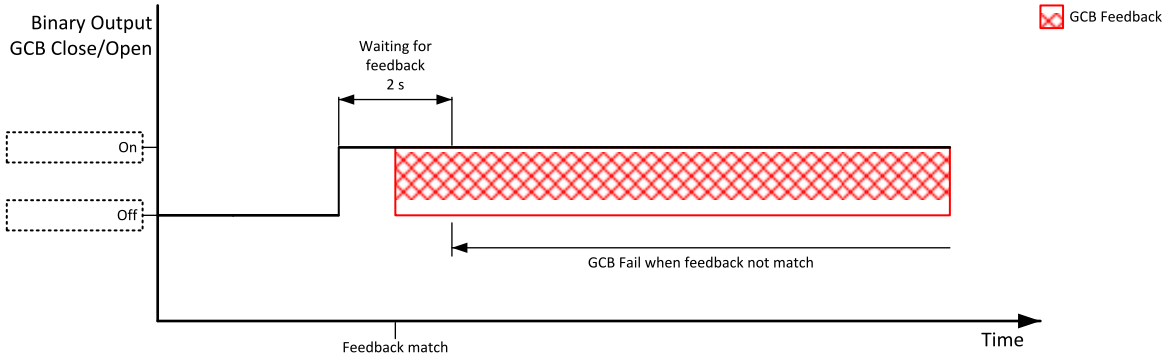



Image 8.134 GCB Feedback 2

back to Logical binary inputs alphabetically

## Geo Home Position

| Related FW | 1.5.0 | 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 448)** and **Home Longitude (page 448)** are adjusted automatically from actual coordinates from GPS signal.

***Note:*** *Input has to be activated for at least 2 seconds.*

back to Logical binary inputs alphabetically

## Geo-Fencing Enabled

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 218 | | |
| **Description** | | | |
| This binary input enables or disables **Fence 1 Protection (page 451)** and **Fence 2 Protection (page 452)** if **Geo-Fencing (page 450)** is adjusted to value "LBI Enable". | | | |

back to Logical binary inputs alphabetically

## Group link

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 59 | | |
| **Description** | | | |
| This input is used for logical connection and disconnection of two gen-set groups selected with setpoints **Group Link L (page 345)** and **Group Link R (page 346)**. If the input is active, then the two selected groups will perform power management, load sharing and kVAr sharing together as one large group.<br>***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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 192 | | |
| **Description** | | | |
| Binary input has the same function as Horn reset button on the InteliGen 200 front panel. | | | |

back to Logical binary inputs alphabetically

# LBI: I

## Idle Speed

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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

## Lang Selection 1

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 107 | | |
| Description | | | |

Use this binary input with binary input **LANG SELECTION 2 (PAGE 662)** to choose required language of controller. The system is based on binary numbers.

| Binary input | Binary number | Active language |
|---|---|---|
| Language Selection 1 is active | 1 | First language (English) |
| **LANG SELECTION 2 (PAGE 662)** is active | 2 | Second language |
| Language Selection 1 and **LANG SELECTION 2 (PAGE 662)** are active | 3 | Third language |

back to Logical binary inputs alphabetically

## Lang Selection 2

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 108 | | |
| Description | | | |

Use this binary input with binary input **LANG SELECTION 1 (PAGE 662)** to choose required language of controller. The system is based on binary numbers.

| Binary input | Binary number | Active language |
|---|---|---|
| **LANG SELECTION 1 (PAGE 662)** is active | 1 | First language (English) |
| Lang Selection 2 is active | 2 | Second language |
| **LANG SELECTION 1 (PAGE 662)** and Lang Selection 2 are active | 3 | Third language |

back to Logical binary inputs alphabetically

## Load Res 2 Active

| Related FW | 1.5.0 | 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 117)**. 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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 622 | | |
| **Description** | | | |
| If the input is closed, the automatic start of the gen-set at Mains failure is blocked. In case of running gen-set in AUTO mode, timer **Mains Return Delay (page 320)** 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 351)** the MCB is closed.<br>***Note:*** *This input simulates healthy Mains.* | | | |

back to Logical binary inputs alphabetically

## Manual Load Reconnection

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 331)**. This works only if automatic reconnection is disabled, i.e. the setpoint **Auto Load Reconnection (page 332)** = Disabled. | | | |

back to Logical binary inputs alphabetically

## MCB Button

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 194 | | |
| **Description** | | | |
| This binary input has the same function as MCB button I/O on the InteliGen 200 front panel. It is evaluated in MAN mode only. | | | |

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## MCB Feedback

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 65 | | |

**Description**

Use this input for indication whether the mains circuit breaker is open or closed.

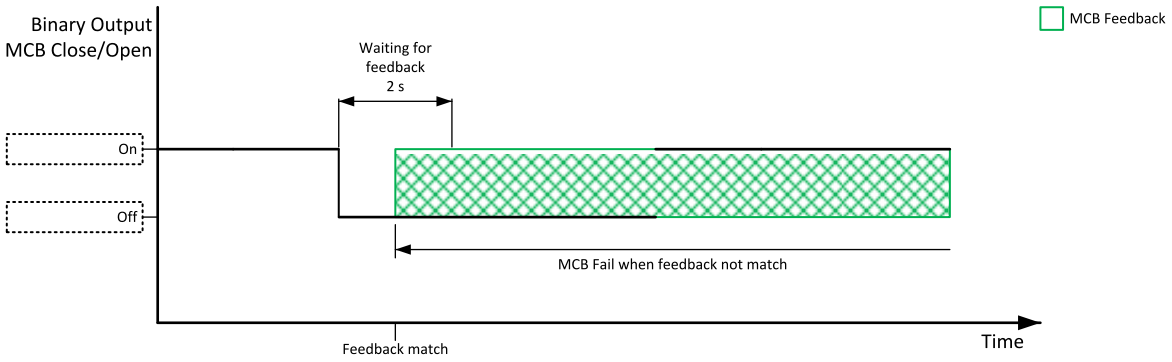



Image 8.135 MCB Feedback 1

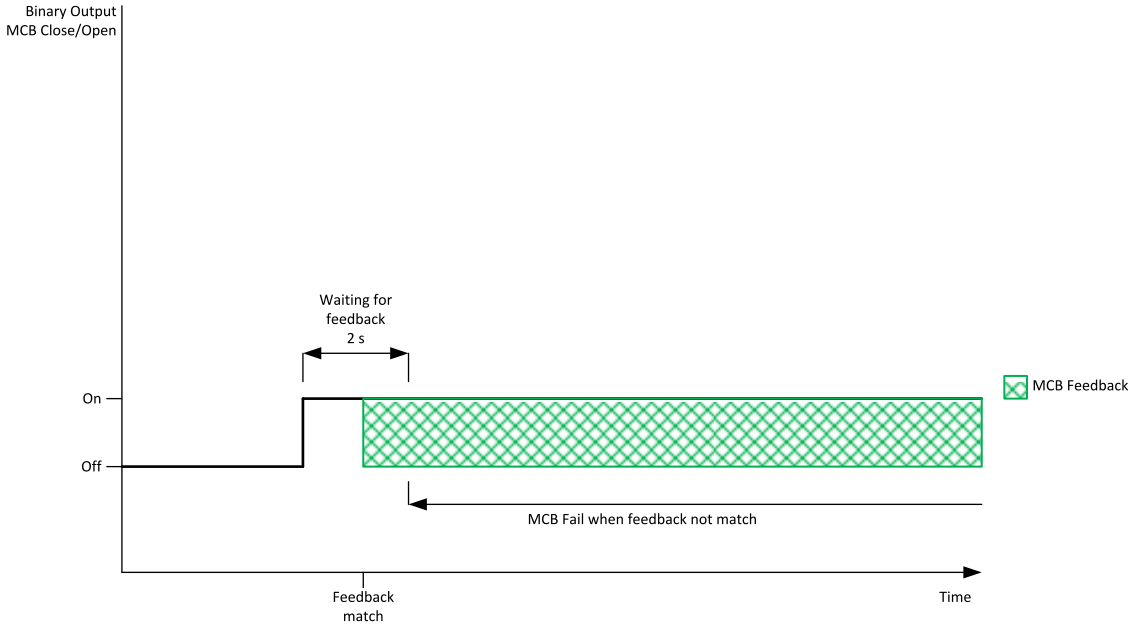



Image 8.136 MCB Feedback 2

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## Min Run Power Active

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 340)**. | | | |

back to Logical binary inputs alphabetically

# LBI: N

## NCB Feedback

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 252)**. | | | |

back to Logical binary inputs alphabetically

## Not Used

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 43 | | |
| **Description** | | | |

Binary input for **OIL PRESSURE (PAGE 772)** 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 closed then oil pressure is OK and is higher than starting oil pressure.

***Note:*** *In case that you want to use binary input of oil pressure sensor just for protection please use one of the* ***BIN PROTECTION 1 (PAGE 635)****.*

back to Logical binary inputs alphabetically

# LBI: R

## Regeneration Force

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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** | 1.5.0 | **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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 620 | | |
| Description | | | |
| The controller is switched to the AUTO mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.<br>This binary input has the lowest priority from Remote OFF / MAN / AUTO / TEST binary inputs<br>Remote control priority:<br>▶ Remote OFF (Highest priority)<br>▶ Remote TEST<br>▶ Remote MAN<br>▶ Remote AUTO (Lowest Priority) | | | |

back to Logical binary inputs alphabetically

## Remote Ctrl Lock

| Related FW | 1.5.0 | 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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 618 | | |
| Description | | | |
| The controller is switched to the MAN mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.<br>Remote control priority:<br>▶ Remote OFF (Highest priority)<br>▶ Remote TEST<br>▶ Remote MAN<br>▶ Remote AUTO (Lowest Priority) | | | |

back to Logical binary inputs alphabetically

## Remote OFF

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| **Comm object** | 617 | | |
| **Description** | | | |
| The controller is switched to the OFF mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.<br>Remote control priority:<br>▶ Remote OFF (Highest priority)<br>▶ Remote TEST<br>▶ Remote MAN<br>▶ Remote AUTO (Lowest Priority) | | | |

back to Logical binary inputs alphabetically

## Remote Start/Stop

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 38 | | |

**Description**

Use this input to start and stop the gen-set in AUTO mode and TEST mode.

| Taken action in SPtM application (AUTO Mode) | |
|---|---|
| Active | Start genset, synchronization, parallel operation (baseload/Imp/Exp), Regardless the Mains params OK.<br>▶ Start the genstet to Island if Mains Not OK<br>▶ Reverse synchronisation when mains gets restored |
| Inactive | Unloading of the genset if it is running in parallel, stop the genset. |
| **Taken action in MINT application (AUTO Mode)** | |
| Active | Start the Genset - After Powermanagement/ #System Start Delay (Actually is using the existing **REMOTE START/STOP (PAGE 669)** internaly (this LBI is not visible in any application)). |
| Inactive | Stop the Genset - After Powermanagement/ #System Stop Delay (Actually is using the existing LBI **REMOTE START/STOP (PAGE 669)** internaly (this LBI is not visible in any application)). |
| **Taken action in AMF application (AUTO Mode)** | |
| Active | ▶ Start the genset and stay running with opened GCB if Mains OK.<br>▶ Go to Island if Mains fails (due to AMF function).<br>▶ If Mains is not OK the AMF function starts the genset to Island anyway. |
| Inactive | ▶ Stop the genset if Mains is OK.<br>▶ If Mains not Ok the genset stays running due to AMF function anyway. |
| **Taken action in MRS application (AUTO Mode)** | |
| Active | ▶ Start the Genset - No delay<br>▶ Close GCB |
| Inactive | ▶ Open GCB<br>▶ Stop the Genset - No delay |

***Note:*** *In the SPTM and AMF application there are more LBIs that can influence the state of the application and can be in the collision with the Common LBI Remote Start/Stop.*

**back to Logical binary inputs alphabetically**

## Remote TEST

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 621 | | |
| Description | | | |
| The controller is switched to the TEST mode (there are four modes OFF / MAN / AUTO / TEST) when this binary input is closed. When opens controller is switched back to previous mode.<br>Remote control priority:<br>▶ Remote OFF (Highest priority)<br>▶ Remote TEST<br>▶ Remote MAN<br>▶ Remote AUTO (Lowest Priority) | | | |

back to Logical binary inputs alphabetically

## Remote Test On Load

| Related FW | 1.5.0 | 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 genset 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 transfered to the genset. The same behaviour like the LBI **FORCE ISLAND (PAGE 658)**. The load transfer according to the settings is performed.<br>***Note:*** *Whenever the LBI **REMOTE START/STOP (PAGE 669)** is active, the LBI **REMOTE TEST ON LOAD (PAGE 671)** has higher priority because it takes the same action like LBI **FORCE ISLAND (PAGE 658)***<br>**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 genset (MAN). |
| MRS | | **Active:** Gen-set is put to TEST mode. On the top of it the GCB is closed. The same behaviour like the LBI **REMOTE START/STOP (PAGE 669)**<br>**Inactive:** Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions. |
| MINT | | **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 LBI **REMOTE START/STOP (PAGE 669)**.<br>**Inactive:** Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions. |
| AMF | | **Active:** Gen-set is put to TEST mode. On the top of it the load is transfered to the genset. The same behaviour like the LBI **FORCE ISLAND (PAGE 658)**. The open load transfer is performed.<br>**Inactive:** Genset comes back to the original mode and behaves accordingly to this mode and other conditions. (the load can be transfered back to the mains (OFF, AUTO) or stay on the genset (MAN). |

**back to Logical binary inputs alphabetically**

# LBI: S

## Sd Override

| Related FW | 1.5.0 | 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 672) 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!**

back to Logical binary inputs alphabetically

## Start Button

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 189 | | |
| Description | | | |

Binary input has the same function as Start Button I on the InteliGen 200 front panel. It is evaluated in MAN mode only.

back to Logical binary inputs alphabetically

## Stop Button

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 190 | | |
| Description | | | |

Binary input has the same function as Stop Button O on the InteliGen 200 front panel. It is evaluated in MAN Mode only.

back to Logical binary inputs alphabetically

# LBI: T

## Top Priority

| Related FW | 1.5.0 | 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 334)**.

> **IMPORTANT: This binary input can be used only if setpoint #Priority Auto Swap (page 335) = Disabled.**

back to Logical binary inputs alphabetically

## 8.1.4 Logical binary outputs

**What Logical binary outputs are:**

Logical binary outputs are outputs for binary values and functions.

### Alphabetical groups of Logical binary outputs


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LBO: C ..... 704
LBO: E ..... 705
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For full list of Logical binary outputs go to the chapter **Logical binary outputs alphabetically (page 674)**.

# Logical binary outputs alphabetically


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# LBO: A

## Air Valves

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1247 | | |
| **Description** | | | |
| This output closes together with binary output **PRESTART (PAGE 729)** and opens after the engine is stopped or in case that engine is not ready. | | | |

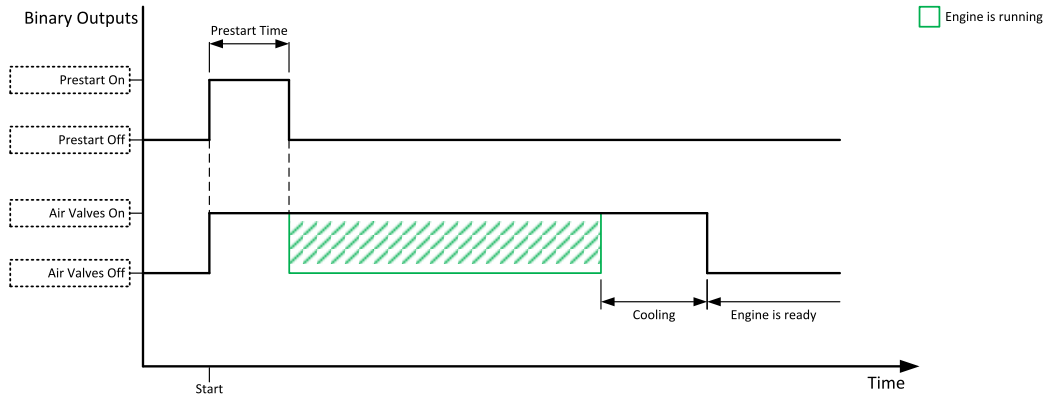



Image 8.137 Air Valves

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## AL AIN 1 Sd+BOC

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1386 | | |
| **Description** | | | |
| The output is closed when there is the shutdown or BOC alarm from the analog input 1 of the controller present in the alarmlist or isn't confirmed. | | | |

back to Logical binary outputs alphabetically

## AL AIN 1 Wrn

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1382 | | |
| **Description** | | | |
| The output is closed when there is the warning alarm from the analog input 1 of the controller present in the alarmlist or isn't confirmed. | | | |

back to Logical binary outputs alphabetically

## AL AIN 2 Sd+BOC

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1387 | | |
| **Description** | | | |
| The output is closed when there is the shutdown or BOC alarm from the analog input 2 of the controller present in the alarmlist or isn't confirmed. | | | |

back to Logical binary outputs alphabetically

## AL AIN 2 Wrn

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1383 | | |
| **Description** | | | |
| The output is closed when there is the warning alarm from the analog input 2 of the controller present in the alarmlist or isn't confirmed. | | | |

back to Logical binary outputs alphabetically

## AL AIN 3 Sd+BOC

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1388 | | |
| **Description** | | | |
| The output is closed when there is the shutdown or BOC alarm from the analog input 3 of the controller present in the alarmlist or isn't confirmed. | | | |

back to Logical binary outputs alphabetically

## AL AIN 3 Wrn

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1384 | | |
| **Description** | | | |
| The output is closed when there is the warning alarm from the analog input 3 of the controller present in the alarmlist or isn't confirmed. | | | |

back to Logical binary outputs alphabetically

## AL AIN 4 Sd+BOC

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1389 | | |
| **Description** | | | |
| The output is closed when there is the shutdown or BOC alarm from the analog input 4 of the controller present in the alarmlist or isn't confirmed. | | | |

back to Logical binary outputs alphabetically

## AL AIN 4 Wrn

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1385 | | |
| **Description** | | | |
| The output is closed when there is the warning alarm from the analog input 4 of the controller present in the alarmlist or isn't confirmed. | | | |

back to Logical binary outputs alphabetically

## AL Battery Flat

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1292 | | |
| **Description** | | | |
| This output is active when the **Sd Battery Flat (page 817)** or **Wrn Battery Voltage (page 792)** alarm is present in the alarmlist or isn't confirm. | | | |

back to Logical binary outputs alphabetically

## AL Battery Charger

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1272 | | |
| **Description** | | | |
| This output is active when the **Battery Charger Fail (page 792)** alarm is present in the alarmlist or isn't confirmed. | | | |

back to Logical binary outputs alphabetically

## AL Battery Voltage

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1293 | | |
| **Description** | | | |
| This output is active when the **Wrn Battery Voltage (page 792)**alarm is present in the alarmlist or isn't confirm. | | | |

back to Logical binary outputs alphabetically

## AL Common BOC

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 9 | | |
| **Description** | | | |
| Output closes when any BOC alarm appears.<br>The output opens, if:<br>▶ No BOC alarm is active and<br>▶ Fault reset button is pressed | | | |

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## AL Common Fls

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 6 | | |
| Description | | | |
| Output closes when any sensor fail alarm appears.<br>The output opens, if:<br>▶ No sensor fail alarm is active and<br>▶ Fault reset button is pressed | | | |

back to Logical binary outputs alphabetically

## AL Common Sd

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 4 | | |
| Description | | | |
| Output closes when any shutdown alarm appears.<br>The output opens, if:<br>▶ No shutdown alarm is active and<br>▶ Fault reset button is pressed | | | |

back to Logical binary outputs alphabetically

## AL Common Stp

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 5 | | |
| Description | | | |
| Output closes when any slow stop alarm appears.<br>The output opens, if:<br>▶ No slow stop alarm is active and<br>▶ Fault reset button is pressed | | | |

back to Logical binary outputs alphabetically

## AL Common Wrn

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 3 | | |
| Description | | | |
| Output closes when any warning alarm appears.<br>The output opens, if:<br>▶ No warning alarm is active and<br>▶ Fault reset button is pressed | | | |

back to Logical binary outputs alphabetically

## AL CoolantTemp Low

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1295 | | |
| Description | | | |
| The output is closed when there is the Wrn Coolant Temperature Low (page 798) alarm from the COOLANT TEMP (PAGE 769) in the alarmlist or isn't confirmed. | | | |

Logical binary outputs alphabetically (page 674)

## AL CoolantTemp Sd

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1421 | | |
| Description | | | |
| The output is closed when there is the shutdown or BOC alarm from the COOLANT TEMP (PAGE 769) in the alarmlist or isn't confirmed. | | | |

Logical binary outputs alphabetically (page 674)

## AL CoolantTemp Wrn

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1420 | | |
| Description | | | |
| The output is closed when there is the warning alarm from the COOLANT TEMP (PAGE 769) in the alarmlist or isn't confirmed.<br>***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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1260 | | |
| Description | | | |
| This output is active when the Wrn Charging Alternator Fail (page 797) alarm is present in the alarmlist or isn't confirm. | | | |

back to Logical binary outputs alphabetically

## AL Earth Fault

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1294 | | |
| Description | | | |
| This output is active when the Sd Earth Fault Current (page 819) alarm is present in alarm list or isn't confirm.<br>***Note:*** *It is strongly recommended to use this output only onetime.* | | | |

back to Logical binary outputs alphabetically

## AL Excitation Loss

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 2309 | | |
| **Description** | | | |
| This output is active when the **BOC Excitation Loss (page 828)** alarm is present in the alarmlist. | | | |

back to Logical binary outputs alphabetically

## AL Fence 1

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1548 | | |
| **Description** | | | |
| This output is active when the **Wrn Fence 1 Alarm (page 799)** or **BOC Fence 1 Alarm (page 828)** or **Sd Fence 1 Alarm (page 819)** (depends on configuration of alarm type) alarm is present in the alarmlist or isn't confirm. | | | |

back to Logical binary outputs alphabetically

## AL Fence 2

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1549 | | |
| **Description** | | | |
| This output is active when the **Wrn Fence 2 Alarm (page 800)** or **BOC Fence 2 Alarm (page 828)** or **Sd Fence 2 Alarm (page 819)** (depends on configuration of alarm type) alarm is present in the alarmlist or isn't confirm. | | | |

back to Logical binary outputs alphabetically

## AL Fuel Level Sd

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1423 | | |
| **Description** | | | |
| The output is closed when there is the shutdown or BOC alarm from the **FUEL LEVEL (PAGE 770)** in the alarmlist or isn't confirmed. | | | |

back to Logical binary outputs alphabetically

## AL Fuel Level Wrn

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1422 | | |
| **Description** | | | |
| The output is closed when there is the warning alarm from the **FUEL LEVEL (PAGE 770)** 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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1267 | | |
| **Description** | | | |
| This output is active generator frequency warning alarm is present in alarmlist or isn't confirm. | | | |

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## AL Gen Frequency

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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** | 1.5.0 | **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. | | | |

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## AL Gen Overvoltage

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## AL Gen Underfrequency

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## AL Gen Undervoltage

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## AL Gen Voltage Wrn

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## AL Gen Voltage

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## AL Mains Fail

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 197 | | |
| **Description** | | | |
| Output for signaling Mains Failure. This output is active when at least one mains frequency BOC or Sd alarm or at least one mains voltage BOC or Sd alarm is present in alarmlist or isn't confirmed. | | | |

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## AL Mains Frequency

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

back to Logical binary outputs alphabetically

## AL Mains Voltage

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## AL Maintenance 1

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## AL Maintenance 2

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## AL Maintenance 3

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## AL Maintenance 4

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 2211 | | |
| **Description** | | | |
| This output is active when the Alarm Maintenance 4 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 4 isn't confirm. | | | |

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## AL Maintenance 5

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 2212 | | |
| **Description** | | | |
| This output is active when the Alarm Maintenance 5 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 5 isn't confirm. | | | |

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## AL Maintenance 6

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 2213 | | |
| **Description** | | | |
| This output is active when the Alarm Maintenance 6 is present in the alarmlist. It means that counter of maintenance is on zero or the Alarm Maintenance 6 isn't confirm. | | | |

back to Logical binary outputs alphabetically

## AL Oil Press Sd

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1419 | | |
| **Description** | | | |
| The output is closed when there is the shutdown alarm from the **OIL PRESSURE (PAGE 772)** in the alarmlist or isn't confirmed. | | | |

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## AL Oil Press Wrn

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1418 | | |
| **Description** | | | |
| The output is closed when there is the warning alarm from the **OIL PRESSURE (PAGE 772)** 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.*

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## AL Overcurrent

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 109 | | |
| **Description** | | | |
| This output is active when the **BOC Overcurrent IDMT (page 832)** or alarm is present in alarmlist or isn't confirm. | | | |

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## AL Overload BOC

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1268 | | |
| **Description** | | | |
| This output is active when the **Sd Overload (page 825)** alarm is present in the alarmlist or isn't confirm. | | | |

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## AL Overload Wrn

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1269 | | |
| **Description** | | | |
| This output is active when the **Wrn Overload (page 807)** alarm is present in alarmlist or isn't confirm. | | | |

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## AL Overspeed

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 779 | | |
| **Description** | | | |
| This output is active when the **Sd Overspeed (page 825)** alarm is present in the alarmlist or isn't confirm. | | | |

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## AL Rental Timer 1

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1370 | | |
| **Description** | | | |
| The binary output closes when the **Rental Timer 1 (page 443)** elapsed. | | | |

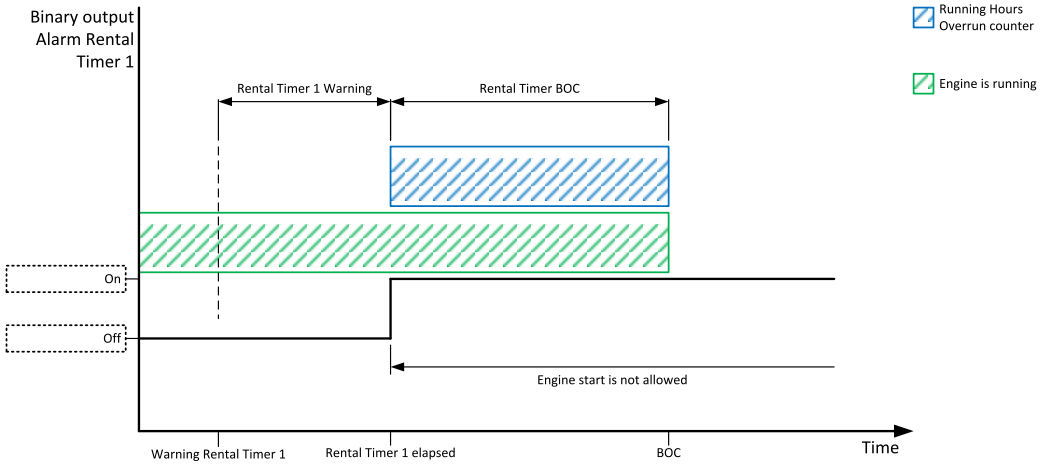



Image 8.138 Rental Timer 1

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## AL Rental Timer 2

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1371 | | |
| Description | | | |
| The binary output closes when the **Rental Timer 2 (page 445)** elapsed. | | | |

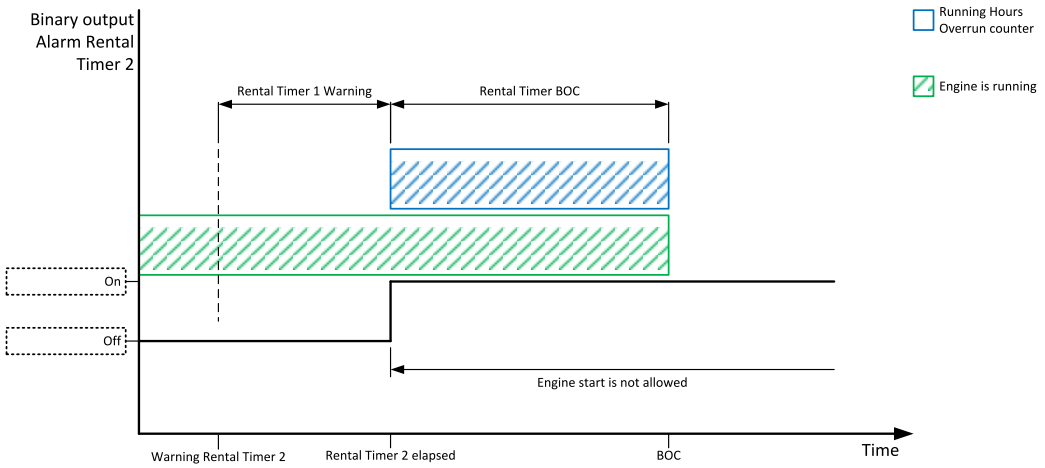



Image 8.139 Rental Timer 2

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## AL Reverse Power

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 2308 | | |
| Description | | | |
| This output is active when the **BOC Reverse Power (page 833)** alarm is present in the alarmlist. | | | |

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## AL Start Fail

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1291 | | |
| Description | | | |
| This output is active when the **Sd Start Fail (page 826)** alarm is present in the alarmlist or isn't confirm. | | | |

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## AL Stop Fail

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 339 | | |
| Description | | | |
| This output is active when the **Wrn Stop Fail (page 808)** alarm is present in the alarmlist or isn't confirm. | | | |

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## AL Synchronisation Fail

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 295 | | |
| **Description** | | | |
| This output is active when the **STP Synchronization Fail (page 834)** alarm is present in the alarmlist. | | | |

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## AL Underspeed

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1296 | | |
| **Description** | | | |
| This output is active when the **Sd Underspeed (page 826)** alarm is present in the alarmlist or isn't confirm. | | | |

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## Alarm

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## AIN Switch01

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 369)** and **Analog Switch 1 Off (page 370)**. The value is measured from **AIN SWITCH 01 (PAGE 762)** analog input.

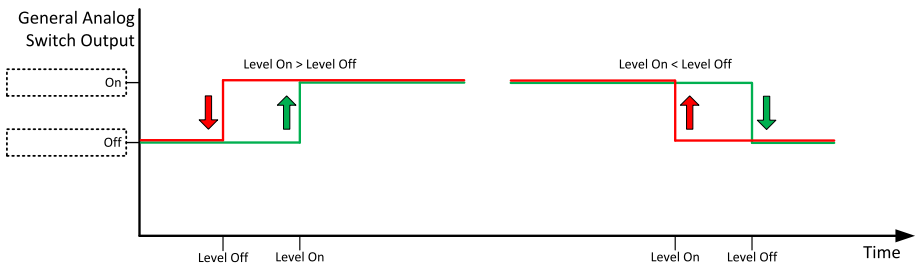



Image 8.140 General analog input 1 switch

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## AIN Switch02

| Related FW | 1.5.0 | 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 372)** and **Analog Switch 2 Off (page 373)**. The value is measured from **AIN SWITCH 02 (PAGE 762)** analog input. | | | |




Image 8.141 General analog input 2 switch

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## AIN Switch03

| Related FW | 1.5.0 | 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 375)** and **Analog Switch 3 Off (page 376)**. The value is measured from **AIN SWITCH 03 (PAGE 762)** analog input. | | | |




Image 8.142 General analog input 3 switch

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## AIN Switch04

| Related FW | 1.5.0 | 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 378)** and **Analog Switch 4 Off (page 379)**. The value is measured from **AIN SWITCH 04 (PAGE 763)** analog input. | | | |




Image 8.143 General analog input 4 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch05

| Related FW | 1.5.0 | 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 381)** and **Analog Switch 5 Off (page 382)**. The value is measured from **AIN SWITCH 05 (PAGE 763)** analog input. | | | |




Image 8.144 General analog input 5 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch06

| Related FW | 1.5.0 | 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 384)** and **Analog Switch 6 Off (page 385)**. The value is measured from **AIN SWITCH 06 (PAGE 763)** analog input. | | | |




Image 8.145 General analog input 6 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch07

| Related FW | 1.5.0 | 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 387)** and **Analog Switch 7 Off (page 388)**. The value is measured from **AIN SWITCH 07 (PAGE 764)** analog input. | | | |




Image 8.146 General analog input 7 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch08

| Related FW | 1.5.0 | 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 390)** and **Analog Switch 8 Off (page 391)**. The value is measured from **AIN SWITCH 08 (PAGE 764)** analog input. | | | |




Image 8.147 General analog input 8 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch09

| Related FW | 1.5.0 | 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 393)** and **Analog Switch 9 Off (page 394)**. The value is measured from **AIN SWITCH 09 (PAGE 764)** analog input. | | | |




Image 8.148 General analog input 9 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch10

| Related FW | 1.5.0 | 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 396)** and **Analog Switch 10 Off (page 397)**. The value is measured from **AIN SWITCH 10 (PAGE 765)** analog input. | | | |




Image 8.149 General analog input 10 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch11

| Related FW | 1.5.0 | 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 399)** and **Analog Switch 11 Off (page 400)**. The value is measured from **AIN SWITCH 11 (PAGE 765)** analog input. | | | |




Image 8.150 General analog input 11 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch12

| Related FW | 1.5.0 | 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 402)** and **Analog Switch 12 Off (page 403)**. The value is measured from **AIN SWITCH 12 (PAGE 765)** analog input. | | | |




Image 8.151 General analog input 12 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch13

| Related FW | 1.5.0 | 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 405)** and **Analog Switch 13 Off (page 406)**. The value is measured from **AIN SWITCH 13 (PAGE 766)** analog input. | | | |




Image 8.152 General analog input 13 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch14

| Related FW | 1.5.0 | 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 408)** and **Analog Switch 14 Off (page 409)**. The value is measured from **AIN SWITCH 14 (PAGE 766)** analog input. | | | |

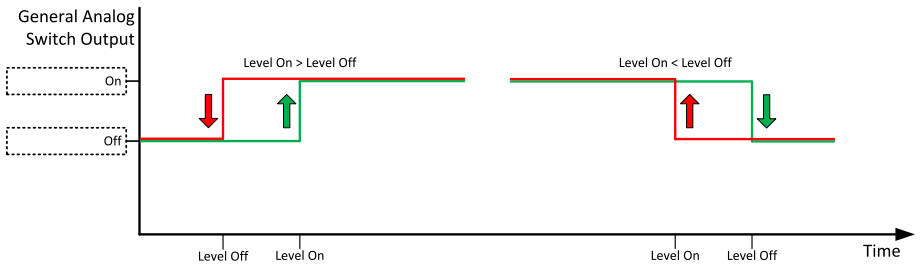



Image 8.153 General analog input 14 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch15

| Related FW | 1.5.0 | 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 411)** and **Analog Switch 15 Off (page 412)**. The value is measured from **AIN SWITCH 15 (PAGE 766)** analog input. | | | |

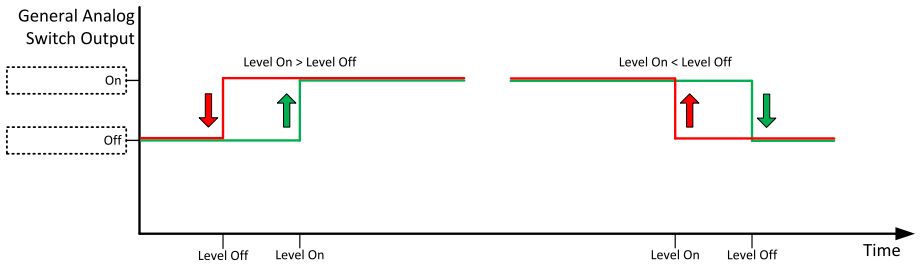



Image 8.154 General analog input 15 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch16

| Related FW | 1.5.0 | 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 414)** and **Analog Switch 16 Off (page 415)**. The value is measured from **AIN SWITCH 16 (PAGE 767)** analog input. | | | |




Image 8.155 General analog input 16 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch17

| Related FW | 1.5.0 | 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 417)** and **Analog Switch 17 Off (page 418)**. The value is measured from **AIN SWITCH 17 (PAGE 767)** analog input. | | | |




Image 8.156 General analog input 17 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch18

| Related FW | 1.5.0 | 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 420)** and **Analog Switch 18 Off (page 421)**. The value is measured from **AIN SWITCH 18 (PAGE 767)** analog input. | | | |




Image 8.157 General analog input 18 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch19

| Related FW | 1.5.0 | 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 423)** and **Analog Switch 19 Off (page 424)**. The value is measured from **AIN SWITCH 19 (PAGE 768)** analog input. | | | |




Image 8.158 General analog input 19 switch

**Logical binary outputs alphabetically (page 674)**

## AIN Switch20

| Related FW | 1.5.0 | 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 426)** and **Analog Switch 20 Off (page 427)**. The value is measured from **AIN SWITCH 20 (PAGE 768)** analog input. | | | |

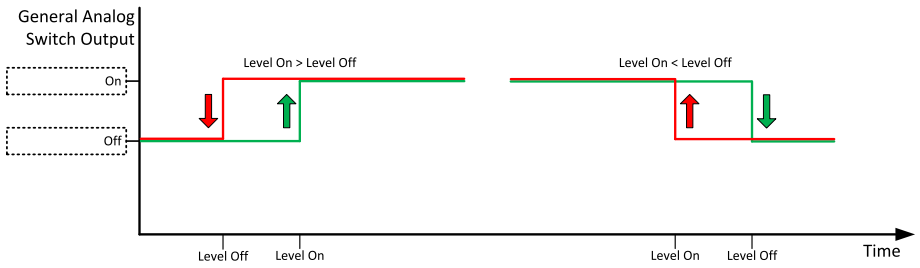



Image 8.159 General analog input 20 switch

**Logical binary outputs alphabetically (page 674)**

## ATT DEF Level Lamp

| Related FW | 1.5.0 | 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 | 1.5.0 | 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 | 1.5.0 | 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. | | | |

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## ATT Inhibited Lamp

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 2155 | | |
| **Description** | | | |
| This output is active when ATT Inhibited Lamp is active. | | | |

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## ATT SCR Error Lamp

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 2153 | | |
| **Description** | | | |
| This output is active when ATT SCR Error Lamp is active. | | | |

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## AVR Down

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 55 | | |
| **Description** | | | |
| This output together with the complementary output **AVR Up (page 699)** is designed for voltage and power factor control at gen-sets, where the AVR does not support analog control. | | | |

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## AVR Up

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 54 | | |
| **Description** | | | |
| This output together with the complementary output **AVR Down (page 699)** is designed for voltage and power factor control at gen-sets, where the AVR does not support analog control. | | | |

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# LBO: B

## BIN 1 Status

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1374 | | |
| Description | | | |

This output is closed, when Binary Input 1 is active and open when Binary Input 1 is inactive. When Binary Input 1 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.

***Note:*** *When LBI 1 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

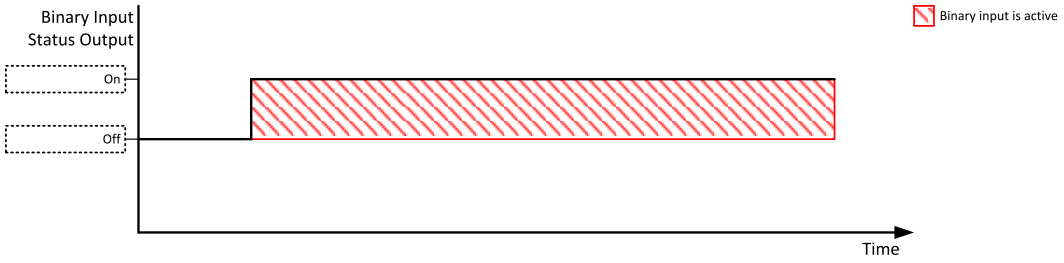



Image 8.160 Binary Input 1 Status

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## BIN 2 Status

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1375 | | |
| Description | | | |

This output is closed, when Binary Input 2 is active and open when Binary Input 2 is inactive. When Binary Input 2 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.

***Note:*** *When LBI 2 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

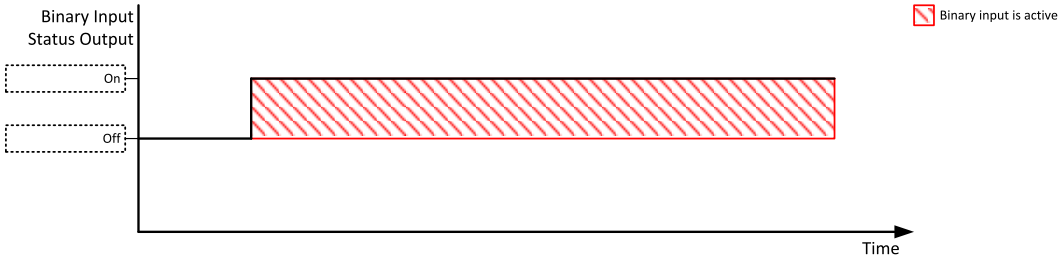



Image 8.161 Binary Input 2 Status

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## BIN 3 Status

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1376 | | |
| **Description** | | | |

This output is closed, when Binary Input 3 is active and open when Binary Input 3 is inactive. When Binary Input 3 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.

***Note:*** *When LBI 3 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

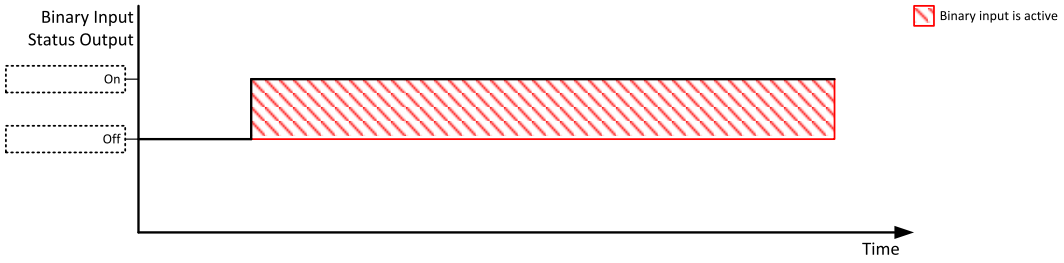



Image 8.162 Binary Input 3 Status

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## BIN 4 Status

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1377 | | |
| **Description** | | | |

This output is closed, when Binary Input 4 is active and open when Binary Input 4 is inactive. When Binary Input 4 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.

***Note:*** *When LBI 4 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

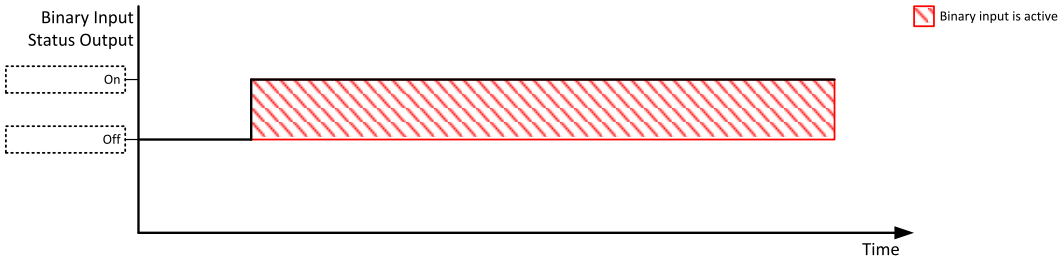



Image 8.163 Binary Input 4 Status

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## BIN 5 Status

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1378 | | |
| **Description** | | | |

This output is closed, when Binary Input 5 is active and open when Binary Input 5 is inactive. When Binary Input 5 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.

***Note:*** *When LBI 5 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

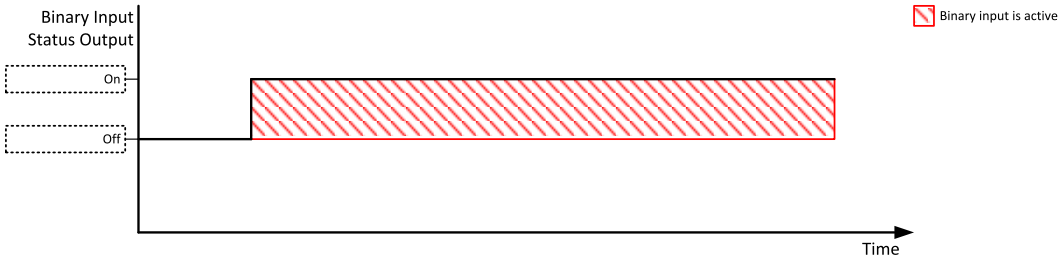



Image 8.164 Binary Input 5 Status

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## BIN 6 Status

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1379 | | |
| **Description** | | | |

This output is closed, when Binary Input 6 is active and open when Binary Input 6 is inactive. When Binary Input 6 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.

***Note:*** *When LBI 6 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

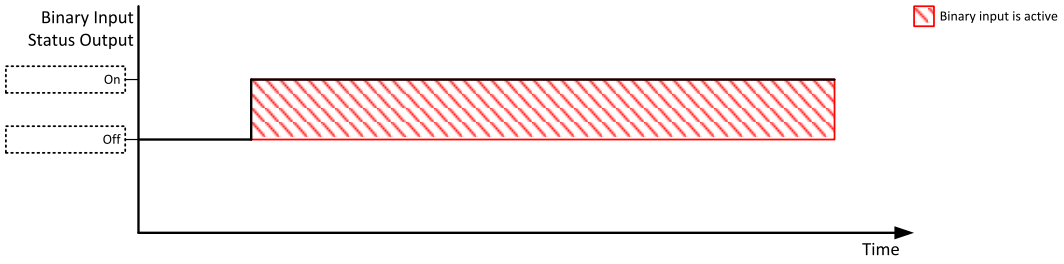



Image 8.165 Binary Input 6 Status

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## BIN 7 Status

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1380 | | |
| **Description** | | | |

This output is closed, when Binary Input 7 is active and open when Binary Input 7 is inactive. When Binary Input 7 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.

***Note:*** *When LBI 7 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

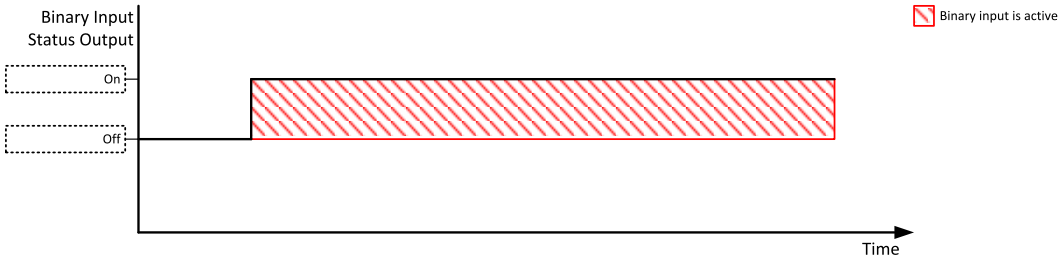



Image 8.166 Binary Input 7 Status

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## BIN 8 Status

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1381 | | |
| **Description** | | | |

This output is closed, when Binary Input 8 is active and open when Binary Input 8 is inactive. When Binary Input 8 is used for BIN protection function then this output is closed when BIN protection alarm is in Alarmlist.

***Note:*** *When LBI 8 is used like protection, then state of this LBO is connected with this protection e.g. when LBI is inactive but alarm of protection is not confirm in alarmlist, LBO is still active.*

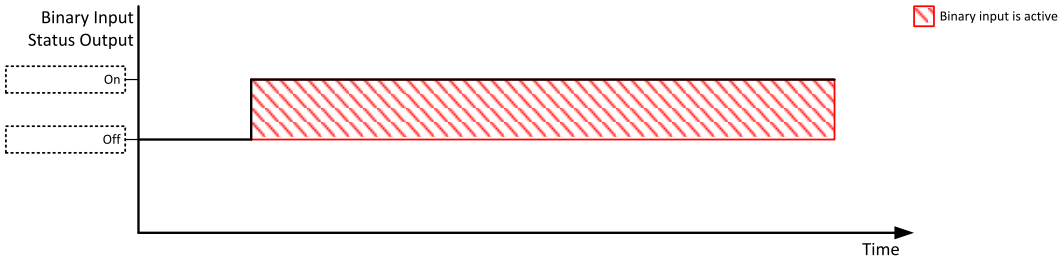



Image 8.167 Binary Input 8 Status

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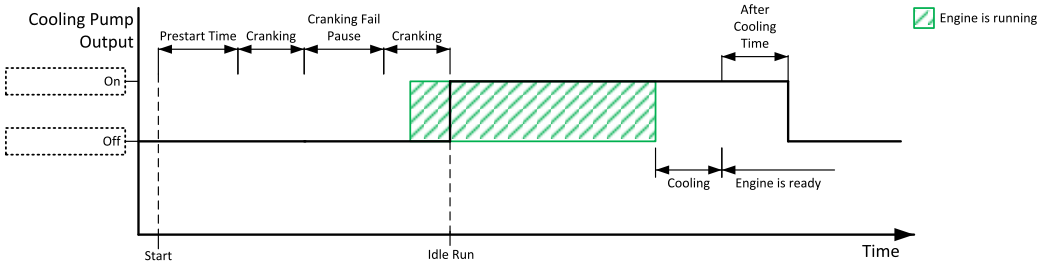
## Bus Healthy

| Related FW | 1.5.0 | 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.<br>It works only with **Application Mode Select (page 244)**= MINT, the output is always inactive with **Application Mode Select (page 244)** = SPTM. | | | |

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# LBO: C

## Cooling Pump

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 40 | | |
| Description | | | |
| This output is dedicated for coolant pump control. It is closed in the moment the gen-set is started and remains closed until the gen-set is stopped and **After Cooling Time (page 281)** elapses or the cranking pause or the Emergency Stop occurs or the controller is switched to OFF mode.<br>  <br><br>Image 8.168 Cooling Pump | | |

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## Cooling

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 74 | | |
| Description | | | |
| The output closes when gen-set is in Cooling state. | | | |

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# LBO: E

## ECU Communic Error

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 348 | | |
| **Description** | | | |
| This output is active when an ECU is configured, but the communication with the ECU is not established or has dropped out.<br>***Note:*** *When **ECU POWER RELAY (PAGE 706)** is not configured, output is evaluated all the time. If **ECU POWER RELAY (PAGE 706)** is configured, output is evaluated only when engine is not stop (**ECU POWER RELAY (PAGE 706)** is active).* | | | |

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## ECU Communic OK

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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.<br>***Note:*** *When **ECU POWER RELAY (PAGE 706)** is not configured, output is evaluated all the time. If **ECU POWER RELAY (PAGE 706)** is configured, output is evaluated only when engine is not stop (**ECU POWER RELAY (PAGE 706)** is active).* | | | |

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## ECU Power Relay

| Related FW | 1.5.0 | 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 closes together with **PRESTART (PAGE 729)** and remains closed for the entire duration that the engine is running. It is opened at the moment that the engine comes to a stop (i.e. together with the **FUEL SOLENOID (PAGE 709)**).

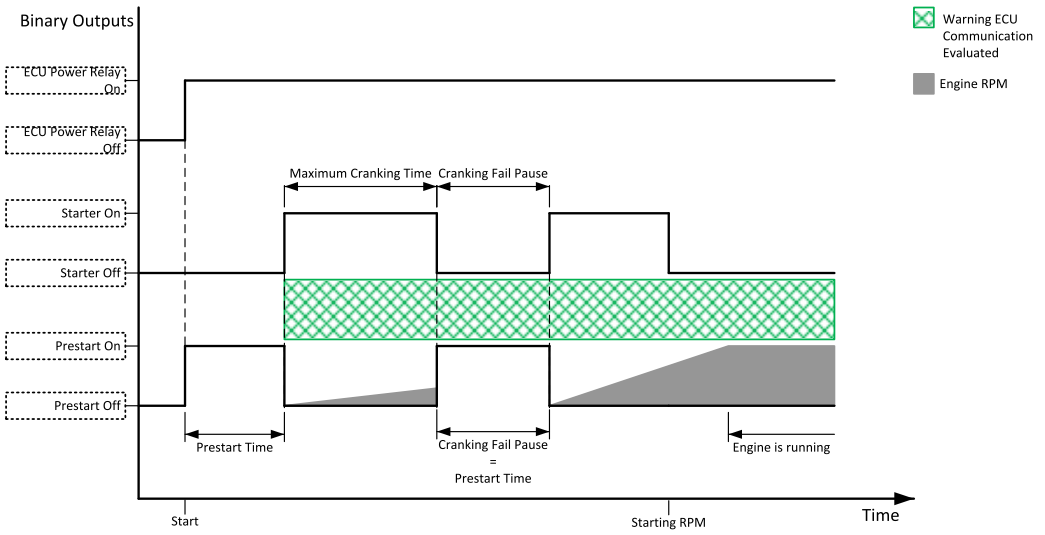



Image 8.169 ECU Power Relay

> **IMPORTANT: This LBO also affects evaluation of Sd ECU Communication Fail (page 819) or Wrn ECU Communication Fail (page 799) alarms. With configured LBO ECU Power Relay, these alarms are evaluated only when this LBO is active. Without configured LBO ECU Power Relay, these alarm are evaluated all the time.**

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## ECU Red Lamp

| Related FW | 1.5.0 | 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.

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## ECU Run Stop

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 958 | | |
| **Description** | | | |
| Signal for starting and stopping of ECU. | | | |

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## ECU Wait To Start

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 959 | | |
| **Description** | | | |
| This output is active when ECU Wait To Start Lamp is active. | | | |

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## ECU Yellow Lamp

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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. | | | |

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## Engines Swapped

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 335)** option RunHourEql. | | | |

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## Exercise Timer 1

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 429)** subgroup. This output is active when Timer 1 is active.<br>***Note:*** *In the event that both Timers are active at the same time,* ***Subgroup: Timer 1 (page 429)*** *has a higher priority than* ***Subgroup: Timer 2 (page 436)****.* | | | |

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## Exercise Timer 2

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 436)** 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 429)*** *has a higher priority than* ***Subgroup: Timer 2 (page 436)****.*

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# LBO: F

## FltRes Button Echo

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 is activated.

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## Forward Synchronisation

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM, SPI |
| **Comm object** | 68 | | |
| **Description** | | | |

The output is closed 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.*

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## Frequency Select

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1815 | | |
| **Description** | | | |

The Frequency select output is opened when Nominal Frequency (Frequency Settings) is equal to 50Hz and closed when Nominal Frequency (Frequency Settings) is equal to 60Hz.

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## Fuel Pump

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1253 | | |
| Description | | | |

Output closes when the value of Fuel Level lies under the value of **Fuel Pump On (page 298)** setpoint and opens when value of **Fuel Pump Off (page 299)** is reached.

This output also can be closed by binary input **FUEL PUMP ON/OFF (PAGE 659)**. In this case the binary output **FUEL PUMP ON (PAGE 298)** is closed until the binary input **FUEL PUMP ON/OFF (PAGE 659)** is active or until the value of Fuel Level reaches 100%.

> ***Note:*** *Setpoints **Fuel Pump On (page 298)** and **Fuel Pump Off (page 299)** are invisible until configuration of this LBO.*

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## Fuel Solenoid

| Related FW | 1.5.0 | 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 269)** setpoint in Engine Settings group.

**Diesel:**

The output closes before binary output **STARTER (PAGE 735)**.The lead time is adjusted by setpoint **Fuel Solenoid Lead (page 274)**.

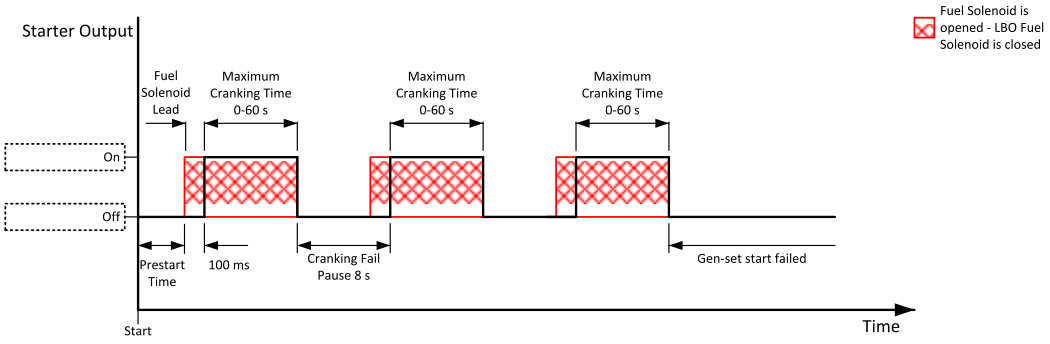



Image 8.170 Fuel Solenoid 1

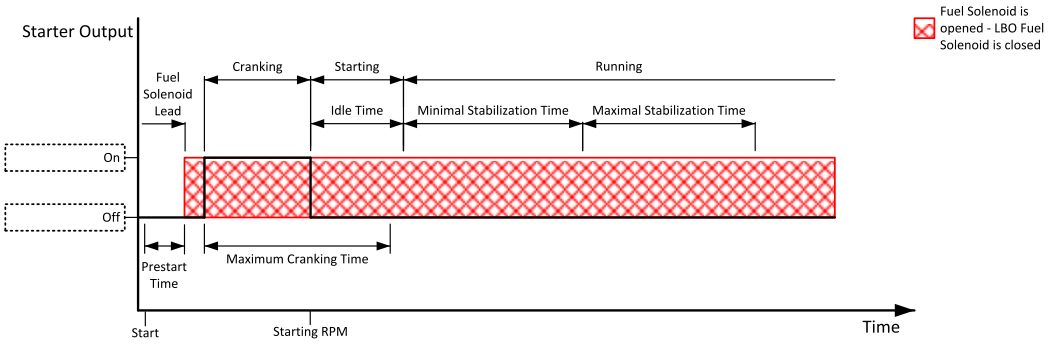



Image 8.171 Fuel Solenoid 2

The output opens when:

- Emergency Stop comes
- cooled gen-set is stopped
- in pause between repeated starts

**Gas:**

The output closes together with binary output **IGNITION (PAGE 719)** when engine RPM exceed 30 RPM (fix value).

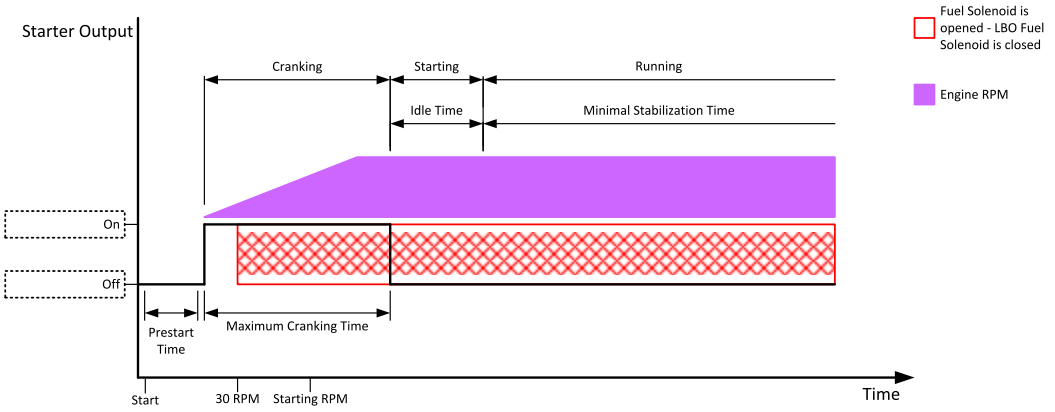



Image 8.172 Fuel Solenoid 3

The output opens when:

- Emergency Stop comes
- cooled gen-set is stopped
- in pause between repeated starts

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# LBO: G

## GCB Button Echo

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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.

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## GCB Close/Open

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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.

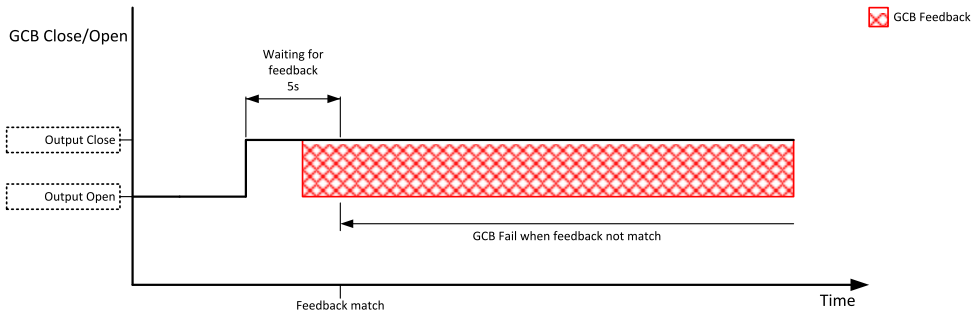



Image 8.173 GCB Close command

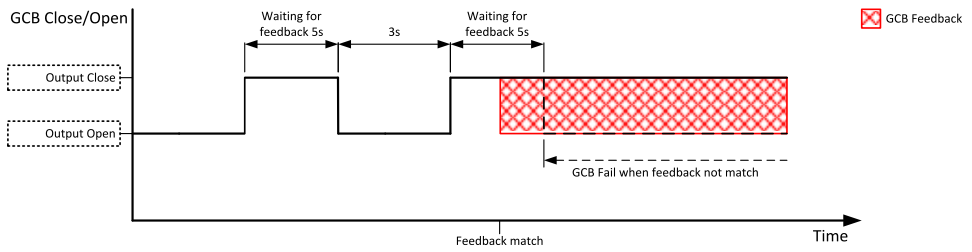



Image 8.174 Repeated GCB Close command

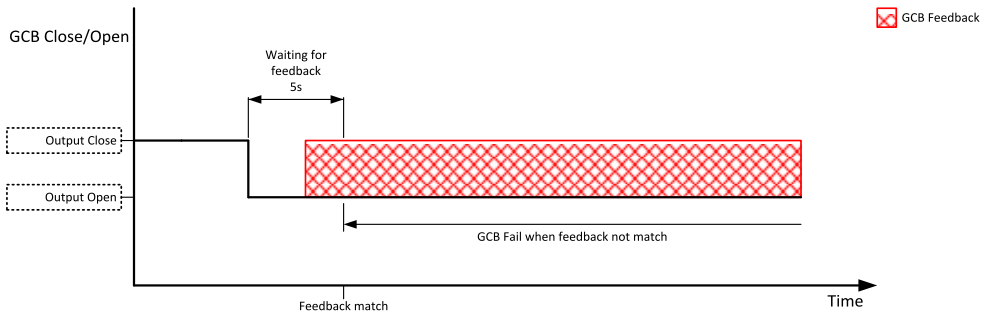



Image 8.175 GCB Open command

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## GCB OFF Coil

| Related FW | 1.5.0 | 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.

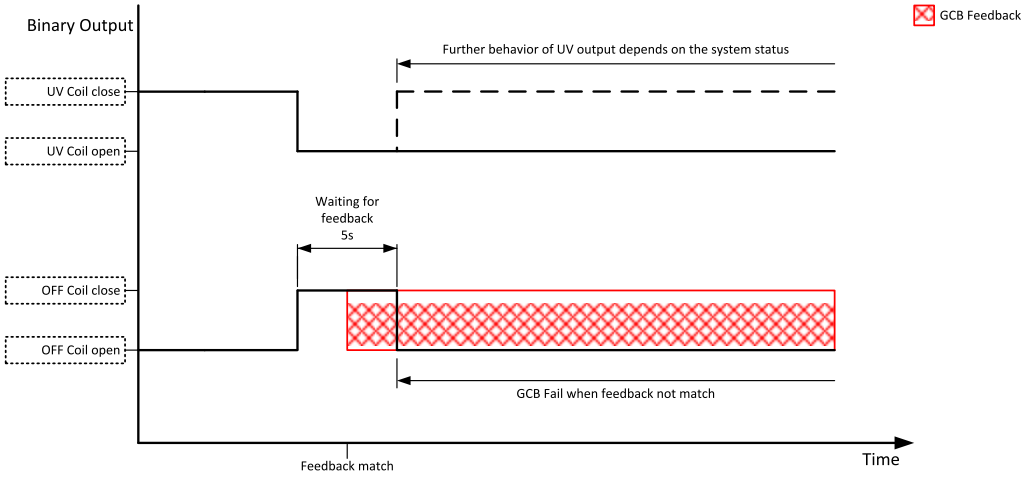



Image 8.176 GCB OFF Coil command

Image 8.177 GCB OFF Coil command

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## GCB ON Coil

| Related FW | 1.5.0 | 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.

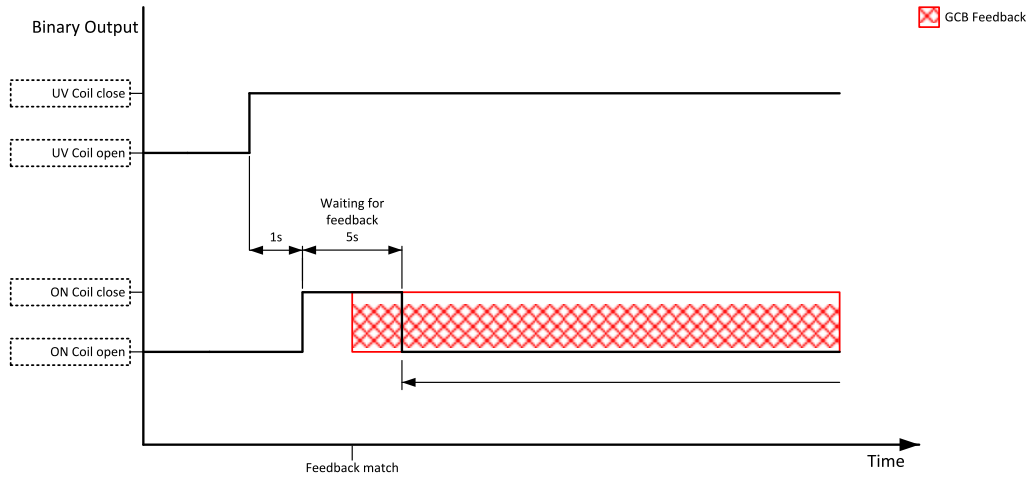



Image 8.178 GCB ON Coil close command

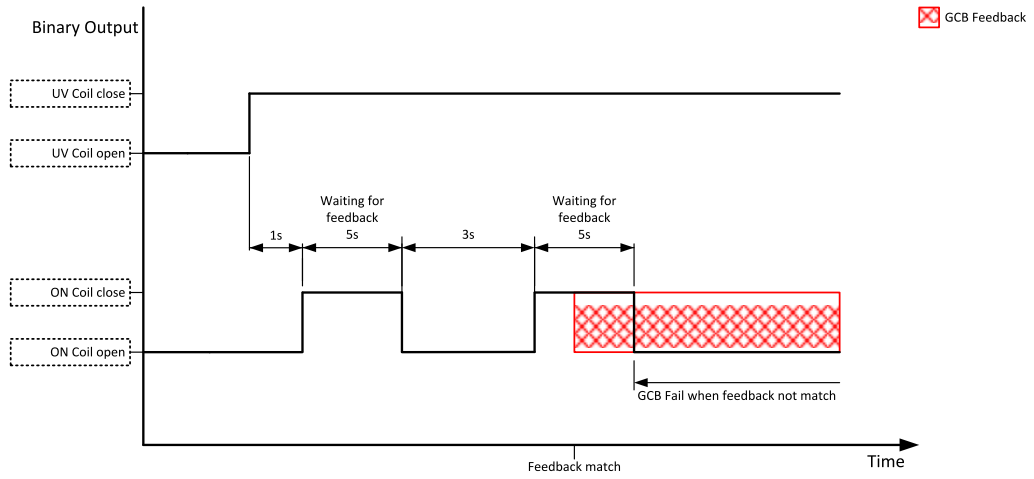



Image 8.179 Repeated GCB ON coil close command

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## GCB UV Coil

| Related FW | 1.5.0 | 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.

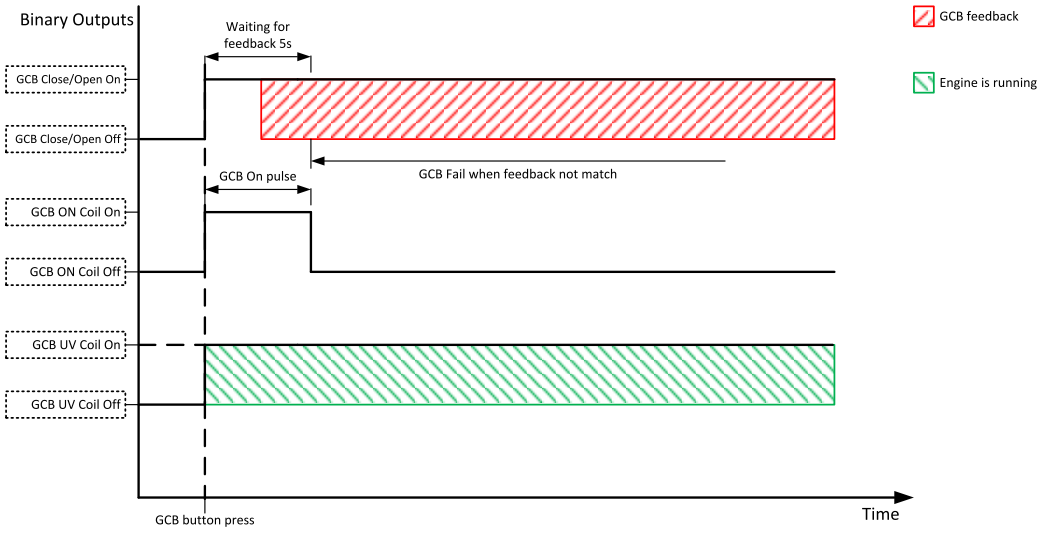



Image 8.180 GCB UV Coil close command

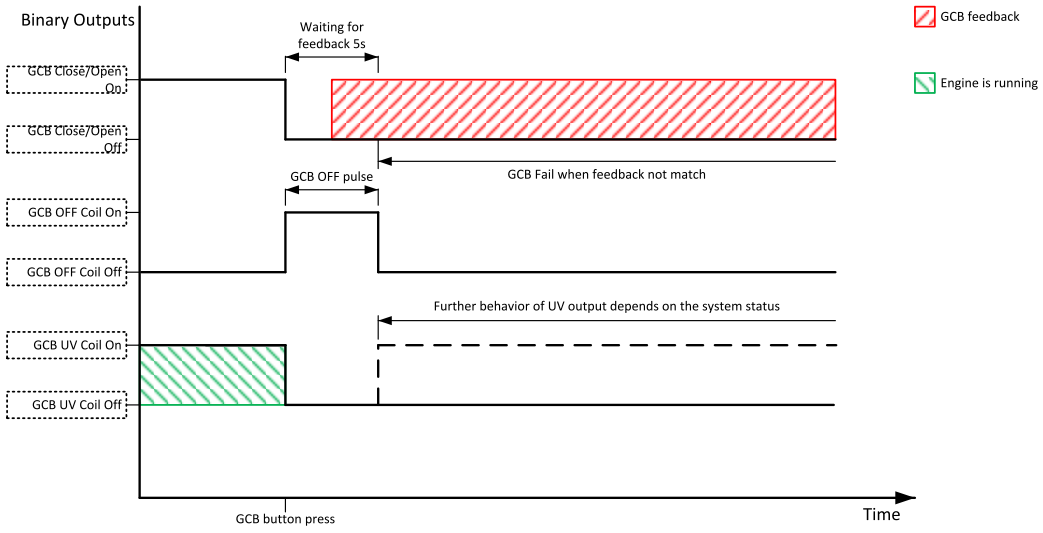



Image 8.181 GCB UV Coil open command

back to Logical binary outputs alphabetically

## Generator Healthy

| Related FW | 1.5.0 | 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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1252 | | |
| Description | | | |

This output is dedicated for diesel engine only. This output will close for exact time pre-set by setpoint **Glow Plugs Time (page 273)** before every starting attempt. The output opens in same time as the **STARTER (PAGE 735)** output closes (100 ms after **PRESTART (PAGE 729)** output opens).

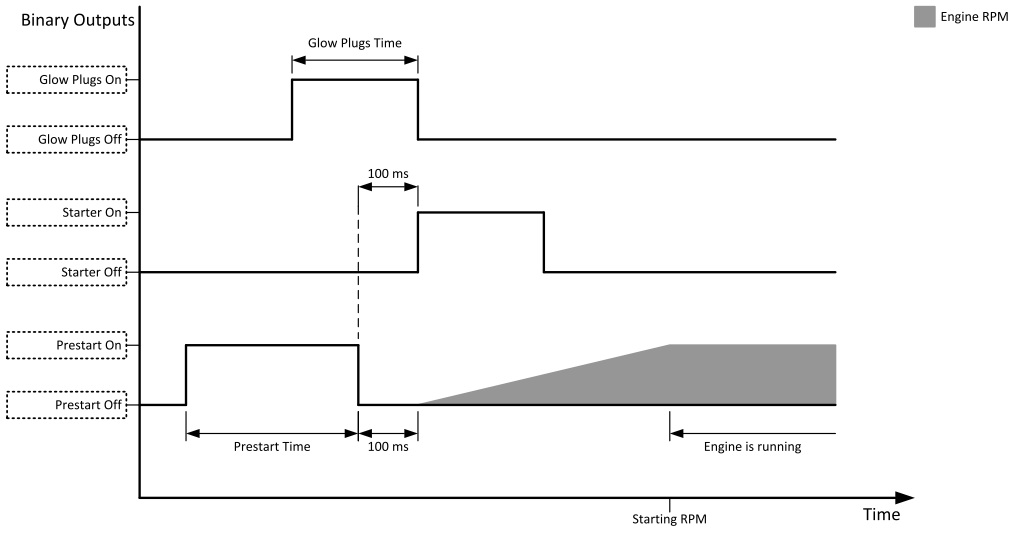



Image 8.182 Glow Plugs

When the **Glow Plugs Time (page 273)** is longer than **Cranking Fail Pause (page 270)** then the **Glow Plugs Time (page 273)** in **Cranking Fail Pause (page 270)** is long as **Cranking Fail Pause (page 270)**.

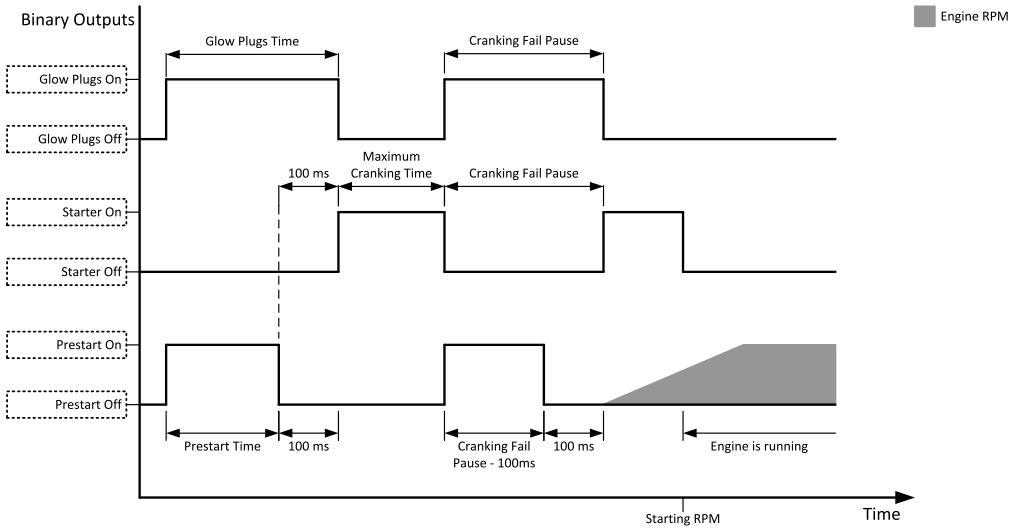



Image 8.183 Glow Plugs in Cranking Fail Pause 1

When the **Glow Plugs Time (page 273)** is shorter than **Cranking Fail Pause (page 270)** then the **Glow Plugs Time (page 273)** in **Cranking Fail Pause (page 270)** is long as normal **Glow Plugs Time (page 273)**.

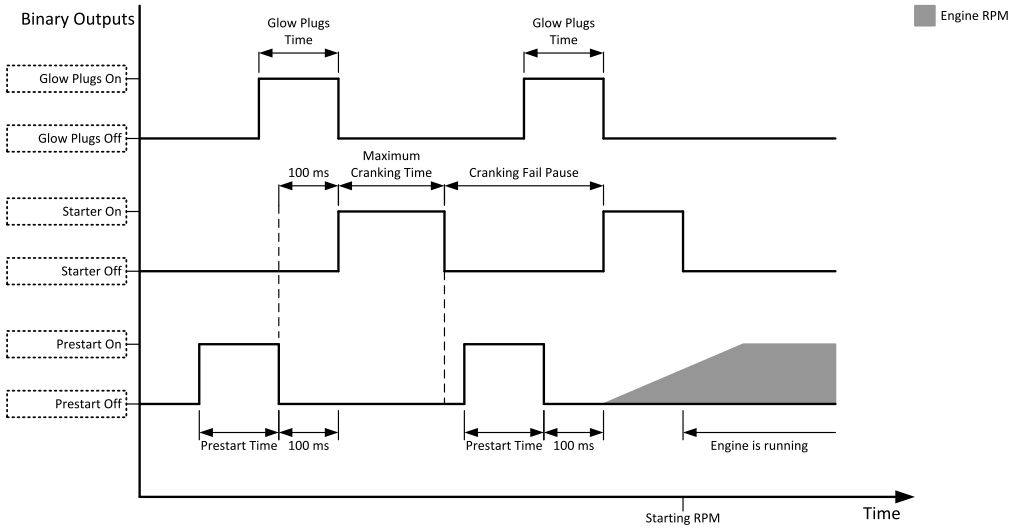



Image 8.184 Glow Plugs in Cranking Fail Pause 2

**back to Logical binary outputs alphabetically**

# LBO: H

## Heartbeat

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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

## Horn

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 266)** has elapsed

back to Logical binary outputs alphabetically

## HornRes Button Echo

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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** | 1.5.0 | **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 closes after the timer **Idle Time (page 275)** elapses. The **Idle Time (page 275)** starts to countdown when **Starting RPM (page 271)** reached. The underspeed protection is not evaluated during fixed 5 seconds period after reaching **Starting RPM (page 271)**. A Start Fail protection occurs if the RPM drop below 2RPM during idle.

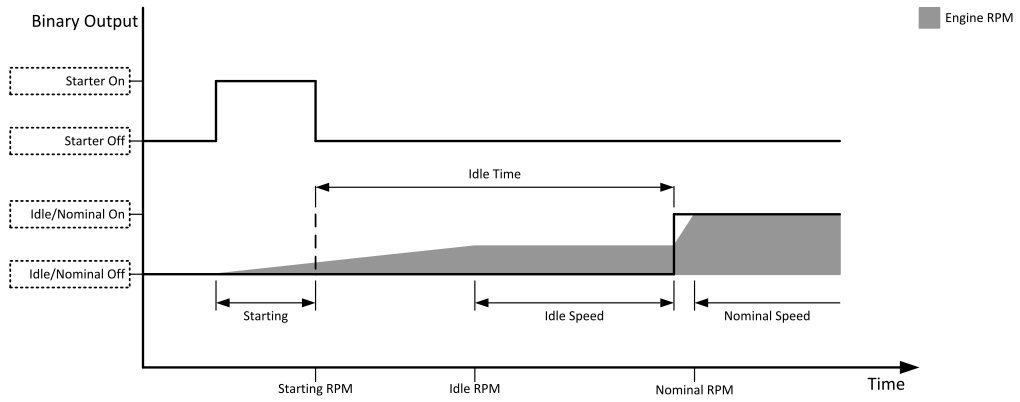



Image 8.185 Idle/Nominal

***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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1902 | | |
| **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 718)** is activated.

back to Logical binary outputs alphabetically

# Ignition

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 37 | | |

**Description**

This output is dedicated to controlling the ignition at a gas engine. The output is closed together with binary output **FUEL SOLENOID (PAGE 709)** in the moment when the timer **Sd Ventilation Time (page 279)** elapsed and the gen-set reaches at least 30 RPM during cranking. The timer **Sd Ventilation Time (page 279)** become active when the gen-set has been stopped for any Sd protection or the controller has been turned on only before first cranking attempt. The output is opened 500ms after all Additional running engine indication **Additional running engine indications (page 170)** will be inactive. The output is opened when the gen-set has to be stopped or in pause during repeated starts.

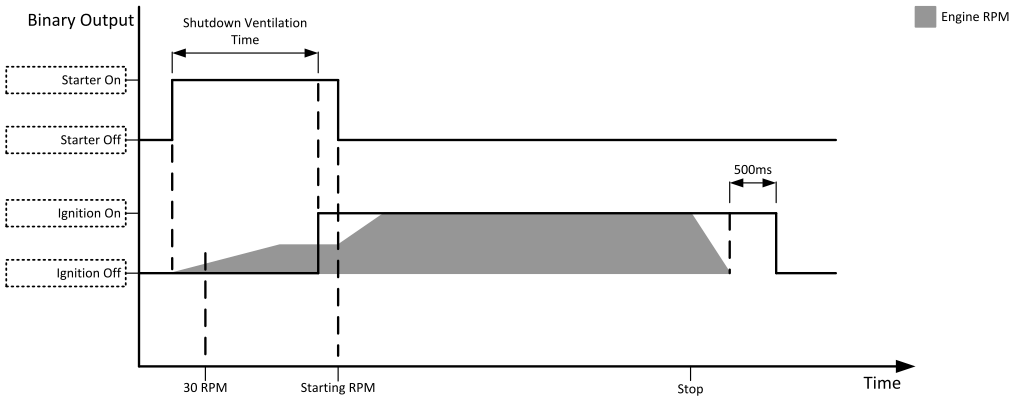



Image 8.186 Ignition 1

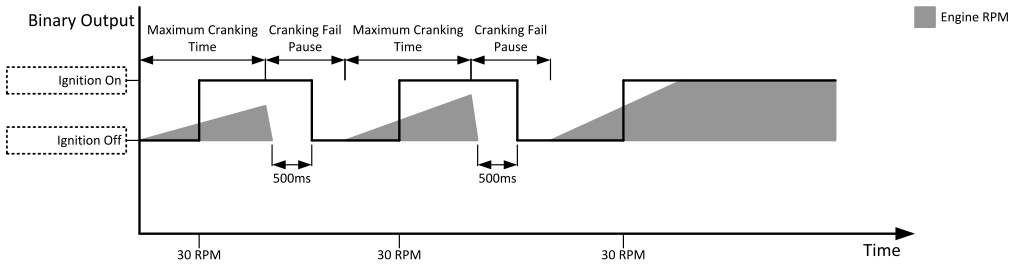



Image 8.187 Ignition 2

back to Logical binary outputs alphabetically

## Ignition On

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 1257 | | |
| **Description** | | | |
| This input is on since start button is pressed till the unit is completely stopped (or the engine doesn't start or Sd or E-Stop becomes active)<br>***Note:*** *This function is the same as* ***ECU POWER RELAY (PAGE 706)*** *. Ignition ON stays there from historical reasons.* | | | |

back to Logical binary outputs alphabetically

# LBO: K

## kWh Pulse

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 51 | | |
| **Description** | | | |
| Particular instances of the load shedding functionality<br>The load shedding outputs are activated (load is beeing shedd) in the order 1, 2, 3.<br>The load shedding outputs are deactivated (load is beeing reconnected) in the order 3, 2, 1.<br>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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 52 | | |
| **Description** | | | |
| Particular instances of the load shedding functionality<br>The load shedding outputs are activated (load is beeing shedd) in the order 1, 2, 3.<br>The load shedding outputs are deactivated (load is beeing reconnected) in the order 3, 2, 1.<br>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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 53 | | |
| Description | | | |
| Particular instances of the load shedding functionality<br>The load shedding outputs are activated (load is beeing shedd) in the order 1, 2, 3.<br>The load shedding outputs are deactivated (load is beeing reconnected) in the order 3, 2, 1.<br>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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 78 | | |
| Description | | | |
| This output is active when mains failure is not detected and the mains voltage and frequency are within limits. The limits for under/overvoltage and under/overfrequency can be found in the Mains Settings setpoint group.<br>It works only with **Application Mode Select (page 244)** = SPTM, the output is always inactive with **Application Mode Select (page 244)** = MINT. | | | |

back to Logical binary outputs alphabetically

## Manual Ready

| Related FW | 1.5.0 | 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 672)** is active (Output **READY (PAGE 732)** is active). | | | |

back to Logical binary outputs alphabetically

## MCB Button Echo

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 34 | | |
| Description | | | |
| This output provides 1s pulse when:<br>▶ MCB button is pressed on the controller front facia or<br>▶ MCB button is pressed on any of external local/remote terminals or<br>▶ MCB command is received via communication line or<br>▶ the input MCB BUTTON is activated. | | | |

back to Logical binary outputs alphabetically

## MCB Close/Open

| Related FW | 1.5.0 | 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.

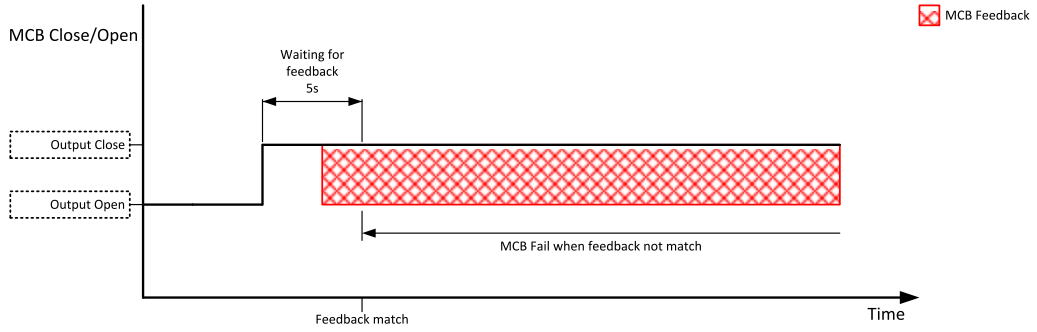



Image 8.188 MCB Close command

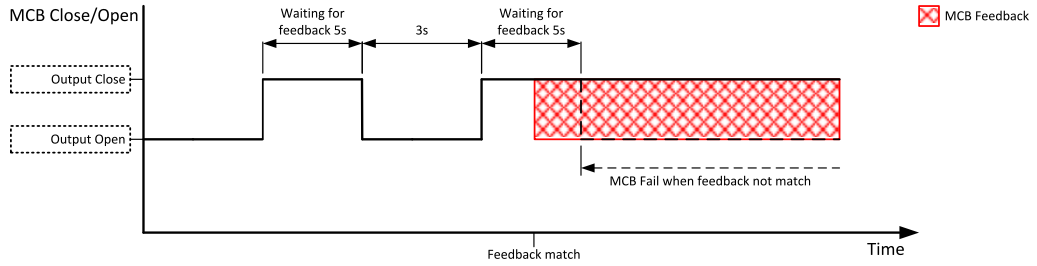



Image 8.189 Repeated MCB Close command

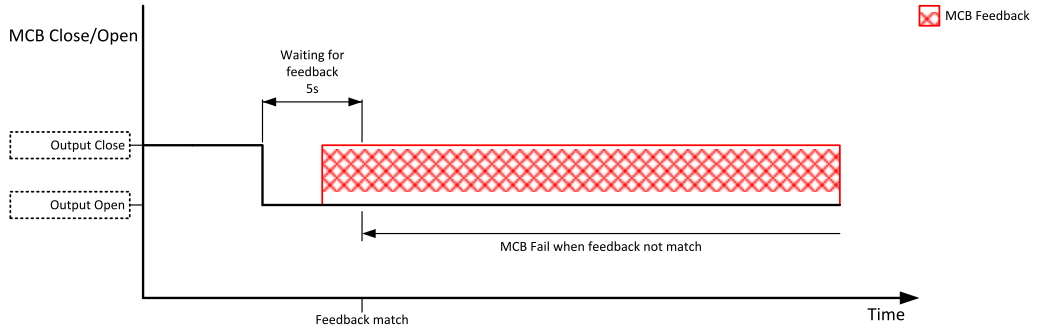



Image 8.190 MCB Open command

back to Logical binary outputs alphabetically

## MCB OFF Coil

| Related FW | 1.5.0 | 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.

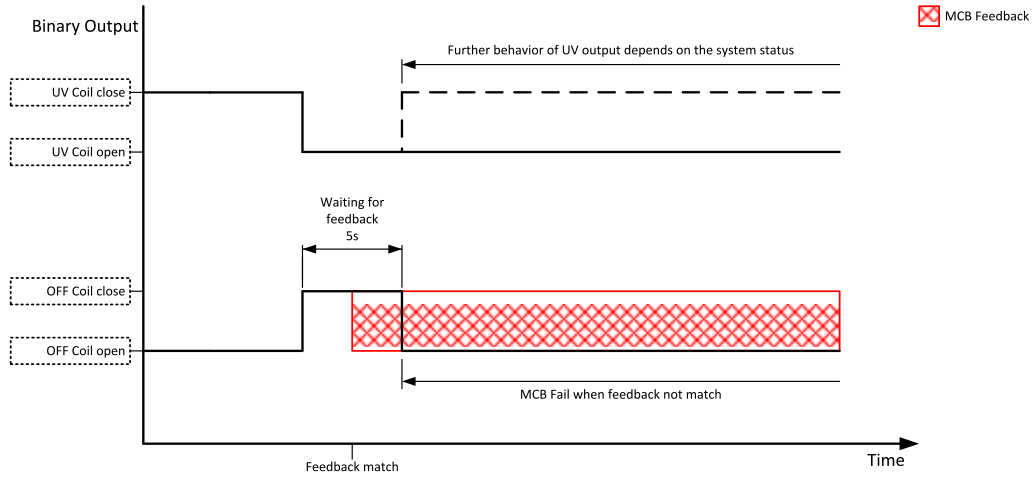



Image 8.191 MCB OFF Coil command

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## MCB ON Coil

| Related FW | 1.5.0 | 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.

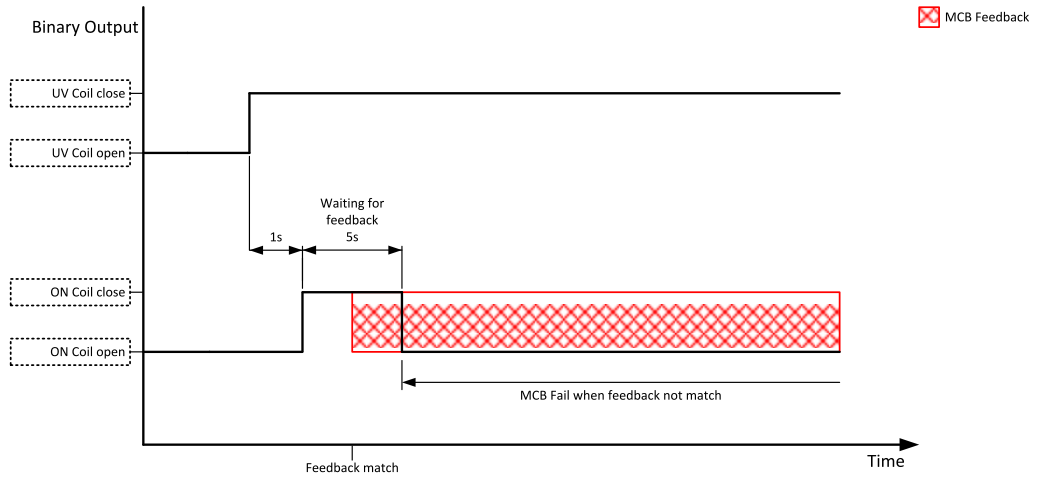



Image 8.192 MCB ON Coil close command

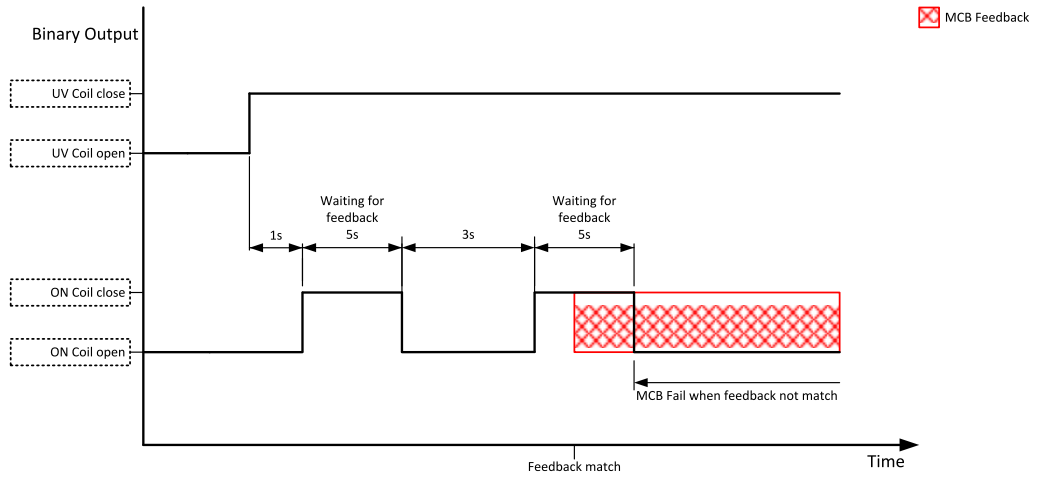



Image 8.193 Repeated MCB ON coil close command

back to Logical binary outputs alphabetically

## MCB UV Coil

| Related FW | 1.5.0 | 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.

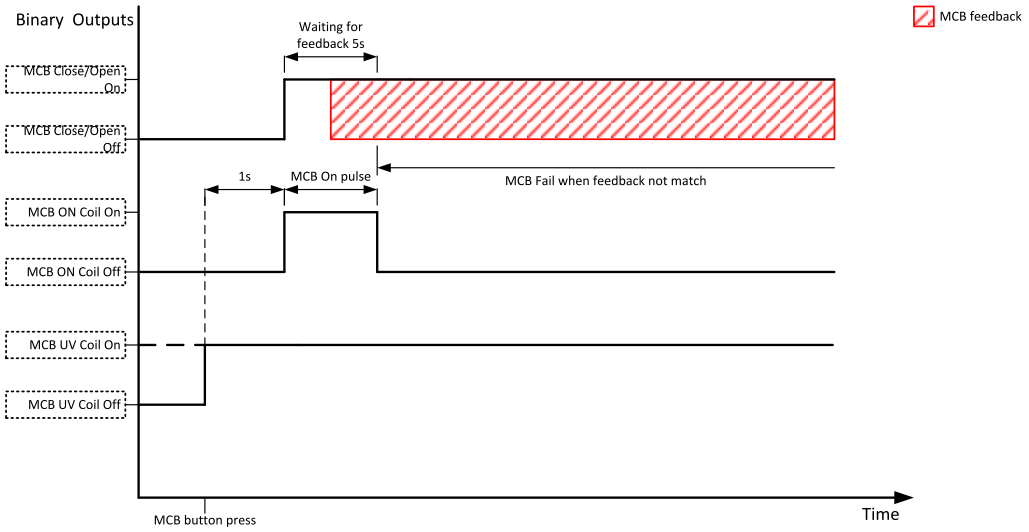



Image 8.194 MCB UV Coil close command

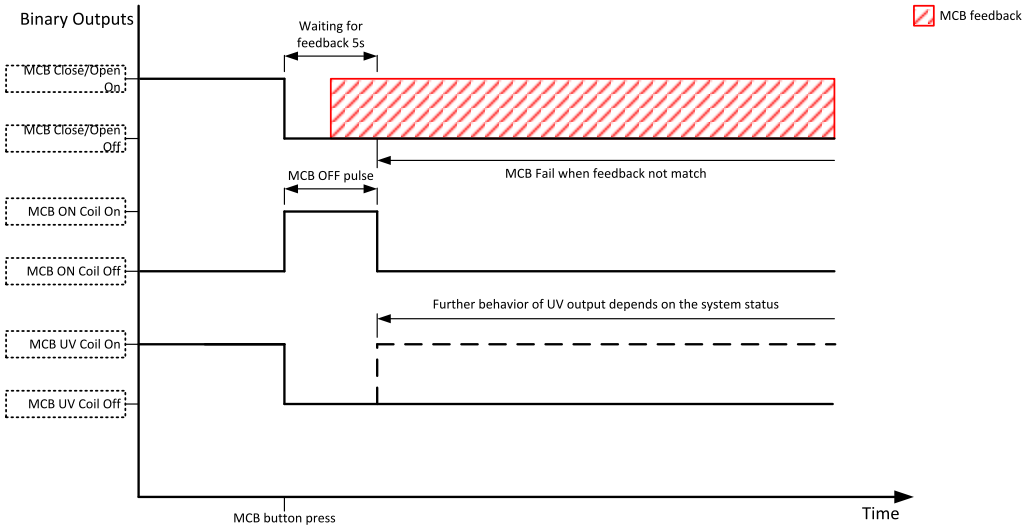



Image 8.195 MCb UV Coil open command

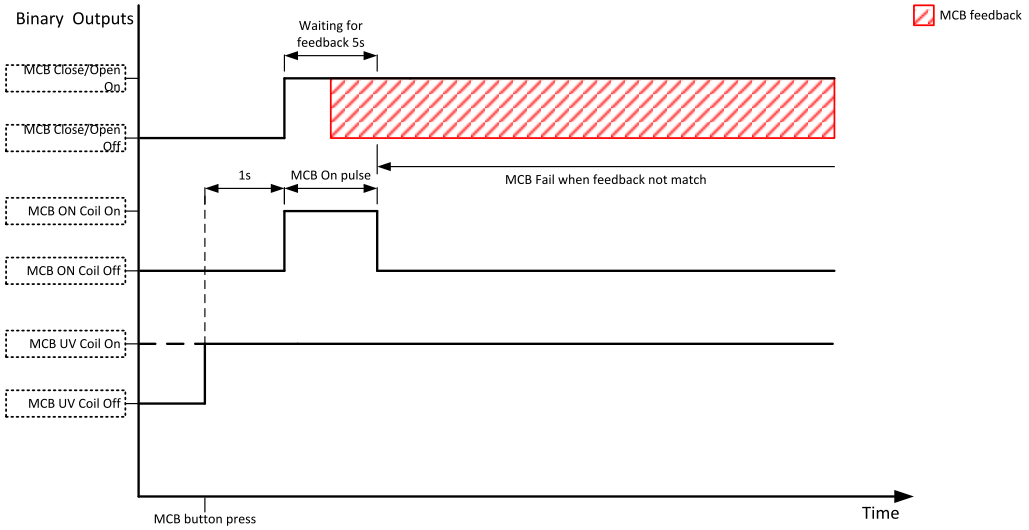



Image 8.196 MCB UV Coil close command

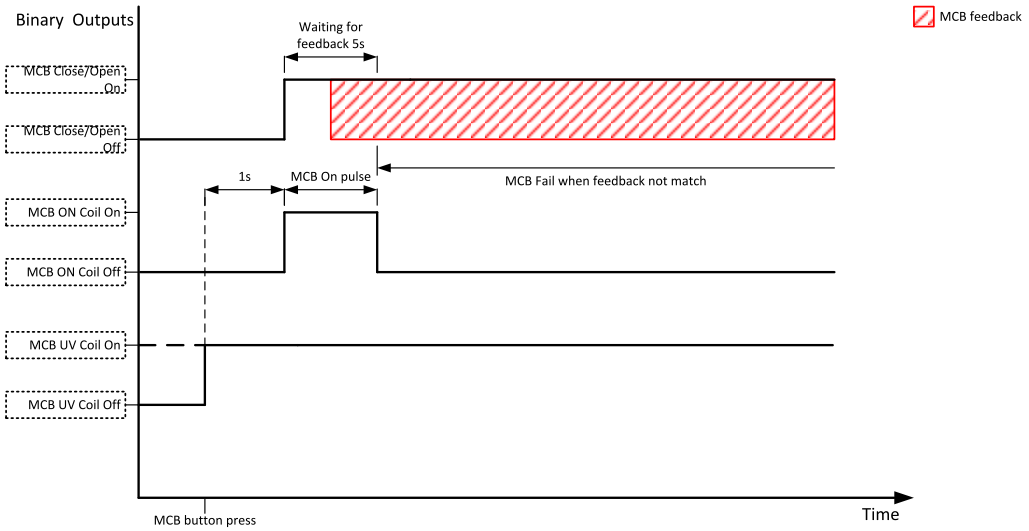



Image 8.197 MCB UV Coil close command

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## Mode AUTO

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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** | 1.5.0 | **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** | 1.5.0 | **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** | 1.5.0 | **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** | 1.5.0 | **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

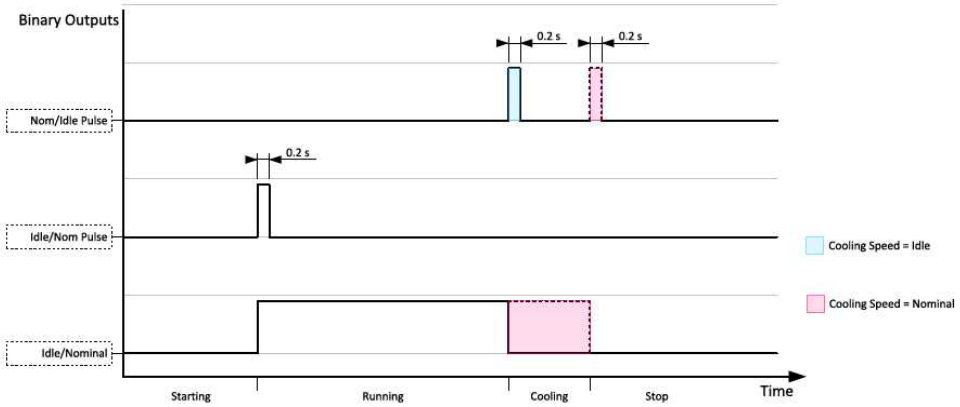
## Nominal/Idle Pulse

| Related FW | 1.5.0 | 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 279)** = Idle
  - 200 ms pulse is generated when transition from the Running to the Cooling state is done.
- **Cooling Speed (page 279)**= 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 718)** is deactivated.




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## Not In AUTO

| Related FW | 1.5.0 | 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 | 1.5.0 | 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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 2118 | | |
| **Description** | | | |
| Active anytime, when the peak shaving start condition is fulfilled. | | | |

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## Power Switch

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 281)** and **Power Switch Off (page 282)**. 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.

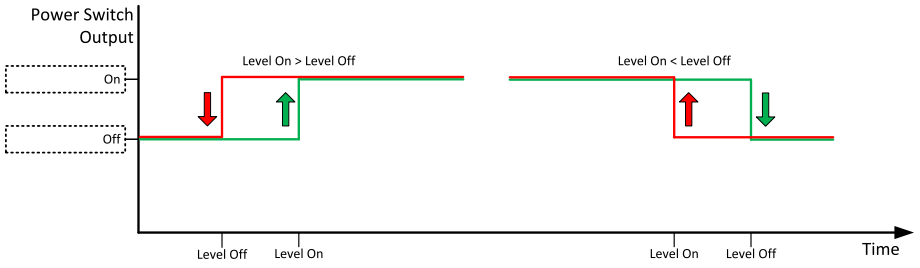



Image 8.198 Power Switch

***Note:*** *Setpoints **Power Switch On (page 281)** and **Power Switch Off (page 282)** are invisible until configuration of this LBO.*

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## Prestart

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 closed for time period of **Prestart Time (page 271)**. The output opens 100 ms before the **STARTER (PAGE 735)** output closes.

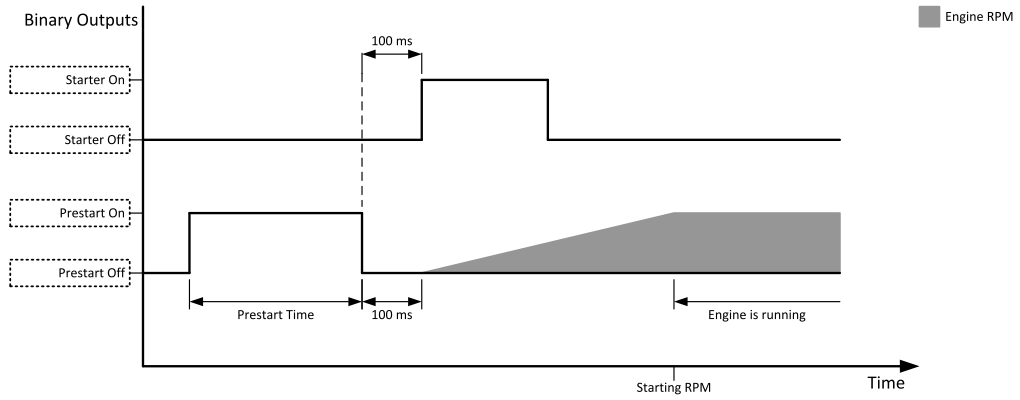



Image 8.199 Engine start

When the **Prestart Time (page 271)** is longer than **Cranking Fail Pause (page 270)** then the **Prestart Time (page 271)** in **Cranking Fail Pause (page 270)** is long as **Cranking Fail Pause (page 270)** minus 100ms.

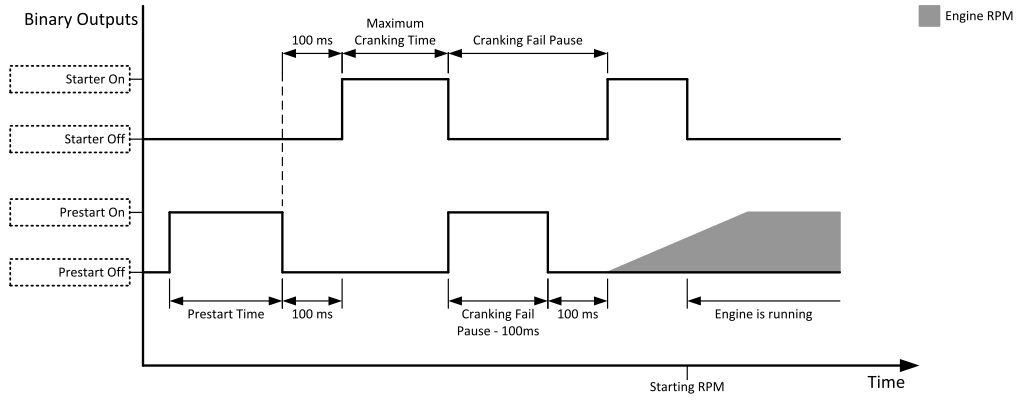



Image 8.200 Prestart in Cranking Fail Pause 1

When the **Prestart Time (page 271)** is shorter than **Cranking Fail Pause (page 270)** then the **Prestart Time (page 271)** in **Cranking Fail Pause (page 270)** is long as normal **Prestart Time (page 271)**.

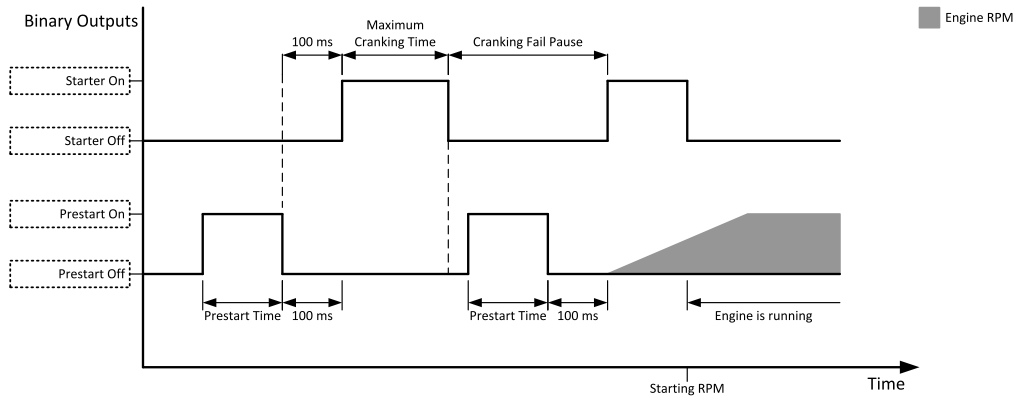



Image 8.201 Prestart in Cranking Fail Pause 2

back to Logical binary outputs alphabetically

# LBO: R

## Ready To AMF

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 324 | | |
| **Description** | | | |

The output is closed 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 Load

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 58 | | |
| **Description** | | | |

The output is closed whenever the GCB is closed or can be closed i.e. the stabilization phase is finished, the gen-set is running and the **Minimal Stabilization Time (page 277)** 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 closed.

back to Logical binary outputs alphabetically

## Ready

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 62 | | |
| Description | | | |
| The binary output is closed, when the engine is stopped and it is possible to start it i.e. no red alarm is activated or SD OVERRIDE (PAGE 672) is active.<br>The binary output is switch on when the Ready state occurs.<br>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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 1372 | | |
| Description | | | |
| This output is closed when DPF lamp from ECU is active. | | | |

back to Logical binary outputs alphabetically

## Reverse Synchronisation

| Related FW | 1.5.0 | Related applications | MINT, SPtM, SPI |
|---|---|---|---|
| Comm object | 69 | | |
| Description | | | |
| The output is closed during reverse synchronization and is opened when MCB is closed or reverse synchronisation is interrupted.<br>***Note:*** *The output can be used for external synchronizing module control.* | | | |

back to Logical binary outputs alphabetically

## Running

| Related FW | 1.5.0 | 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 closes if **FUEL SOLENOID (PAGE 709)** is closed and **STARTER (PAGE 735)** and **PRESTART (PAGE 729)** are open. The out remains close until engine stop and cooling period elapses. | | | |

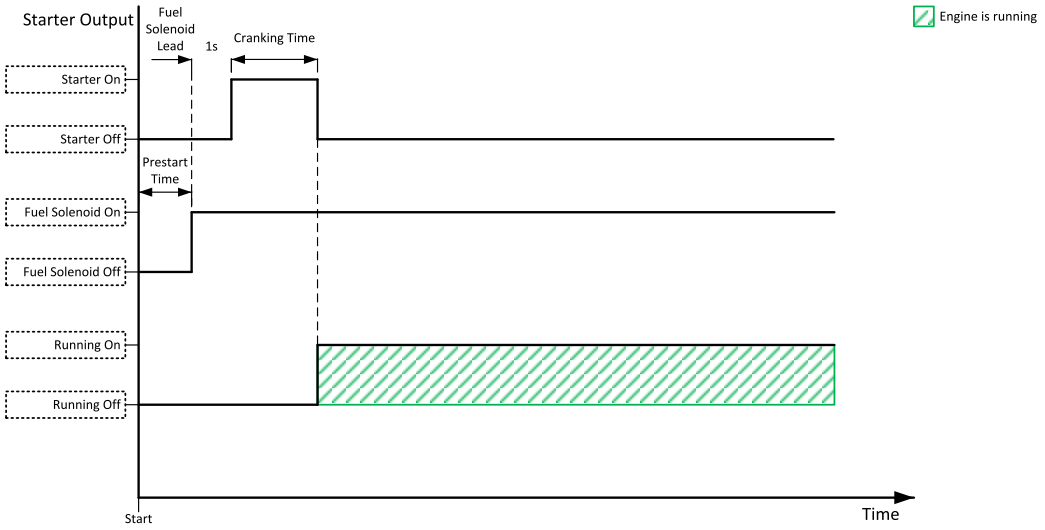



Image 8.202 Running

back to Logical binary outputs alphabetically

# LBO: S

## Sd Override

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 962 | | |
| Description | | | |
| The output is closed if **SD OVERRIDE (PAGE 672)** input is active and open if **SD OVERRIDE (PAGE 672)** input is inactive. This output is usually used to send information about **SD OVERRIDE (PAGE 672)** input into ECU. | | | |

back to Logical binary outputs alphabetically

## Speed Down

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 57 | | |
| Description | | | |
| This output together with the complementary output **SPEED UP (PAGE 734)** 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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 56 | | |
| **Description** | | | |
| This output together with the complementary output **SPEED DOWN (PAGE 733)** 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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 33 | | |
| **Description** | | | |
| This output provides 1s pulse when:<br>▶ Start button is pressed on the controller front facia or<br>▶ Start button is pressed on any of external local/remote terminals or<br>▶ Start command is received via communication line or<br>▶ the input START BUTTON is activated. | | | |

back to Logical binary outputs alphabetically

## Starter

| Related FW | 1.5.0 | 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 270)** in Engine Settings group. Cranking fail pause is adjusted by setpoint **Cranking Fail Pause (page 270)**.

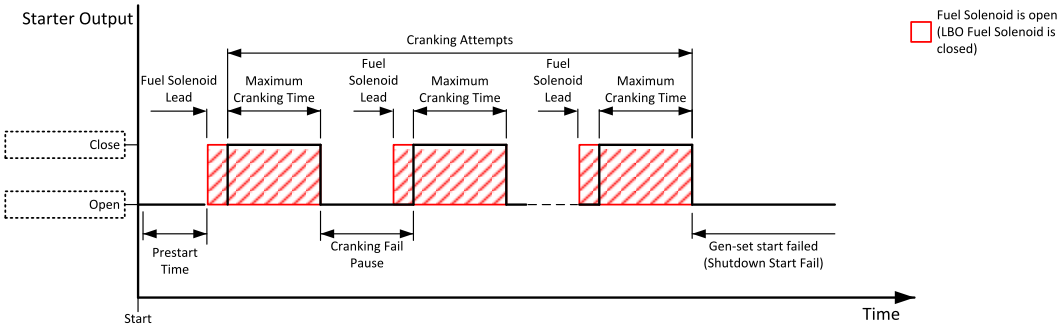



Image 8.203 Starter

The starter output opens when:

- the “firing” speed is reached
- maximum time of cranking is exceeded
- request to stop comes up
- D+ value is higher than 80%
- Oil pressure value is higher than **Starting Oil Pressure (page 272)**
- Generator voltage > 25% of **Nominal Voltage Ph-N (page 261)** or **Nominal Voltage Ph-Ph (page 261)** (any phase)

**back to Logical binary outputs alphabetically**

## Still Log 0

| Related FW | 1.5.0 | 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 | 1.5.0 | 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 | 1.5.0 | 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 | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 25 | | |
| Description | | | |

Output is active for 1 second after **STOP SOLENOID (PAGE 736)** output activation. This signal is sent to ECU in case of engine stop request.

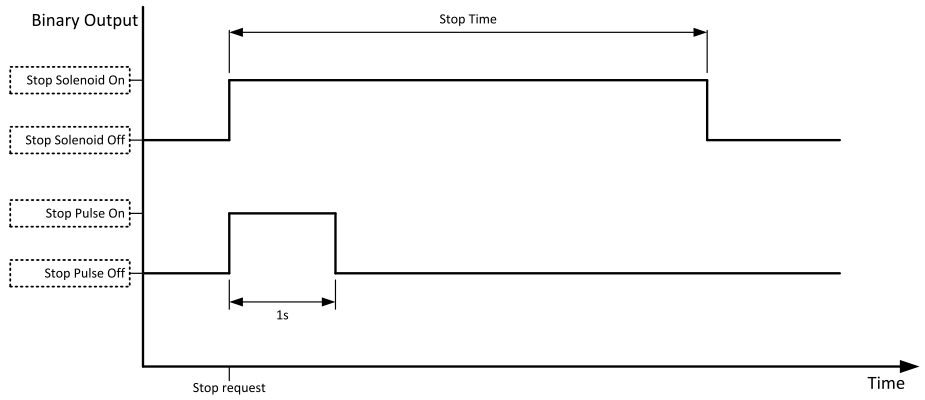



Image 8.204 Stop Pulse

back to Logical binary outputs alphabetically

## Stop Solenoid

| Related FW | 1.5.0 | Related applications | MINT, SPtM |
|---|---|---|---|
| Comm object | 23 | | |
| Description | | | |

This output is dedicated to control the stop solenoid (valve). The output closes when an engine stop command is received and is deactivated 12 s after last running engine indication went off, i.e. engine is stopped.

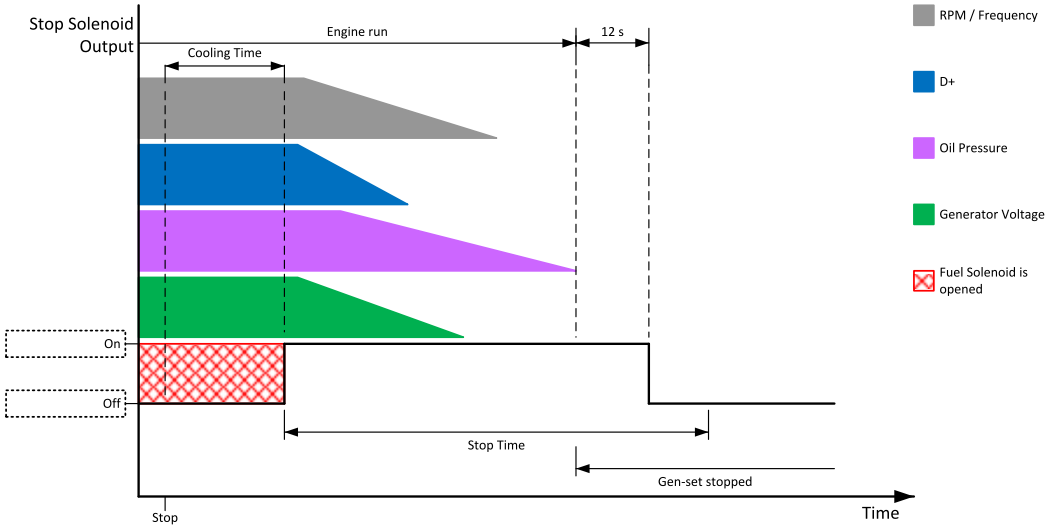



Image 8.205 Stop Solenoid 1

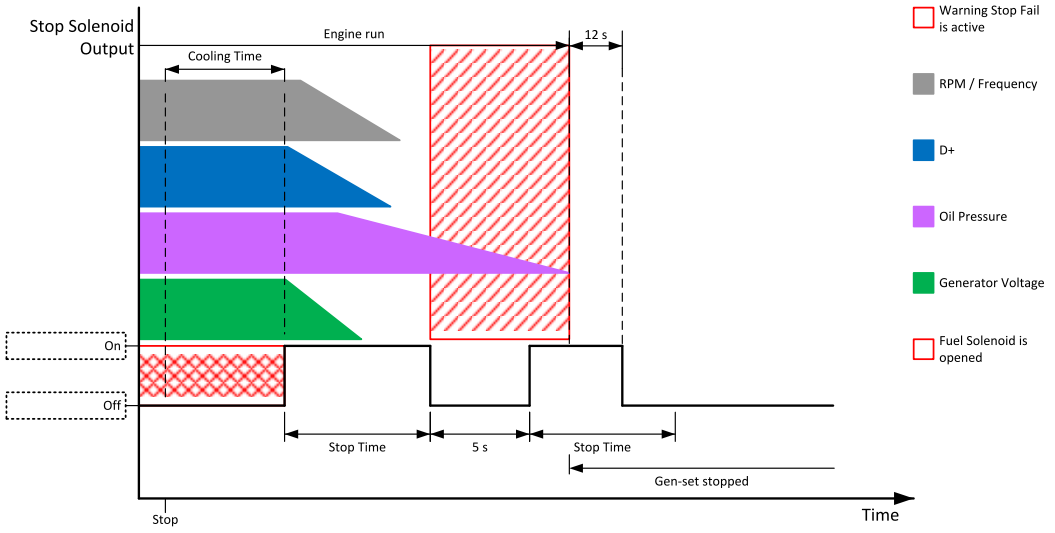



Image 8.206 Stop Solenoid 2

***Note:*** *If **Additional running engine indications (page 170)** went off during 5 s pause than Stop Solenoid is not activated again otherwise stop solenoid is activated again.*

**Logical binary outputs alphabetically (page 674)**

## Supplying Load

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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.<br>When the measured active power is equal to or bigger than 5 % of **Nominal Power (page 257)** for 1 s then the binary output is closed.<br>When the measured active power is equal to or lower than 3 % of **Nominal Power (page 257)** for 1 s then the binary output is opened. | | | |

back to Logical binary outputs alphabetically

## Synchronizing

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 325 | | |
| **Description** | | | |
| The output is active during synchronization. Output is opened when GCB is closed or synchronization is interrupted. | | | |

back to Logical binary outputs alphabetically

## System Ready

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT |
| **Comm object** | 86 | | |
| **Description** | | | |
| The output is active, if a group of Gen-sets is able to cover the **Start Reserve (page 595)**. The output is inactive, if the group of Gen-sets does not have enough capacity to cover the **Start Reserve (page 595)**.<br>The output is active, if the **Actual Reserve (page 595)** is higher than the **Start Reserve (page 595)** or system is able to increase the **Actual Reserve (page 595)** 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 595)** lower than the **Start Reserve (page 595)**. | | | |

back to Logical binary outputs alphabetically

## System Reserve OK

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 87 | | |
| **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** | 1.5.0 | **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 293)** and **Temperature Switch Off (page 294)**.

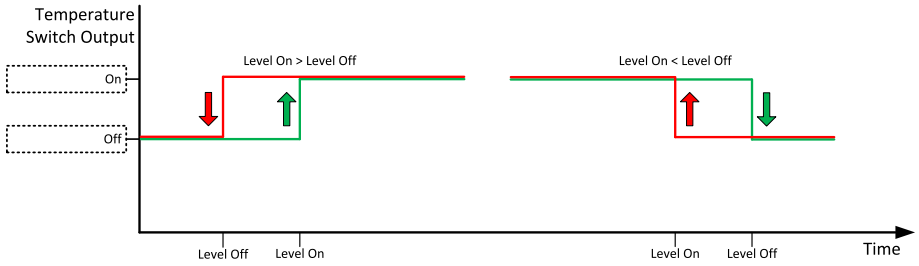



Image 8.207 Temperature Switch

***Note:*** *Setpoints **Temperature Switch On (page 293)** and **Temperature Switch Off (page 294)** are invisible until configuration of this LBO.*

**back to Logical binary outputs alphabetically**

# LBO: U

## Unloading

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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**

## 8.1.5 Logical analog inputs

**What Logical analog inputs are:**

Logical analog inputs are inputs for analog values.

### Alphabetical groups of Logical analog inputs


LAI: A ..... 742
LAI: C ..... 769
LAI: F ..... 770
LAI: M ..... 771
LAI: N ..... 771
LAI: O ..... 772


For full list of Logical analog inputs go to the chapter **Logical analog inputs alphabetically (page 741)**.

# Logical analog inputs alphabetically


AIN Prot01 .....742
AIN Prot02 .....743
AIN Prot03 .....744
AIN Prot04 .....745
AIN Prot05 .....746
AIN Prot06 .....747
AIN Prot07 .....748
AIN Prot08 .....749
AIN Prot09 .....750
AIN Prot10 .....751
AIN Prot11 .....752
AIN Prot12 .....753
AIN Prot13 .....754
AIN Prot14 .....755
AIN Prot15 .....756
AIN Prot16 .....757
AIN Prot17 .....758
AIN Prot18 .....759
AIN Prot19 .....760
AIN Prot20 .....761
AIN Switch 01 .....762
AIN Switch 02 .....762
AIN Switch 03 .....762
AIN Switch 04 .....763
AIN Switch 05 .....763
AIN Switch 06 .....763
AIN Switch 07 .....764
AIN Switch 08 .....764
AIN Switch 09 .....764
AIN Switch 10 .....765
AIN Switch 11 .....765
AIN Switch 12 .....765
AIN Switch 13 .....766
AIN Switch 14 .....766
AIN Switch 15 .....766
AIN Switch 16 .....767
AIN Switch 17 .....767
AIN Switch 18 .....767
AIN Switch 19 .....768
AIN Switch 20 .....768
Coolant Temp ..... 769
Fuel Level .....770
Mains Import Measurement .....771
Not Used .....771
Oil Pressure ..... 772
Oil Temp .....773

# LAI: A

## AIN Prot01

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 1 Wrn (page 368)** and **Analog Protection 1 Sd (page 368)**. Delay is adjusted by setpoint **Analog Protection 1 Delay (page 369)**.

### Protection types

| | |
|---|---|
| Monitoring | Analog value is only measured and displayed on the LCD screen but not used for protection. |
| HistRecOnl | Analog value is only measured and displayed on the LCD screen but not used for protection. History record is made if value is out of the limits. |
| AL Indic | Analog value is not used for protection. Only alarmlist record is made if analog value is out of the limits. |
| Wrn | Analog value is used for warning protection only. |
| Wrn+Stp | Analog value is used for warning and slow stop protection |
| Stp | Analog value is used for slow stop protection |
| Wrn + 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 | 1.5.0 | 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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 2 Wrn (page 370)** and **Analog Protection 2 Sd (page 371)**. Delay is adjusted by setpoint **Analog Protection 2 Delay (page 371)**.

### 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 + 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 | 1.5.0 | 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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 3 Wrn (page 373)** and **Analog Protection 3 Sd (page 374)**. Delay is adjusted by setpoint **Analog Protection 3 Delay (page 374)**.

### 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 + 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 | 1.5.0 | 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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 4 Wrn (page 376)** and **Analog Protection 4 Sd (page 377)**. Delay is adjusted by setpoint **Analog Protection 4 Delay (page 377)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 5 Wrn (page 379)** and **Analog Protection 5 Sd (page 380)**. Delay is adjusted by setpoint **Analog Protection 5 Delay (page 380)**.

### 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 + 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 | 1.5.0 | 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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 6 Wrn (page 382)** and **Analog Protection 6 Sd (page 383)**. Delay is adjusted by setpoint **Analog Protection 6 Delay (page 383)**.

### 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 + 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 | 1.5.0 | 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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 7 Wrn (page 385)** and **Analog Protection 7 Sd (page 386)**. Delay is adjusted by setpoint **Analog Protection 7 Delay (page 386)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 8 Wrn (page 388)** and **Analog Protection 8 Sd (page 389)**. Delay is adjusted by setpoint **Analog Protection 8 Delay (page 389)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 9 Wrn (page 391)** and **Analog Protection 9 Sd (page 392)**. Delay is adjusted by setpoint **Analog Protection 9 Delay (page 392)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 10 Wrn (page 394)** and **Analog Protection 10 Sd (page 395)**. Delay is adjusted by setpoint **Analog Protection 10 Delay (page 395)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 11 Wrn (page 397)** and **Analog Protection 11 Sd (page 398)**. Delay is adjusted by setpoint **Analog Protection 11 Delay (page 398)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 12 Wrn (page 400)** and **Analog Protection 12 Sd (page 401)**. Delay is adjusted by setpoint **Analog Protection 12 Delay (page 401)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 13 Wrn (page 403)** and **Analog Protection 13 Sd (page 404)**. Delay is adjusted by setpoint **Analog Protection 13 Delay (page 404)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 14 Wrn (page 406)** and **Analog Protection 14 Sd (page 407)**. Delay is adjusted by setpoint **Analog Protection 14 Delay (page 407)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 15 Wrn (page 409)** and **Analog Protection 15 Sd (page 410)**. Delay is adjusted by setpoint **Analog Protection 15 Delay (page 410)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 16 Wrn (page 412)** and **Analog Protection 16 Sd (page 413)**. Delay is adjusted by setpoint **Analog Protection 16 Delay (page 413)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 17 Wrn (page 415)** and **Analog Protection 17 Sd (page 416)**. Delay is adjusted by setpoint **Analog Protection 17 Delay (page 416)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 18 Wrn (page 418)** and **Analog Protection 18 Sd (page 419)**. Delay is adjusted by setpoint **Analog Protection 18 Delay (page 419)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 19 Wrn (page 421)** and **Analog Protection 19 Sd (page 422)**. Delay is adjusted by setpoint **Analog Protection 19 Delay (page 422)**.

### 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 + 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** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Analog Protection 20 Wrn (page 424)** and **Analog Protection 20 Sd (page 425)**. Delay is adjusted by setpoint **Analog Protection 20 Delay (page 425)**.

### 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 + 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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH01 (PAGE 688)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 1 On (page 369)** and **Analog Switch 1 Off (page 370)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH02 (PAGE 689)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 2 On (page 372)** and **Analog Switch 2 Off (page 373)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH03 (PAGE 689)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 3 On (page 375)** and **Analog Switch 3 Off (page 376)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH04 (PAGE 690)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 4 On (page 378)** and **Analog Switch 4 Off (page 379)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH05 (PAGE 690)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 5 On (page 381)** and **Analog Switch 5 Off (page 382)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH06 (PAGE 691)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 6 On (page 384)** and **Analog Switch 6 Off (page 385)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH07 (PAGE 691)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 7 On (page 387)** and **Analog Switch 7 Off (page 388)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH08 (PAGE 692)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 8 On (page 390)** and **Analog Switch 8 Off (page 391)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH09 (PAGE 692)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 9 On (page 393)** and **Analog Switch 9 Off (page 394)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH10 (PAGE 693)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 10 On (page 396)** and **Analog Switch 10 Off (page 397)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH11 (PAGE 693)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 11 On (page 399)** and **Analog Switch 11 Off (page 400)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH12 (PAGE 694)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 12 On (page 402)** and **Analog Switch 12 Off (page 403)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH13 (PAGE 694)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 13 On (page 405)** and **Analog Switch 13 Off (page 406)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH14 (PAGE 695)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 14 On (page 408)** and **Analog Switch 14 Off (page 409)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH15 (PAGE 695)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 15 On (page 411)** and **Analog Switch 15 Off (page 412)**.<br>**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** | 1.5.0 | **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 48**. This analog input controls logical binary output **AIN SWITCH16 (PAGE 696)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 16 On (page 414)** and **Analog Switch 16 Off (page 415)**.<br>**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** | 1.5.0 | **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 48**. This analog input controls logical binary output **AIN SWITCH17 (PAGE 696)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 17 On (page 417)** and **Analog Switch 17 Off (page 418)**.<br>**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** | 1.5.0 | **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 48**. This analog input controls logical binary output **AIN SWITCH18 (PAGE 697)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 18 On (page 420)** and **Analog Switch 18 Off (page 421)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH19 (PAGE 697)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 19 On (page 423)** and **Analog Switch 19 Off (page 424)**.<br>**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 | 1.5.0 | 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 48**. This analog input controls logical binary output **AIN SWITCH20 (PAGE 698)**. The behavior of the switch depends on the adjustment of the setpoints **Analog Switch 20 On (page 426)** and **Analog Switch 20 Off (page 427)**.<br>**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 | 1.5.0 | 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 48**. Limits for this protection are adjusted by setpoints **Coolant Temperature Wrn (page 288)** and **Coolant Temperature Sd (page 289)**. Delay is adjusted by setpoint **Coolant Temperature Delay (page 289)**.

### 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 655)*** *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: F

## Fuel Level

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **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 48**. Limits for this protection are adjusted by setpoints **Fuel Level Wrn (page 295)** and **Fuel Level Sd (page 295)**. Delay is adjusted by setpoint **Fuel Level Delay (page 296)**.

### 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 297) 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 659)*** *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** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 5 | | |
| **Description** | | | |
| Logical analog input designed for **Mains import measurement (page 191)**. 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 354)** | | | |

back to Logical analog inputs alphabetically

# LAI: N

## Not Used

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 230 | | |
| **Description** | | | |
| Input has no function. | | | |

back to Logical analog inputs alphabetically

# LAI: O

## Oil Pressure

| | | | |
|---|---|---|---|
| **Related FW** | 1.5.0 | **Related applications** | MINT, SPtM |
| **Comm object** | 9 | | |
| **Description** | | | |

Logical analog input designed for oil pressure value received from analog sensor. For more information about wiring of analog inputs **see Analog inputs on page 48**. Limits for this protection are adjusted by setpoints **Oil Pressure Wrn (page 286)** and **Oil Pressure Sd (page 287)**. Delay is adjusted by setpoint **Oil Pressure Delay (page 287)**.

### 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 chose* ***OIL PRESSURE (PAGE 666)*** *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 | 1.5.0 | 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 48**. Limits for this protection are adjusted by setpoints **Oil Temp Wrn (page 290)** and **Oil Temp Sd (page 291)**. Delay is adjusted by setpoint **Oil Temp Delay (page 291)**.

### 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

## 8.1.6 PLC

### List of PLC groups

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For full list of PLC blocks go to the chapter **List of PLC blocks (page 775)**.

# List of PLC blocks


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# Group: Basic Logical functions

## OR/AND

| | |
|---|---|
| **PLC group** | Basic logical functions |
| **Related FW** | 1.5.0 |
| **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.

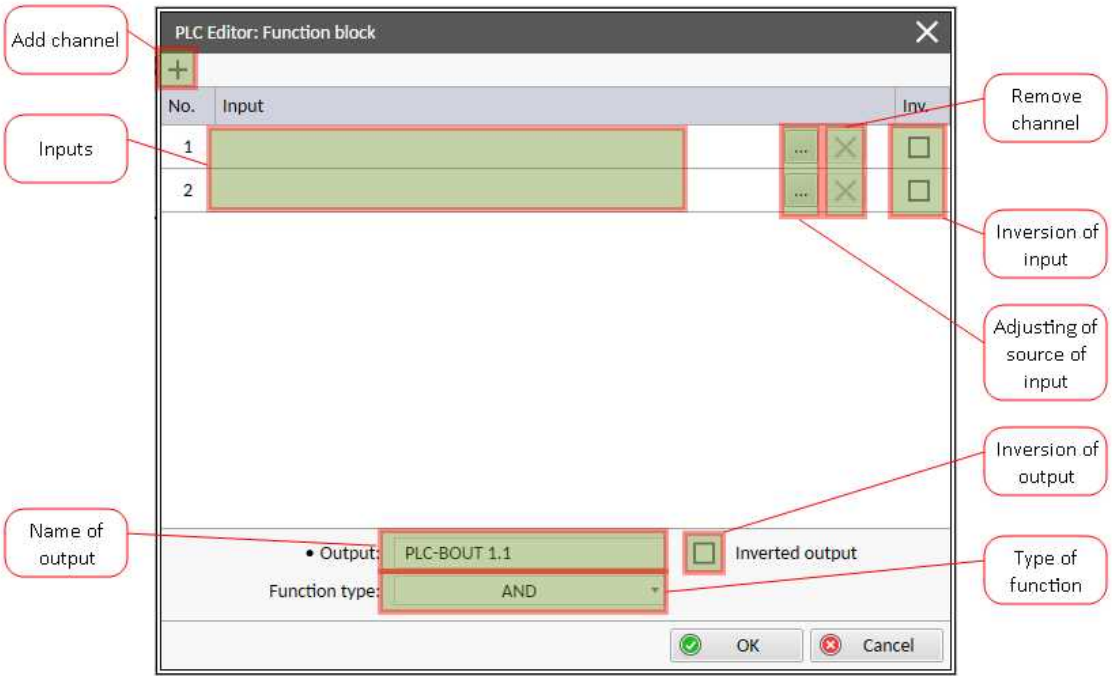



Image 8.208 Configuration of OR/AND block

**back to List of PLC blocks**

## XOR/RS

| | |
|---|---|
| **PLC group** | Basic logical functions |
| **Related FW** | 1.5.0 |
| **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 |

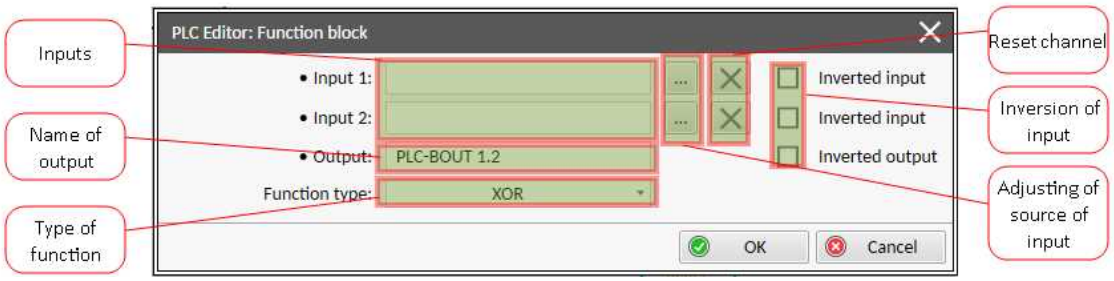



Image 8.209 Configuration of XOR/RS block

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# Group: Comparison of analog inputs

## Comparator With Hysteresis

| | |
|---|---|
| **PLC group** | Comparison of analog inputs |
| **Related FW** | 1.5.0 |
| **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.

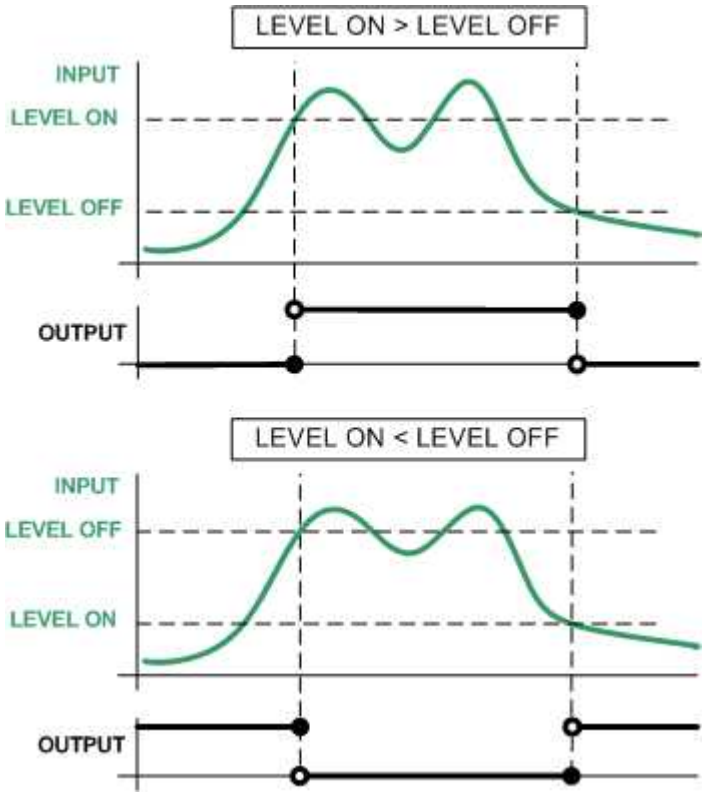



Image 8.210 Different On and Off levels

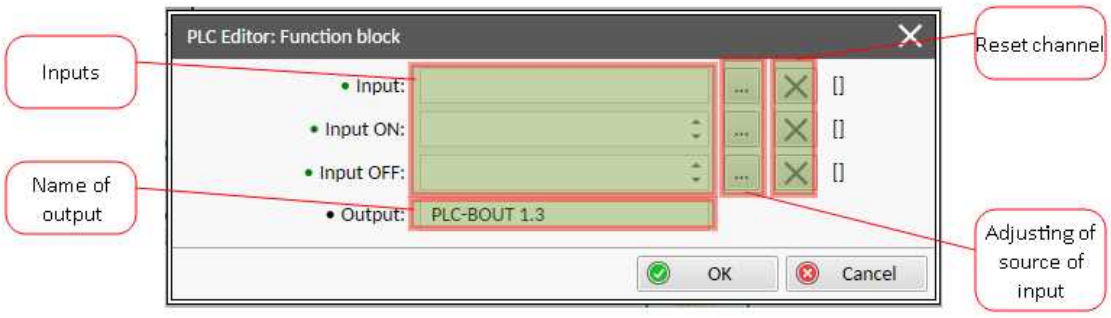



Image 8.211 Configuration of Comp Hyst block

***Note:*** *Level On and Level Off can be constants or values from controller.*

> **IMPORTANT: In case that values on inputs have different decimal numbers than the values are converted and the name of block is red. It is strongly recommended to use values with the same decimal numbers.**

back to List of PLC blocks

## Comparator With Delay

| | |
|---|---|
| **PLC group** | Comparison of analog inputs |
| **Related FW** | 1.5.0 |
| **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.

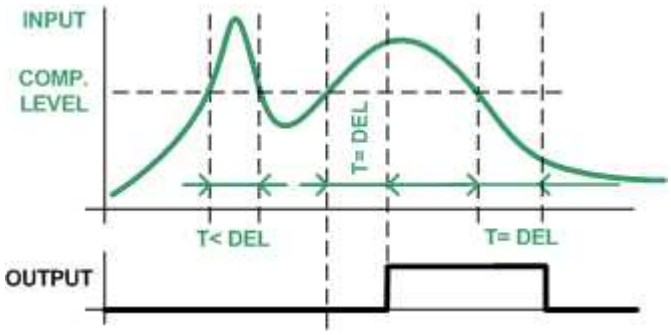



Image 8.212 Principle of delay

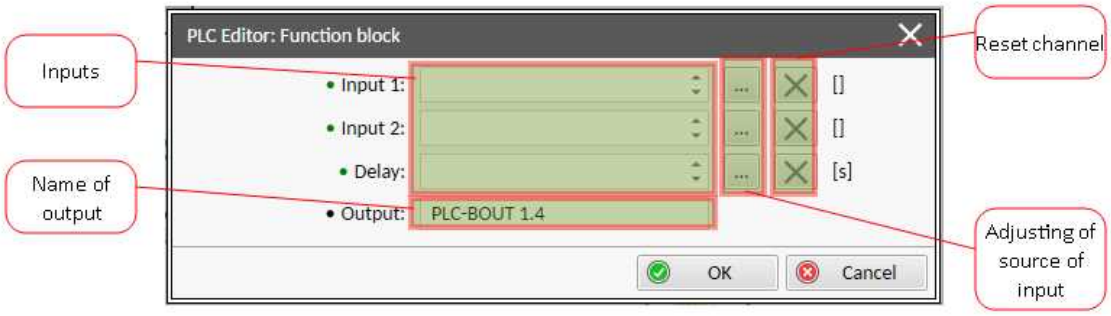



Image 8.213 Configuration of Comp Time block

***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** | 1.5.0 |
| **Related applications** | MINT, SPtM |
| **Comm object** | 14 |




**Inputs**

| Input | Type | Negation | Range | Function |
|---|---|---|---|---|
| Run | Binary | No | 0/1 | The timer runs only if this input is active or not connected |
| Reload | Binary | No | 0/1 | This input reloads the timer to the initial value |
| Reload value | Analog | No | 0,0..3276,7 [s] | Initial value of the timer |

**Outputs**

| Output | Type | Negation | Range | Function |
|---|---|---|---|---|
| Output | Binary | No | 0/1 | Timer output |

**Description**

The block works as a countdown timer which is decreased by 1 every PLC cycle. The timer initial value is adjustable by the "Reload value" input. The timer is automatically reloaded with the initial value when it reaches zero or it can be reloaded in any other moment using the "reload" input. The timer is held at reload value until the reload input is deactivated. The timer output is inverted always when the timer is reloaded.

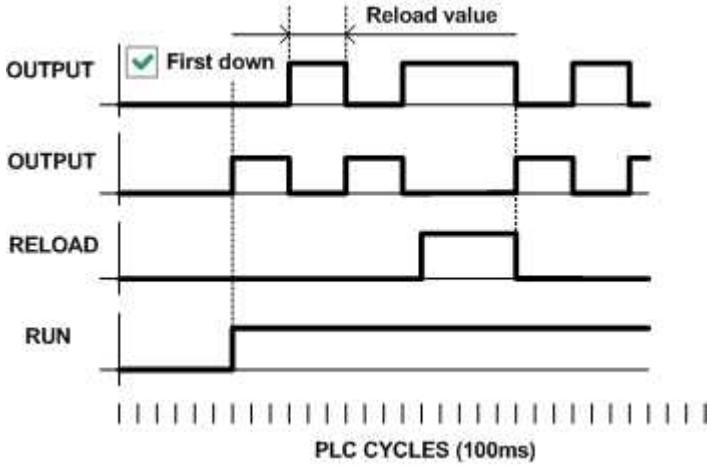



Image 8.214 Principle of timer

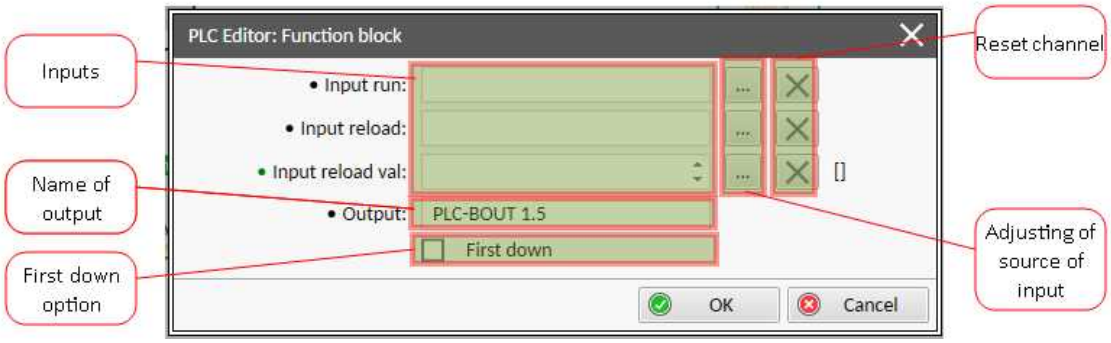



Image 8.215 Configuration of Timer block

***Note:*** *Input reload value can be constant or value from controller.*

***Note:*** *If you want the output to start at logical 0, tick First down option. Otherwise the output will start at logical 1.*

> **IMPORTANT: In case that inputs are not connected and First down option isn´t tick, than output is active.**

back to List of PLC blocks

# Delay

| | |
|---|---|
| **PLC group** | Time functions |
| **Related FW** | 1.5.0 |
| **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.

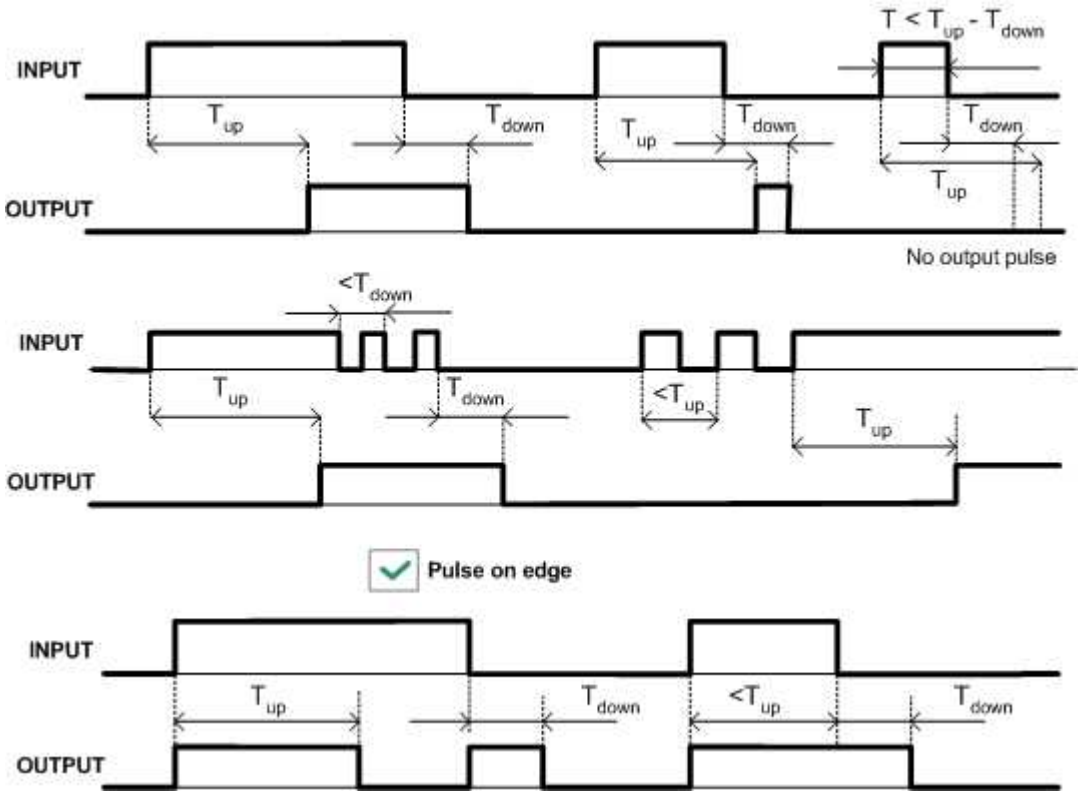



Image 8.216 Delay modes principles

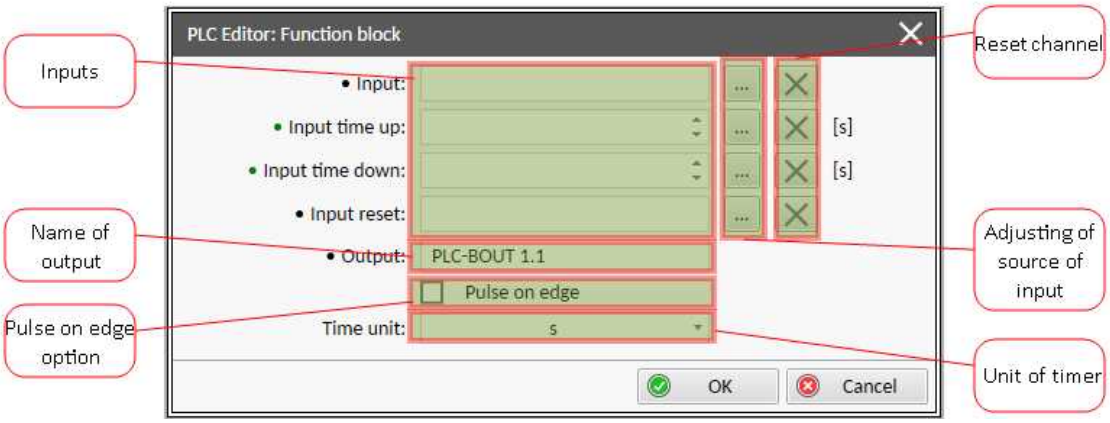



Image 8.217 Configuration of Delay block

***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** | 1.5.0 |
| **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 8.218 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** | 1.5.0 |
| **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. |

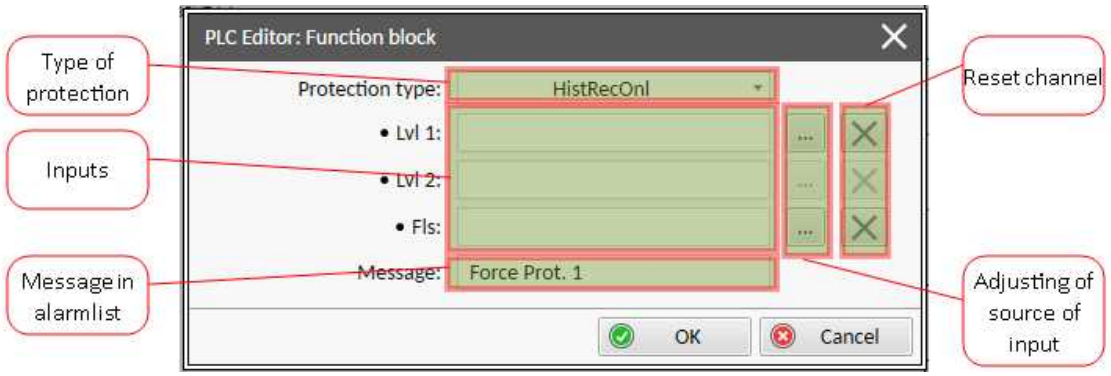



Image 8.219 Configuration of Force Prot block

Available protections are:

- Monitoring
- HistRecOnl
- AL Indic
- Wrn
- Wrn+BOC
- BOC
- Wrn+Sd
- Sd

***Note:*** *Maximal number of characters for alarmlist message is 15.*

***Note:*** *Prefix of protection (e.g. Wrn, Sd, BOC) is added automatically into alarmlist message.*

**back to List of PLC blocks**

# 8.2 Alarms

8.2.1 Alarms level 1 ..... 787
8.2.2 Alarms level 2 ..... 815
8.2.3 Fail sensor and other types ..... 834

**What alarms are:**

The controller evaluates two levels of alarms. For more information **see Alarm management on page 149**.

## 8.2.1 Alarms level 1

Warnings ..... 790
Other type ..... 809

For full list of Alarms level 1 go to **List of alarms level 1 (page 788)**.

**What alarms level 1 are:**

The level 1 alarm indicates that a value or parameter is out of normal limits, but has still not reached critical level. For more information **see Alarm types - Level 1 on page 151**.

# List of alarms level 1


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Alarm SMS 2 Fail .....791
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Wrn Coolant Temperature Low .....798
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ECU Yellow Lamp ..... 799
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Wrn Fence 2 Alarm .....800
Wrn Fuel Level ..... 800
Wrn Fuel Theft .....800
Wrn Generator L1 > Voltage .....800
Wrn Generator L1 < Voltage .....801
Wrn Generator L1L2 > Voltage .....801
Wrn Generator L1L2 < Voltage .....801
Wrn Generator L2 > Voltage .....801
Wrn Generator L2 < Voltage .....802
Wrn Generator L2L3 > Voltage .....802
Wrn Generator L2L3 < Voltage .....802
Wrn Generator L3 > Voltage .....802
Wrn Generator L3 < Voltage .....803
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Wrn Maintenance 2 ..... 805
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EM(B) - insufficient .....811
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Module(slotA) - unexpected ..... 813
Module(slotA) - unknown module ..... 813
Module(slotB) - comm. outage ..... 813
Module(slotB) - false module ..... 813
Module(slotB) - unattended ..... 814
Module(slotB) - unexpected ..... 814
Module(slotB) - unknown module ..... 814

# Warnings

## Alarm Email 1 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **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 494)** and email wasn't send. |

back to List of alarms level 1

## Alarm Email 2 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Alarm Email 2 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 495)** and email wasn't send. |

back to List of alarms level 1

## Alarm Email 3 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Alarm Email 3 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 495)** and email wasn't send. |

back to List of alarms level 1

## Alarm Email 4 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Alarm Email 4 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 496)** and email wasn't send. |

back to List of alarms level 1

## Alarm SMS 1 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Alarm SMS 1 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 491)** and SMS wasn't send. |

back to List of alarms level 1

## Alarm SMS 2 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Alarm SMS 2 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 491)** and SMS wasn't send. |

back to List of alarms level 1

## Alarm SMS 3 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Alarm SMS 3 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 492)** and SMS wasn't send. |

back to List of alarms level 1

## Alarm SMS 4 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Alarm SMS 4 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 492)** and SMS wasn't send. |

back to List of alarms level 1

## Battery Charger Fail

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Battery Charge Fail |
| **Alarm evaluated** | Mains is OK |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm is activated when logical binary input **BATTERY CHARGER (PAGE 635)** is active. |

back to List of alarms level 1

## Wrn Battery Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Battery Voltage |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm informs the operator that the controller supply voltage is out of limits. The following setpoints are related to it:<br>▶ **Battery Undervoltage (page 300)**<br>▶ **Battery Overvoltage (page 300)**<br>▶ **Battery <> Voltage Delay (page 301)** |

back to List of alarms level 1

## Bus CCW Rotation

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Bus CCW Rotation |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT |
| **Description** | The controller detects phase sequence on bus voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. |

back to List of alarms level 1

## ECU Wait To Start

| | |
|---|---|
| **Alarm Type** | Warning |
| **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 688)**is not activated, after deactivation of lamp, alarm automatically disappear. |

back to List of alarms level 1

## Wrn Emergency Droop Active

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Emergency Droop Active |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm is issued when Emergency Droop regulation as active. |

back to List of alarms level 1

## Event Email 1 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Event Email 1 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 494)** and email wasn't send. |

back to List of alarms level 1

## Event Email 2 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Event Email 2 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 495)** and email wasn't send. |

back to List of alarms level 1

## Event Email 3 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Event Email 2 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 495)** and email wasn't send. |

back to List of alarms level 1

## Event Email 4 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Event Email 4 Fail |
| **Alarm evaluated** | All the time |

| | |
|---|---|
| **Related applications** | 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 496)** and email wasn't send. |

back to List of alarms level 1

## Event SMS 1 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Event SMS 1 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 491)** and SMS wasn't send. |

back to List of alarms level 1

## Event SMS 2 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Event SMS 2 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 491)** and SMS wasn't send. |

back to List of alarms level 1

## Event SMS 3 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Event SMS 3 Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | 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 492)** and SMS wasn't send. |

back to List of alarms level 1

## Event SMS 4 Fail

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Event SMS 4 Fail |
| **Alarm evaluated** | All the time |

| | |
|---|---|
| **Related applications** | 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 492)** and SMS wasn't send. |

back to List of alarms level 1

## Generator CCW Rotation

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Generator CCW Rotation |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | The controller detects phase sequence on generator voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. |

back to List of alarms level 1

## Mains CCW Rotation

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Mains CCW Rotation |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | The controller detects phase sequence on mains voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. |

back to List of alarms level 1

## Rental Timer 1 Elapsed

| | |
|---|---|
| **Alarm Type** | Warning |
| **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 443)** elapses. |

back to List of alarms level 1

## Rental Timer 2 Elapsed

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Rental Timer 2 Elapsed |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm is activated when **Rental Timer 2 (page 445)** elapses. |

back to List of alarms level 1

## Rental Timer Block Start

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | Rental Timer Block Start |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Alarm is active when there is start command and **Rental Timer 1 (page 443)** or **Rental Timer 2 (page 445)** elapsed. |

back to List of alarms level 1

## Soft Transfer Fail

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Soft Transfer Fail |
| **Alarm evaluated** | During transition of load |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm is issued when the unloading was not successful (**Load Ramp (page 354)** + 10 % gets elapsed). |

back to List of alarms level 1

## Speed Regulation Limit

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Speed Regulation Limit |
| **Alarm evaluated** | Gen-set is running |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm is issued when speed governor output (**Speed control outputs (page 143)**) stays close to one of the limit values for more than 2 seconds. |

back to List of alarms level 1

## Voltage Regulation Limit

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Voltage Regulation Limit |
| **Alarm evaluated** | Gen-set is running |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm is issued when AVR output (**Voltage control outputs (page 145)**) stays close to one of the limit values for more than 2 seconds. |

back to List of alarms level 1

## Wrn AIN Prot

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn + Name of analog input |
| **Alarm evaluated** | All the time |

| | |
|---|---|
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that value the general analog protection is out of warning protection limit. |

back to List of alarms level 1

## Wrn Charging Alternator Fail

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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 80% of the controller supply voltage. This alarm works similar to the red “battery” alarm indicator on a vehicle dashboard.<br>The setpoint has to be in Charge Fail or Enabled position to enable this alarm. |

back to List of alarms level 1

## Wrn BadPwrCfg

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn BadPwrCfg |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT |
| **Description** | This alarm is issued when there is different power format on controller which are connected via CAN2. |

back to List of alarms level 1

## Wrn Battery > Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | All the time |
| **Alarm evaluated** | Wrn Battery > Voltage |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm informs the operator that the controller supply voltage is too high. The following setpoints are related to it:<br>▶ **Battery Overvoltage (page 300)**<br>▶ **Battery <> Voltage Delay (page 301)** |

back to List of alarms level 1

## Wrn Battery < Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Battery < Voltage |
| **Alarm evaluated** | All the time |

| | |
|---|---|
| **Related applications** | MINT, SPtM |
| **Description** | This alarm informs the operator that the controller supply voltage is too low. The following setpoints are related to it:<br>▶ **Battery Undervoltage (page 300)**<br>▶ **Battery <> Voltage Delay (page 301)** |

back to List of alarms level 1

## Wrn BIN Protection

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn + Name of binary input |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Binary input also can be adjusted like alarm. In this case message in alarmlist contains prefix - Wrn and binary input name. This alarm occurs, when appropriate binary input is active. |

back to List of alarms level 1

## Wrn Coolant Temp

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Coolant Temp |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that the coolant temperature is higher than the temperature set in **Coolant Temperature Wrn (page 288)** setpoint. |

back to List of alarms level 1

## Wrn Coolant Temperature Low

| | |
|---|---|
| **Alarm Type** | Warning |
| **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 294)** setpoint. |

back to List of alarms level 1

## Wrn ECU Communication Fail

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn ECU Communication Fail |
| **Alarm evaluated** | With configured LBO **ECU Power Relay (page 706)** - only when this LBO is active<br>Without configured LBO **ECU Power Relay (page 706)** - 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

## ECU Red Lamp

| | |
|---|---|
| **Alarm Type** | Other |
| **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.<br>***Note:*** *This lamp can be ignored during prestart phase. Use InteliConfig to enable this function.* |

back to List of alarms level 1

## ECU Yellow Lamp

| | |
|---|---|
| **Alarm Type** | Other |
| **Alarmlist message** | ECU Yellow Lamp |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm occurs when an yellow ECU alarm is logged in Alarm List.<br>***Note:*** *This lamp can be ignored during prestart phase. Use InteliConfig to enable this function.* |

back to List of alarms level 1

## Wrn Fence 1 Alarm

| | |
|---|---|
| **Alarm Type** | Warning |
| **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:<br>▶ **Geo-Fencing (page 450)**<br>▶ **Fence 1 Protection (page 451)**<br>▶ **Fence Radius 1 (page 449)** |

back to List of alarms level 1

## Wrn Fence 2 Alarm

| | |
|---|---|
| **Alarm Type** | Warning |
| **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:<br>▶ **Geo-Fencing (page 450)**<br>▶ **Fence 2 Protection (page 452)**<br>▶ **Fence Radius 2 (page 449)** |

back to List of alarms level 1

## Wrn Fuel Level

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Fuel Level |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that the fuel level is lower than the level set in **Fuel Level Wrn (page 295)** setpoint. |

back to List of alarms level 1

## Wrn Fuel Theft

| | |
|---|---|
| **Alarm Type** | Warning |
| **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 297)**. |

back to List of alarms level 1

## Wrn Generator L1 > Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Overvoltage Wrn (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 1

## Wrn Generator L1 < Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Undervoltage Wrn (page 309)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 1

## Wrn Generator L1L2 > Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Overvoltage Wrn (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 1

## Wrn Generator L1L2 < Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Undervoltage Wrn (page 309)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 1

## Wrn Generator L2 > Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Overvoltage Wrn (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 1

## Wrn Generator L2 < Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Undervoltage Wrn (page 309)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 1

## Wrn Generator L2L3 > Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Overvoltage Wrn (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

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## Wrn Generator L2L3 < Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Undervoltage Wrn (page 309)**<br>▶ **Generator <> Voltage Delay (page 309)** |

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## Wrn Generator L3 > Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Overvoltage Wrn (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 1

## Wrn Generator L3 < Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Undervoltage Wrn (page 309)**<br>▶ **Generator <> Voltage Delay (page 309)** |

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## Wrn Generator L3L1 > Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Overvoltage Wrn (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 1

## Wrn Generator L3L1 < Voltage

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Undervoltage Wrn (page 309)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 1

## Wrn Generator > Frequency

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Overfrequency Wrn (page 310)**<br>▶ **Generator <> Frequency Delay (page 311)** |

back to List of alarms level 1

## Wrn Generator < Frequency

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Generator Underfrequency Wrn (page 311)**<br>▶ **Generator <> Frequency Delay (page 311)** |

back to List of alarms level 1

## Wrn Check DPF Status

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Check DPF Status |
| **Alarm evaluated** | When ECU is configured |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm occurs when ECU send alarm message about Tier IV protection.<br>***Note:*** *Tier IV protection have to be supported by ECU.* |

back to List of alarms level 1

## Wrn Maintenance 1

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Maintenance 1 |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Adjust the setpoint **Maintenance Timer 1 (page 301)** to the interval of the next maintenance check. The value of the setpoint will count down while the engine is running and if reaches zero, this alarm will be issued. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to a positive value. |

back to List of alarms level 1

## Wrn Maintenance 2

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Maintenance 2 |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Adjust the setpoint **Maintenance Timer 2 (page 302)** to the interval of the next maintenance check. The value of the setpoint will count down while the engine is running and if reaches zero, this alarm will be issued. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to a positive value. |

back to List of alarms level 1

## Wrn Maintenance 3

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Maintenance 3 |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Adjust the setpoint **Maintenance Timer 3 (page 302)** to the interval of the next maintenance check. The value of the setpoint will count down while the engine is running and if reaches zero, this alarm will be issued. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to a positive value. |

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## Wrn Maintenance 4

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Maintenance 4 |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Adjust the setpoint **Maintenance Timer 4 (page 302)** to the date of the next maintenance check. Alarm is issued when the actual date reaches the value of this setpoint. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to new date. |

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## Wrn Maintenance 5

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Maintenance 5 |
| **Alarm evaluated** | All the time |

| | |
|---|---|
| **Related applications** | MINT, SPtM |
| **Description** | Adjust the setpoint **Maintenance Timer 5 (page 303)** to the date of the next maintenance check. Alarm is issued when the actual date reaches the value of this setpoint. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to new date. |

back to List of alarms level 1

## Wrn Maintenance 6

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Maintenance 6 |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Adjust the setpoint **Maintenance Timer 6 (page 303)** to the date of the next maintenance check. Alarm is issued when the actual date reaches the value of this setpoint. The alarm message will remain in the alarm list (even if the controller is switched off and on again) until the setpoint is re-adjusted to new date. |

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## Wrn MCB Fail

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn MCB Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm will occur when the **MCB Feedback (page 664)** input does not match the expected position given by the **MCB Close/Open (page 722)** output. It stays active until the mismatch between the output and feedback disappears.<br>▶ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately.<br>▶ 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 320)** has elapsed.<br>▶ 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.<br>▶ 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. |

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## 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 286)** setpoint. |

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## Wrn Overload

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn 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:<br>▶ **Overload Wrn (page 304)** adjusts the overload limit.<br>▶ **Overload Delay (page 304)** Overload Del adjusts the delay. |

back to List of alarms level 1

## Wrn Override All Sd

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Override All Sd |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm occurs when binary input **SD OVERRIDE (PAGE 672)** is activated. |

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## Wrn Rental Timer 1

| | |
|---|---|
| **Alarm Type** | Warning |
| **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 443)** elapsed. Hours are adjusted by setpoint **Rental Timer 1 Wrn (page 445)**. |

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## Wrn Rental Timer 2

| | |
|---|---|
| **Alarm Type** | Warning |
| **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 445)** elapsed. Hours are adjusted by setpoint **Rental Timer 2 Wrn (page 447)**. |

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## Wrn Reverse Synchro Fail

| | |
|---|---|
| **Alarm Type** | Warning |
| **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 360)** gets elapsed. |

back to List of alarms level 1

## Wrn Stop Fail

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Stop Fail |
| **Alarm evaluated** | While the engine shall be stopped |
| **Related applications** | MINT, SPtM |
| **Description** | 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 709)** has been switched off and time delay **Stop Time (page 280)** has elapsed and lasts for the entire time the **FUEL SOLENOID (PAGE 709)** or **STARTER (PAGE 735)** are off. |

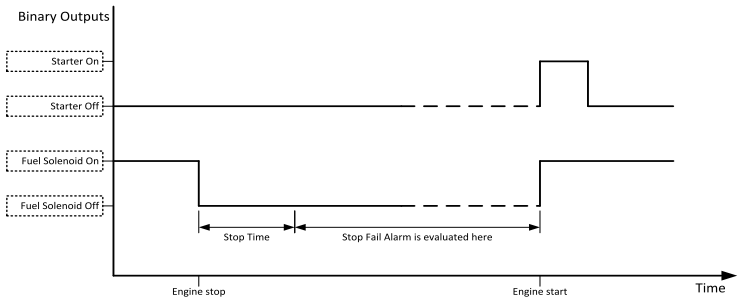



Image 8.220 Stop Fail

***Note:*** *Gen-set cannot be started until this alarm is inactive and reset.*

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## Wrn Unsupported PMS Mode

| | |
|---|---|
| **Alarm Type** | Warning |
| **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 334)** is adjusted to not available option. |

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# Other type

## After-Treatment

| | |
|---|---|
| **Alarm Type** | Alarm indication |
| **Alarmlist message** | After-Treatment |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm occurs when appropriate after-treatment lamp is active. |

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## ALI External Mains Fail

| | |
|---|---|
| **Alarm Type** | Alarm indication |
| **Alarmlist message** | Aftertreatment |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Indication of mains failure, which is induced by an external mains protection using LBI: **External Mains Fail Relay (page 657)**. |

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## Dead Bus GCB Blocked

| | |
|---|---|
| **Alarm Type** | Alarm indication |
| **Alarmlist message** | Dead Bus GCB Blocked |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm is issued when controller is in AUTO mode and Droop operation is active. |

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## EM(A) - a message lost

| | |
|---|---|
| **Alarm Type** | Other |
| **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. |

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## EM(A) - configuration mistake

| | |
|---|---|
| **Alarm Type** | Other |
| **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. |

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## EM(A) - insufficient

| | |
|---|---|
| **Alarm Type** | Other |
| **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. |

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## EM(A) - missing or damaged

| | |
|---|---|
| **Alarm Type** | Other |
| **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). |

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## EM(B) - a message lost

| | |
|---|---|
| **Alarm Type** | Other |
| **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. |

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## EM(B) - configuration mistake

| | |
|---|---|
| **Alarm Type** | Other |
| **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. |

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## EM(B) - insufficient

| | |
|---|---|
| **Alarm Type** | Other |
| **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. |

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## EM(B) - missing or damaged

| | |
|---|---|
| **Alarm Type** | Other |
| **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

## Generator CCW Rotation

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Generator CCW Rotation |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | The controller detects phase sequence on generator voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. There is a fixed defined phase sequence in InteliGen 200 controller: T35 = N, T36 = L1, T37 = L2 and T38 = L3. When the phases are connected in a different order, alarms are detected. This alarm prevent circuit breaker closing. |

back to List of alarms level 1

## Mains CCW Rotation

| | |
|---|---|
| **Alarm Type** | Alarm indication |
| **Alarmlist message** | Mains CCW Rotation |
| **Alarm evaluated** | All the time |

| | |
|---|---|
| **Related applications** | MINT, SPtM |
| **Description** | The controller detects phase sequence on mains voltage terminals. This protection is important after controller installation to avoid wrong voltage phase connection. There is a fixed defined phase sequence in InteliGen 200 controller: T39 = N, T40 = L1, T41 = L2 and T42 = L3. When the phases are connected in a different order, alarms are detected. This alarm prevent circuit breaker closing. |

back to List of alarms level 1

## Manual Restore

| | |
|---|---|
| **Alarm Type** | Alarm indication |
| **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 325)** setpoint is set to manual, load is on gen-set a mains has returned. |

back to List of alarms level 1

## Module(slotA) - comm. outage

| | |
|---|---|
| **Alarm Type** | Other |
| **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** | Other |
| **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** | Other |
| **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** | Other |
| **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** | Other |
| **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** | Other |
| **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** | Other |
| **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** | Other |
| **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** | Other |
| **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** | Other |
| **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

## Wrn Fuel Transfer Failed

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Wrn Fuel Transfer Failed |
| **Alarm evaluated** | When **FUEL PUMP (PAGE 709)** is active |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm will occur when there is no increase of fuel level when **FUEL PUMP (PAGE 709)** is active. |

back to List of alarms level 1

## Wrn Transferring Fuel

| | |
|---|---|
| **Alarm Type** | Warning |
| **Alarmlist message** | Transferring Fuel |
| **Alarm evaluated** | When **FUEL PUMP (PAGE 709)** is active |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm will occur when **FUEL PUMP (PAGE 709)** is active. |

back to List of alarms level 1

## 8.2.2 Alarms level 2

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For full list of Alarms level 2 go to **List of alarms level 2 (page 816)**.

**What alarms level 2 are:**

The level 2 level alarm indicates that a critical level of the respective value or parameter has been reached. For more information **see Alarm types - Level 2 on page 151**.

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# Shutdown

## Emergency Stop

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Emergency Stop |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Alarm is activated when binary input **EMERGENCY STOP (PAGE 657)** 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.<br>***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.*<br>***Note:*** *The MCB control is not affected by this alarm.* |

back to List of alarms level 2

## E-Stop

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | E-Stop |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Alarm is activated when dedicated E-Stop input is activated. The gen-set shuts down in the moment the input is activated and starting is blocked until the input is deactivated and fault reset is pressed. |

back to List of alarms level 2

## Sd AIN Protec

| | |
|---|---|
| **Alarm Type** | Sd |
| **Alarmlist message** | Sd + Name of analog input |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that value the general analog protection is out of shutdown protection limit. |

back to List of alarms level 2

## Sd Battery Flat

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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 BIN Protection

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd + Name of binary input |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Binary input also can be adjusted like alarm. In this case message in alarmlist contains prefix - Sd and binary input name. This alarm occurs, when appropriate binary input is active. |

back to List of alarms level 2

## Sd Coolant Temp

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd Coolant Temp |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that the coolant temperature is higher than the temperature set in **Coolant Temperature Sd (page 289)** setpoint. |

back to List of alarms level 2

## Sd Current Unbalance

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd Current Unbalance |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm evaluates the unbalance of the phase currents, i.e. the difference between highest and lowest phase current at any given time. The following setpoints are related to it:<br>▶ **Current Unbalance BOC (page 307)** adjusts the maximum allowed difference between the highest and lowest phase current at any given time.<br>▶ **Current Unbalance BOC Delay (page 307)** adjusts the alarm delay. |

back to List of alarms level 2

## Sd Earth Fault Current

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Earth Fault Sd (page 510)** adjusts the maximum allowed earth fault current.<br>▶ **Earth Fault Delay (page 509)** adjusts the alarm delay. |

back to List of alarms level 2

## Sd ECU Communication Fail

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd ECU Communication Fail |
| **Alarm evaluated** | With configured LBO **ECU Power Relay (page 706)** - only when this LBO is active<br>Without configured LBO **ECU Power Relay (page 706)** - 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 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:<br>▶ **Geo-Fencing (page 450)**<br>▶ **Fence 1 Protection (page 451)**<br>▶ **Fence Radius 1 (page 449)** |

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:<br>▶ **Geo-Fencing (page 450)**<br>▶ **Fence 1 Protection (page 451)**<br>▶ **Fence Radius 1 (page 449)** |

back to List of alarms level 2

## Sd Fuel Level

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd Fuel Level |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that the fuel level is lower than the level set in **Fuel Level Sd (page 295)** setpoint. |

back to List of alarms level 2

## Sd GCB Fail

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd GCB Fail |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm will occur when the **GCB FEEDBACK (PAGE 660)** input does not match the expected position given by the **GCB CLOSE/OPEN (PAGE 711)** output. It stays active until the mismatch between the output and feedback persists.<br>▶ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately.<br>▶ 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 Generator L1 > Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Overvoltage Sd (page 307)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L1 < Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L1L2 > Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Overvoltage Sd (page 307)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L1L2 < Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L2 > Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Overvoltage Sd (page 307)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L2 < Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L2L3 > Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Overvoltage Sd (page 307)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L2L3 < Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L3 > Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Overvoltage Sd (page 307)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L3 < Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L3L1 > Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Overvoltage Sd (page 307)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator L3L1 < Voltage

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## Sd Generator > Frequency

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Overfrequency BOC (page 310)**<br>▶ **Generator <> Frequency Delay (page 311)** |

back to List of alarms level 2

## Sd Generator < Frequency

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Generator Underfrequency BOC (page 311)**<br>▶ **Generator <> Frequency Delay (page 311)** |

back to List of alarms level 2

## Sd Generator Voltage Unbalance Ph-Ph

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd Generator Voltage Unbalance Ph-Ph |
| **Alarm evaluated** | Generator excited only |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm evaluates the unbalance of the phase to phase voltage, i.e. the difference between highest and lowest phase to phase voltage at any given time. The following setpoints are related to it:<br>▶ **Voltage Unbalance BOC (page 309)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time.<br>▶ **Voltage Unbalance BOC Delay (page 310)** adjusts the alarm delay. |

back to List of alarms level 2

## Sd Generator Voltage Unbalance Ph-N

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd Generator Voltage Unbalance Ph-N |
| **Alarm evaluated** | Generator excited only |

| | |
|---|---|
| **Related applications** | MINT, SPtM |
| **Description** | This alarm evaluates the unbalance of the phase voltage, i.e. the difference between highest and lowest phase voltage at any given time. The following setpoints are related to it:<br>▶ **Voltage Unbalance BOC (page 309)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time.<br>▶ **Voltage Unbalance BOC Delay (page 310)** adjusts the alarm delay. |

back to List of alarms level 2

## Sd Oil Pressure

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd Oil Pressure |
| **Alarm evaluated** | Gen-set is running |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that the oil pressure is lover than the pressure set in **Oil Pressure Sd (page 287)** setpoint. |

back to List of alarms level 2

## Sd Overload

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Overload BOC (page 304)** adjusts the overload limit.<br>▶ **Overload Delay (page 304)** adjusts the delay |

back to List of alarms level 2

## Sd Overspeed

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Overspeed Sd (page 284)** adjust the overspeed limit |

back to List of alarms level 2

## Sd RPM Measurement Fail

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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 271)** within the **Maximum Cranking Time (page 270)**, although some of additional running engine indication sources indicate that the engine has started. |

back to List of alarms level 2

## Sd Short Circuit

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd 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:<br>▶ **Short Circuit BOC (page 305)** adjusts the short current limit<br>▶ **Short Circuit BOC Delay (page 305)** adjusts the delay in fine steps |

back to List of alarms level 2

## Sd Start Fail

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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:<br>▶ **Cranking Attempts (page 270)** adjust the number of attempts |

back to List of alarms level 2

## Sd Underspeed

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **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, i.e. the RPM drops under the value of setpoint **Starting RPM (page 271)**.<br>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

# Other type

## BOC AIN Prot

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC + Name of analog input |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that the value of general analog protection is out of BOC protection limit. |

back to List of alarms level 2

## BOC BIN Protection

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC + Name of binary input |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | Binary input also can be adjusted like alarm. In this case message in alarmlist contains prefix - BOC and binary input name. This alarm occurs, when appropriate binary input is active. |

back to List of alarms level 2

## BOC Coolant Temp

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC Coolant Temperature |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that the coolant temperature is higher than the temperature set in **Coolant Temperature Sd (page 289)** setpoint. |

back to List of alarms level 2

## BOC Current Unbalance

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC Current Unbalance |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm evaluates the unbalance of the phase currents, i.e. the difference between highest and lowest phase current at any given time. The following setpoints are related to it:<br>▶ **Current Unbalance BOC (page 307)** adjusts the maximum allowed difference between the highest and lowest phase current at any given time.<br>▶ **Current Unbalance BOC Delay (page 307)** adjusts the alarm delay. |

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 312)** for time longer then the value of setpoint **Excitation Loss Delay (page 313)**. |

back to List of alarms level 2

## BOC Fence 1 Alarm

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Geo-Fencing (page 450)**<br>▶ **Fence 1 Protection (page 451)**<br>▶ **Fence Radius 1 (page 449)** |

back to List of alarms level 2

## BOC Fence 2 Alarm

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Geo-Fencing (page 450)**<br>▶ **Fence 1 Protection (page 451)**<br>▶ **Fence Radius 1 (page 449)** |

back to List of alarms level 2

## BOC Fuel Level

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC Fuel Level |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that the fuel level is lower than the level set level in **Fuel Level Sd (page 295)** setpoint. |

back to List of alarms level 2

## BOC Generator L1 < Voltage

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## BOC Generator L1L2 < Voltage

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## BOC Generator L2 < Voltage

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## BOC Generator L2L3 < Voltage

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## BOC Generator L3 < Voltage

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## BOC Generator L3L1 < Voltage

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Generator Undervoltage BOC (page 308)**<br>▶ **Generator <> Voltage Delay (page 309)** |

back to List of alarms level 2

## BOC Generator > Frequency

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Generator Overfrequency BOC (page 310)**<br>▶ **Generator <> Frequency Delay (page 311)** |

back to List of alarms level 2

## BOC Generator < Frequency

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Generator Underfrequency BOC (page 311)**<br>▶ **Generator <> Frequency Delay (page 311)** |

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:<br>▶ **Voltage Unbalance BOC (page 309)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time.<br>▶ **Voltage Unbalance BOC Delay (page 310)** adjusts the alarm delay. |

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:<br>▶ **Voltage Unbalance BOC (page 309)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time.<br>▶ **Voltage Unbalance BOC Delay (page 310)** 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 will occur when the **NCB Feedback (page 665)** input does not match the expected position given by the **NCB Close/Open (page 727)** output. It stays active until the mismatch between the output and feedback persists.<br>▶ If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately.<br>▶ 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 Oil Pressure

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC Oil Pressure |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm indicates that the oil pressure is lover than the pressure set in **Oil Pressure Sd (page 287)** setpoint. |

back to List of alarms level 2

## BOC Overcurrent IDMT

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | Sd + Name of binary input |
| **Alarm evaluated** | Generator excited only |
| **Related applications** | MINT, SPtM |
| **Description** | The overcurrent alarm is based on IDMT principle. The reaction time of an IDMT alarm is not fixed, but depends on how much is the protected value (generator current in this case) above the limit (**Nominal Current (page 258)**). The higher is the overcurrent, the shorter the reaction time will be. All generator phases are evaluated.<br>The behaviour of the overcurrent alarm is adjusted by the following setpoints:<br>▶ **IDMT Overcurrent Delay (page 306)** defines the reaction time of the protection when the current is twice the amount of nominal value.<br>▶ **Nominal Current (page 258)** 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 Overload

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Overload BOC (page 304)** adjusts the overload limit.<br>▶ **Overload Delay (page 304)** adjusts the delay |

back to List of alarms level 2

## BOC Rental Timer

| | |
|---|---|
| **Alarm Type** | Shutdown |
| **Alarmlist message** | BOC Rental Timer |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm occurs when **Rental Timer BOC (page 447)** elapses. |

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 312)** for time longer then the value of setpoint **Reverse Power Delay (page 312)**. |

back to List of alarms level 2

## BOC Short Circuit

| | |
|---|---|
| **Alarm Type** | BOC |
| **Alarmlist message** | BOC 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:<br>▶ **Short Circuit BOC (page 305)** adjusts the short current limit<br>▶ **Short Circuit BOC Delay (page 305)** adjusts the delay in fine steps |

back to List of alarms level 2

## STP Bus Meas Error

| | |
|---|---|
| **Alarm Type** | STP |
| **Alarmlist message** | STP Bus Meas Error |
| **Alarm evaluated** | All the time |

| | |
|---|---|
| **Related applications** | MINT, SPtM |
| **Description** | The Bus Meas Error" is issued in MINT application when the voltage on the controller's bus terminals is out of limits 20 seconds after:<br>▶ GCB (own) was closed in MAN or AUT mode<br>▶ MCB (feedback) was closed in AUT mode<br>▶ Any other GCB in power management group (on CAN bus) was closed.<br>The alarm is activated after 20s. However, the GCB (own) closing is blocked immediately for safety reasons. This protection can avoid e.g. potential direct closing of GCB while the controller's bus conductors are unintentionally unplugged from the terminals. |

back to List of alarms level 2

### STP Synchronization Fail

| | |
|---|---|
| **Alarm Type** | STP |
| **Alarmlist message** | STP Synchronization Fail |
| **Alarm evaluated** | During synchronization |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm is issued when gen-set is synchronizing to the mains/bus via GCB and **Synchronization Timeout (page 360)** gets elapsed. |

back to List of alarms level 2

## 8.2.3 Fail sensor and other types


Fls Coolant Temp ..... 837
Fls Fuel Level ..... 837
Fls AIN Prot 1 ..... 837
Fls AIN Protect 2 ..... 837
Fls AIN Protect 3 ..... 838
Fls AIN Protect 4 ..... 838
Fls AIN Protect 5 ..... 838
Fls AIN Protect 6 ..... 838
Fls AIN Protect 7 ..... 839
Fls AIN Protect 8 ..... 839
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Fls AIN Protect 12 ..... 840
Fls AIN Protect 13 ..... 840
Fls AIN Protect 14 ..... 840
Fls AIN Protect 15 ..... 841
Fls AIN Protect 16 ..... 841
Fls AIN Protect 17 ..... 841

Fls AIN Protect 18 ..... 841
Fls AIN Protect 19 ..... 842
Fls AIN Protect 20 ..... 842
Fls Oil Pressure ..... 842

For full list of Fails sensor and other types of alarms go to **List of fail sensor alarms (page 836)**.

### What Fail sensor and other types of alarms are

If the measured resistance on an analog input exceeds the valid range, a sensor fail will be detected and a sensor fail message will appear in the Alarmlist. For more information **see Sensor fail detection (FLS) on page 152**.

# List of fail sensor alarms


Fls Coolant Temp ..... 837
Fls Fuel Level ..... 837
Fls AIN Prot 1 ..... 837
Fls AIN Protect 2 ..... 837
Fls AIN Protect 3 ..... 838
Fls AIN Protect 4 ..... 838
Fls AIN Protect 5 ..... 838
Fls AIN Protect 6 ..... 838
Fls AIN Protect 7 ..... 839
Fls AIN Protect 8 ..... 839
Fls AIN Protect 9 ..... 839
Fls AIN Protect 10 ..... 839
Fls AIN Protect 11 ..... 840
Fls AIN Protect 12 ..... 840
Fls AIN Protect 13 ..... 840
Fls AIN Protect 14 ..... 840
Fls AIN Protect 15 ..... 841
Fls AIN Protect 16 ..... 841
Fls AIN Protect 17 ..... 841
Fls AIN Protect 18 ..... 841
Fls AIN Protect 19 ..... 842
Fls AIN Protect 20 ..... 842
Fls Oil Pressure ..... 842

# Fail sensor

## FIs Coolant Temp

| | |
|---|---|
| **Alarm Type** | FIs |
| **Alarmlist message** | FIs 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 alarms

## FIs Fuel Level

| | |
|---|---|
| **Alarm Type** | FIs |
| **Alarmlist message** | FIs 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. |

List of fail sensor alarms (page 836)

## FIs AIN Prot 1

| | |
|---|---|
| **Alarm Type** | FIs |
| **Alarmlist message** | FIs + 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 alarms

## FIs AIN Protect 2

| | |
|---|---|
| **Alarm Type** | FIs |
| **Alarmlist message** | FIs + 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## 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 alarms

## Fls Oil Pressure

| | |
|---|---|
| **Alarm Type** | Fls |
| **Alarmlist message** | Fls Oil Pressure |
| **Alarm evaluated** | All the time |
| **Related applications** | MINT, SPtM |
| **Description** | This alarm occurs when measurement value of oil pressure is out of range or is missing. |

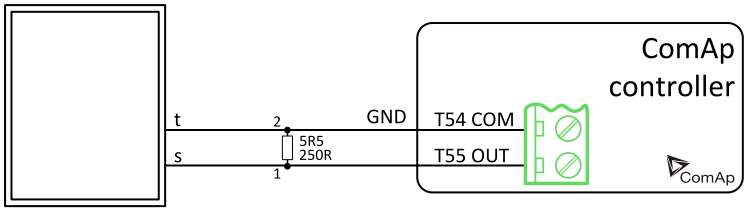
back to List of fail sensor alarms

# 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!**

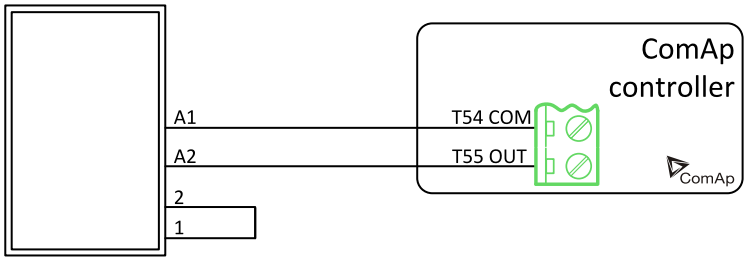
## 8.3.1 AVR interfaces alphabetically

### AVK Newage Cosimat N+



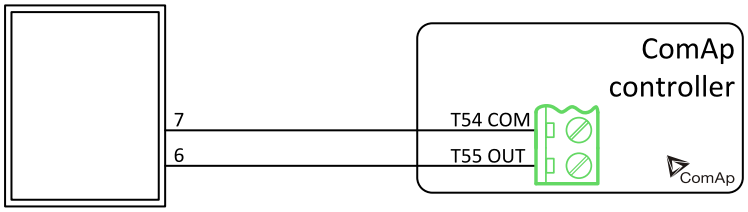

**Voltage Control:**
*Voltage Regulator Character* = NEGATIVE
*Voltage Regulator Bias* = 0.50 V
*Voltage Regulator Low Limit* = 0.00 V
*Voltage Regulator High Limit* = 2.00 V

### 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

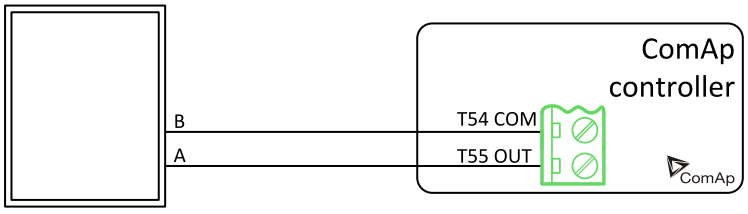
### Basler: APR 63-5, AEC 63-7, KR-FX, KR-FFX




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

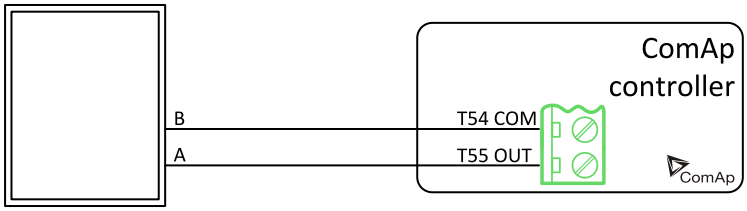
### Basler: DECS 100




AVRi output is connected instead of external resistor for voltage adjusting.

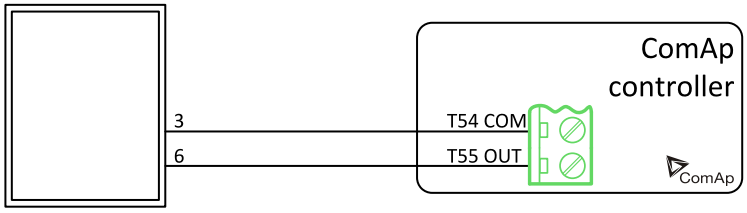
**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 0.00 V
*Voltage Regulator Low Limit* = -2.00 V
*Voltage Regulator High Limit* = 2.00 V

## 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

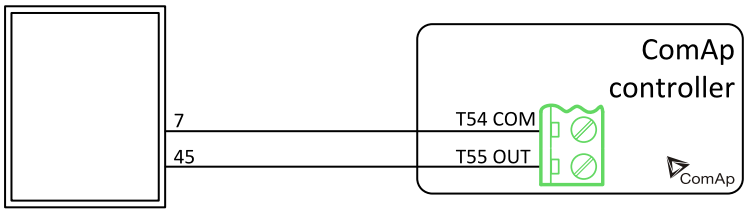
## Catterpillar CDVR




Pin 44 on DVR – PF regulation directly from DVR is not connected.

**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

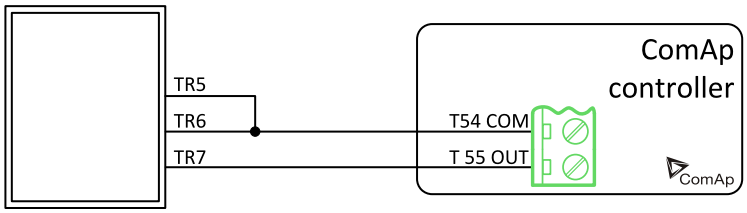
## Catterpillar DVR




Pin 44 on DVR – PF regulation directly from DVR is not connected.

**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

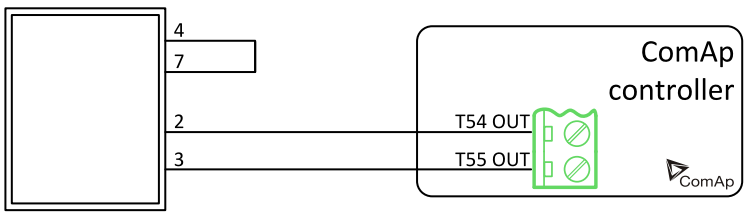
## Catterpillar VR6, VR3F




For VR3F link 4-7 has to be removed.

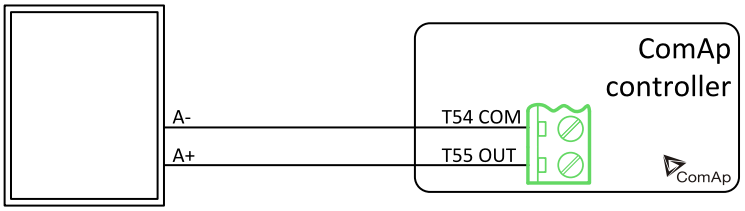
**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 1.00 V
*Voltage Regulator Low Limit* = 0.00 V
*Voltage Regulator High Limit* = 2.00 V

## Catterpillar VR6-B



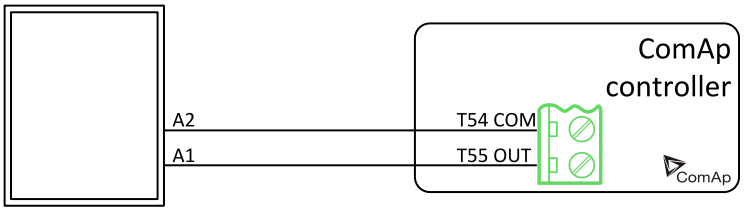

**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 0.00 V
*Voltage Regulator Low Limit* = -2.00 V
*Voltage Regulator High Limit* = 2.00 V

## ENGGA WT- 2



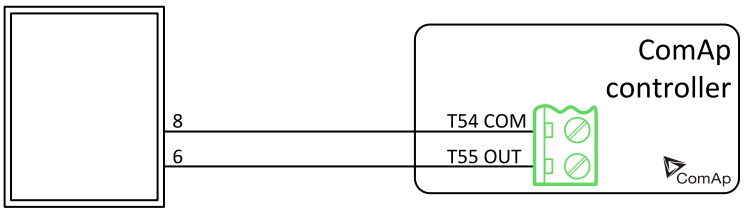

**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 0.00 V
*Voltage Regulator Low Limit* = -2.00 V
*Voltage Regulator High Limit* = 2.00 V

## ENGGA WT- 3



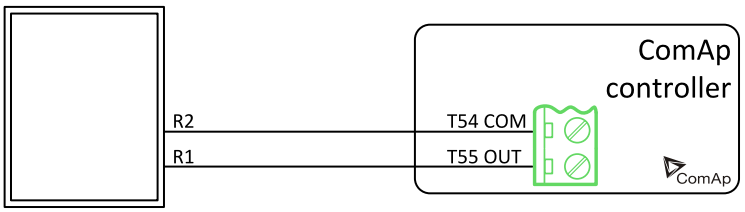

**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 0.00 V
*Voltage Regulator Low Limit* = -2.00 V
*Voltage Regulator High Limit* = 2.00 V

## KATO KCR 360



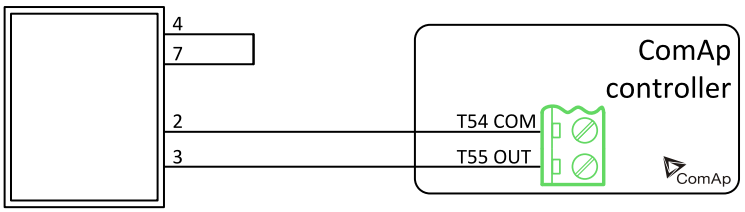

**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 0.00 V
*Voltage Regulator Low Limit* = -2.00 V
*Voltage Regulator High Limit* = 2.00 V

## KATO KCR 760



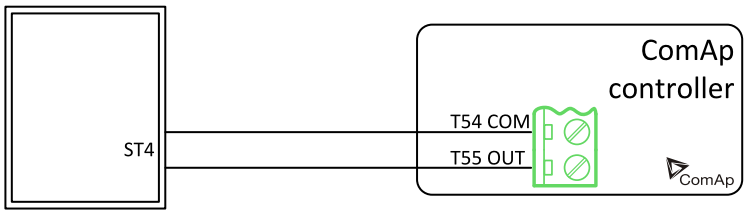

**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = -0.20 V
*Voltage Regulator Low Limit* = -2.00 V
*Voltage Regulator High Limit* = 2.00 V

## 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

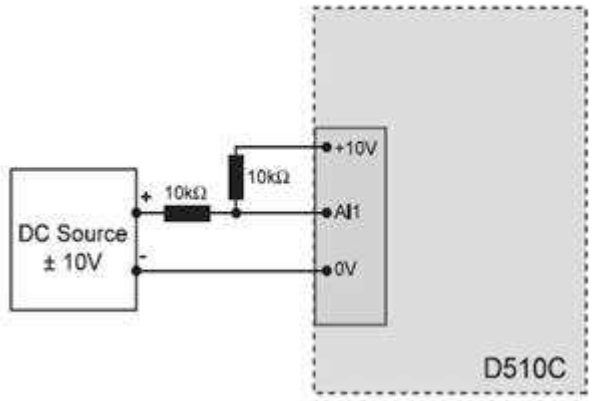
## Kutai EA448




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

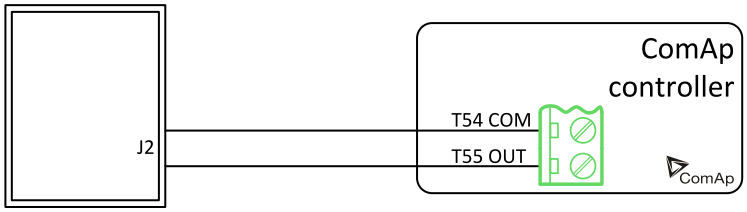
## Leroy somer D510C




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

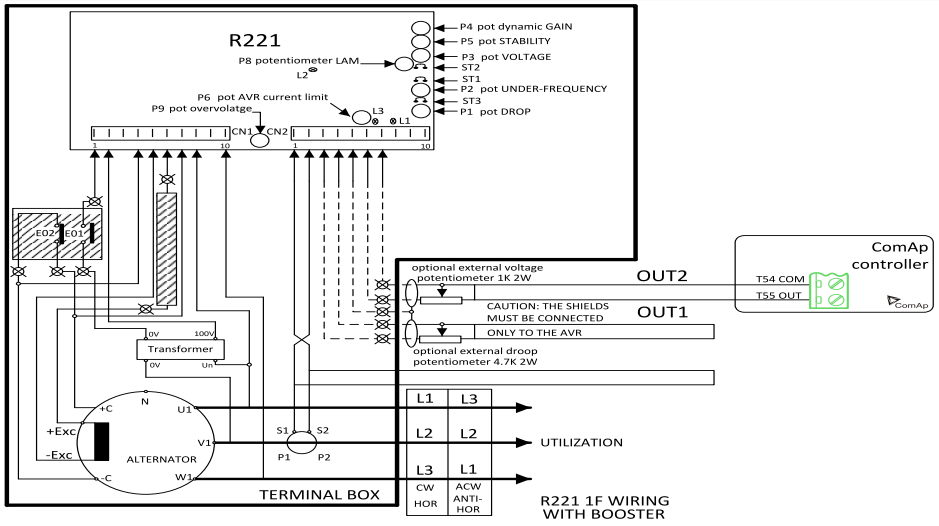
## Leroy Somer: R 129




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




**Voltage Control:**

*Voltage Regulator Character* = POSITIVE

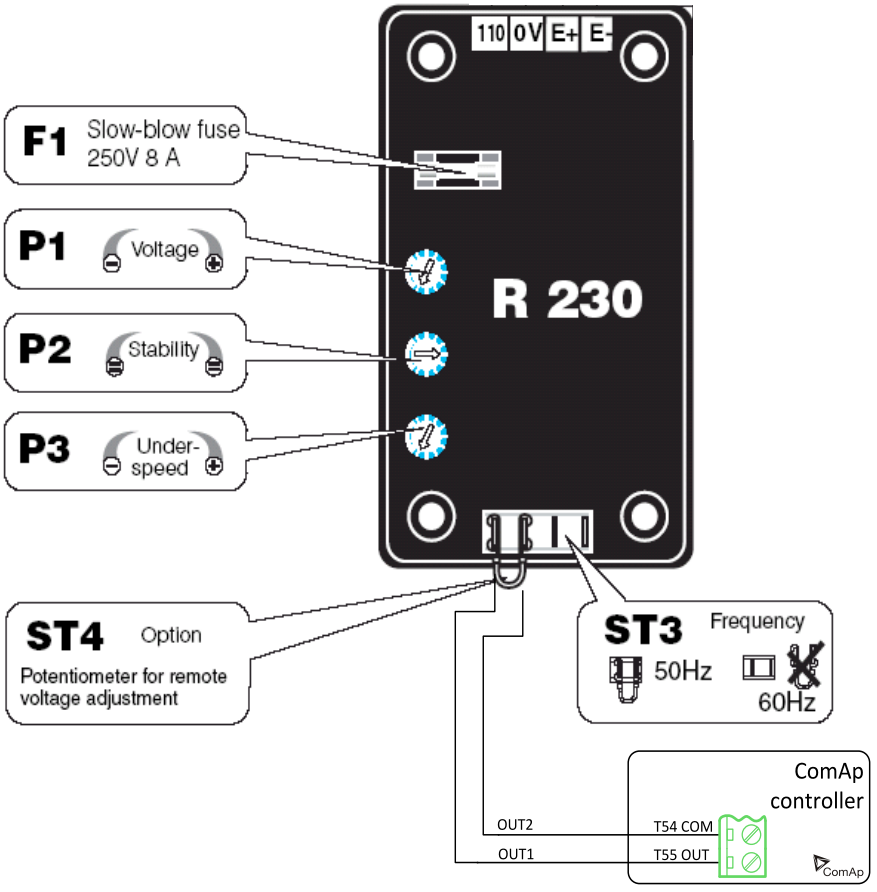
*Voltage Regulator Bias* = -1.00 V

*Voltage Regulator Low Limit* = -2.10 V

*Voltage Regulator High Limit* = 2.10 V

Module R726 is not required. AVRi trim to minimum counter clockwise +5%.

## Leroy Somer: R 230




**Voltage Control:**

*Voltage Regulator Character* = POSITIVE

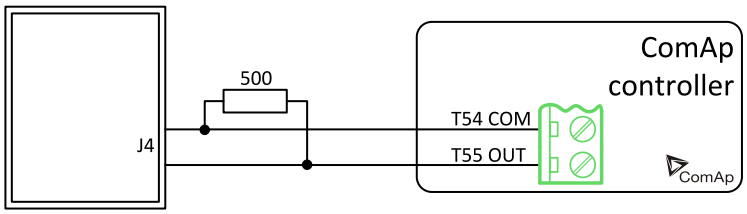
*Voltage Regulator Bias* = 0.00 V

*Voltage Regulator Low Limit* = -2.00 V

*Voltage Regulator High Limit* = 2.00 V

Module R726 is not required. AVRi trim minimum counter clockwise.

## Leroy Somer: R 230




Remove Link J4 and replace through R500

Primary voltage setting with resistors connected: 230V

progress hint:

- 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

**Voltage Control:**

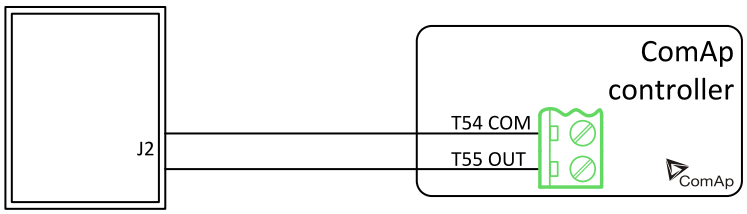
*Voltage Regulator Character* = POSITIVE

*Voltage Regulator Bias* = 0.00 V

*Voltage Regulator Low Limit* =-2.00 V

*Voltage Regulator High Limit* = 2.00 V

## Leroy Somer: R 250




**Voltage Control:**

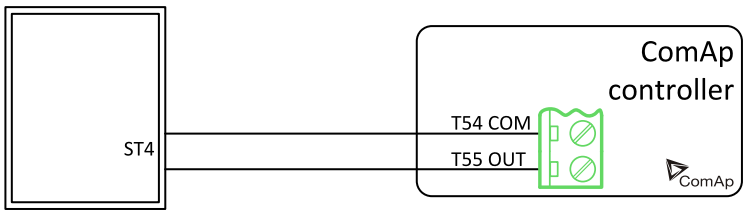
*Voltage Regulator Character* = POSITIVE

*Voltage Regulator Bias* = 1.00 V

*Voltage Regulator Low Limit* = 0.00 V

*Voltage Regulator High Limit* = 2.00 V

## Leroy Somer: R 438 LS, R448




AVRi output is connected (Undefined variable: Specific.Remote Voltage trimmer 470 Ω to terminals) ST4. (Undefined variable: Specific.Module R726 is not reauired.).

**Voltage Control:**

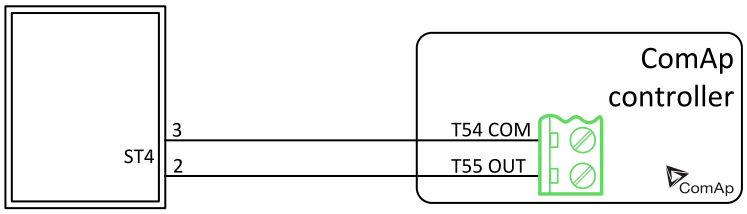
*Voltage Regulator Character* = POSITIVE

*Voltage Regulator Bias* = 1.00 V

*Voltage Regulator Low Limit* = 0.00 V

*Voltage Regulator High Limit* = 2.00 V

## Leroy Somer: R 449




Module R726 is not required..

**Voltage Control:**

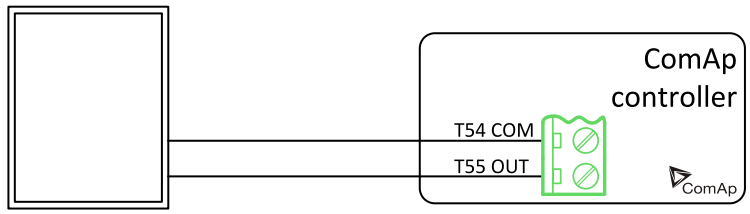
*Voltage Regulator Character* = POSITIVE

*Voltage Regulator Bias* = 0.00 V

*Voltage Regulator Low Limit* = -2.00 V

*Voltage Regulator High Limit* = 2.00 V

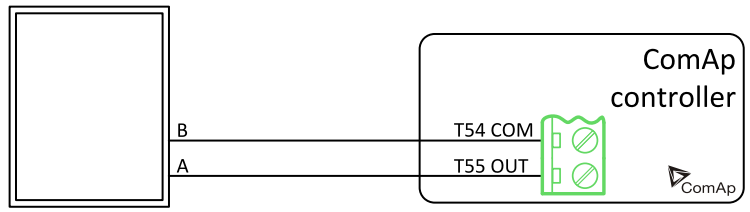
## Leroy Somer: R 450




Use Avri instead pf potentiometer 1000 Ω. Read Leroy Somer R 450 manual before use.

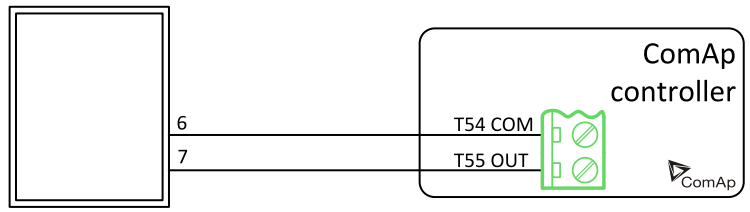
**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 1.00 V
*Voltage Regulator Low Limit* = 0.00 V
*Voltage Regulator High Limit* = 2.00 V

## Marathon DVR2000E



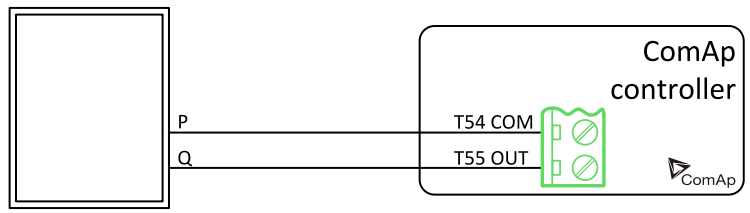

**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 0.00 V
*Voltage Regulator Low Limit* = -5.00 V
*Voltage Regulator High Limit* = 5.00 V

## Marathon PM100, 200



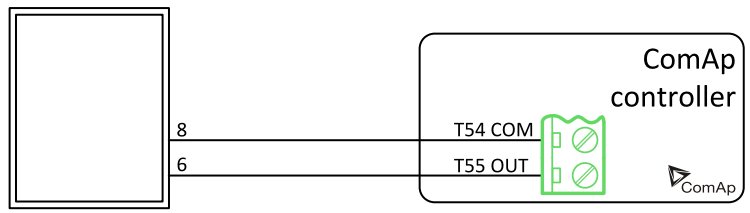

**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 0.00 V
*Voltage Regulator Low Limit* = -2.00 V
*Voltage Regulator High Limit* = 2.00 V

## MarelliGenerators MARK 5 (M16FA655A)



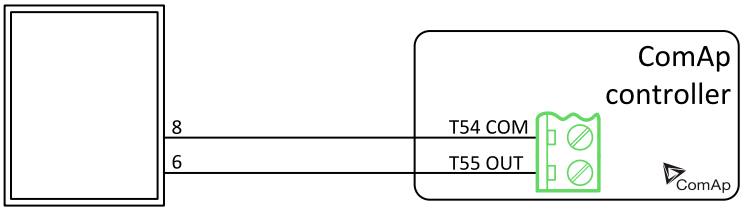

**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 0.60 V
*Voltage Regulator Low Limit* = 0.00 V
*Voltage Regulator High Limit* = 4.00 V

## 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:**

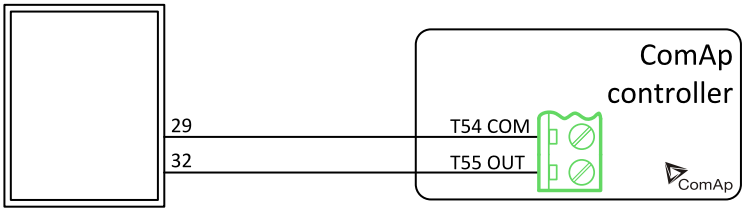
*Voltage Regulator Character* = POSITIVE

*Voltage Regulator Bias* = 0.00 V

*Voltage Regulator Low Limit* = -3.50 V

*Voltage Regulator High Limit* = 3.50 V

## Mecc Alte Der 1




Remove jumpers connecting input 27 to 28 and input 31 to 32.

**Voltage Control:**

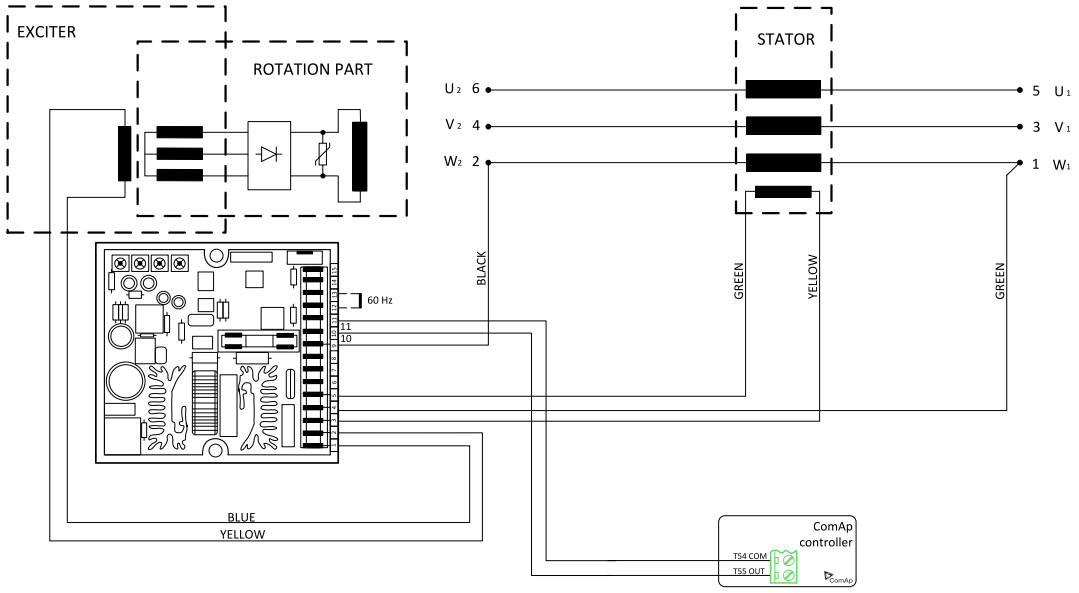
*Voltage Regulator Character* = POSITIVE

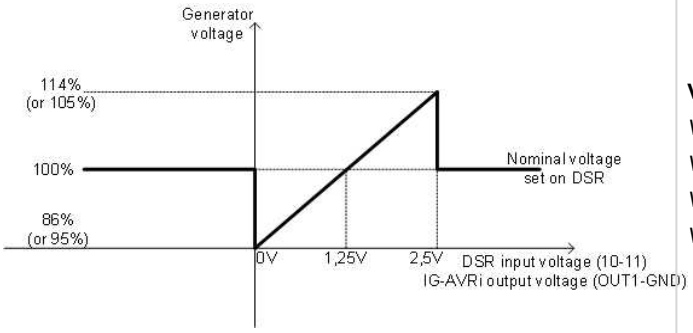
*Voltage Regulator Bias* = 0.00 V

*Voltage Regulator Low Limit* =-10.00 V

*Voltage Regulator High Limit* = 10.00 V

## Mecc Alte DSR




**Voltage Control:**

*Voltage Regulator Character* = POSITIVE

*Voltage Regulator Bias* = 1.25 V

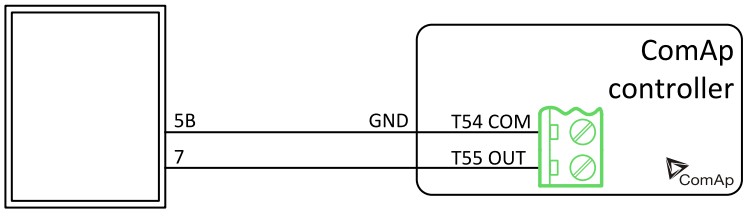
*Voltage Regulator Low Limit* = 0.00 V

*Voltage Regulator High Limit* = 2.50 V

The Vext input (connector CN1 – terminals 10 and 11) permits analogical remote control of output voltage with a programmable variation range of up to ±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

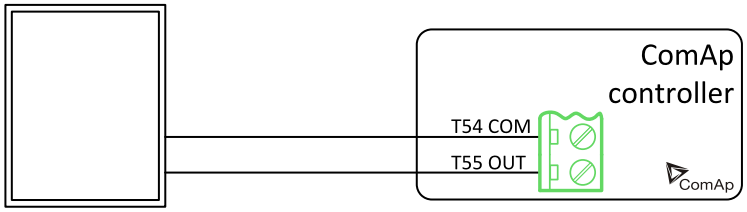
the trimmer (if enabled) or through parameter 19 (as shown on the picture). Changing of DSR parameters requires PC with dedicated software and DI1-DSR unit! DSR automatically detects presence of transformer for parallel operation (if used it works with droop, if not used it works isochronous).

## Mecc Alte Spa: S.R:7/2




**Voltage Control:**
*Voltage Regulator Character* = NEGATIVE
*Voltage Regulator Bias* = 7.50 V
*Voltage Regulator Low Limit* = 0.00 V
*Voltage Regulator High Limit* = 10.00 V

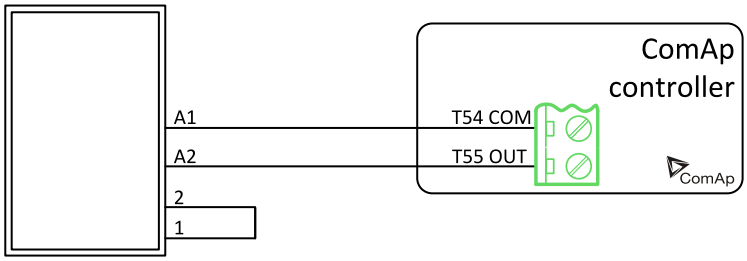
## Mecc Alte Spa U.V.R.6




AVRi output is connected instead Remote voltage trimmer 100 Kohm
(T55 OUT = top position wire and T54 COM = second top position).

**Voltage Control:**
*Voltage Regulator Character* = NEGATIVE
*Voltage Regulator Bias* = 7.50 V
*Voltage Regulator Low Limit* = 0.00 V
*Voltage Regulator High Limit* = 10.00 V

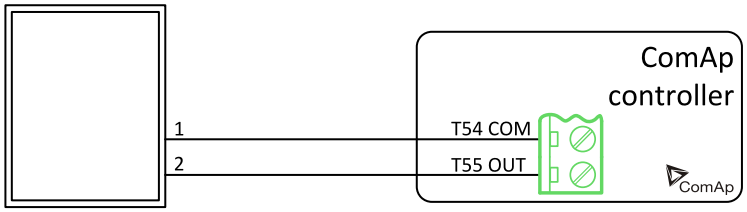
## Newer Leroy Somer




Regulation signal +/- 0...2,5 V

**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = 0.00 V
*Voltage Regulator Low Limit* = -2.50 V
*Voltage Regulator High Limit* = 2.50 V

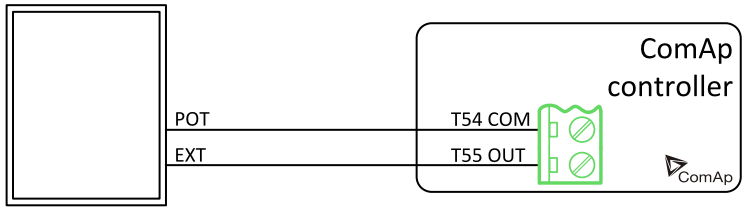
## Piller




AVRi output is connected instead Remote voltage trimmer 100 kΩ.

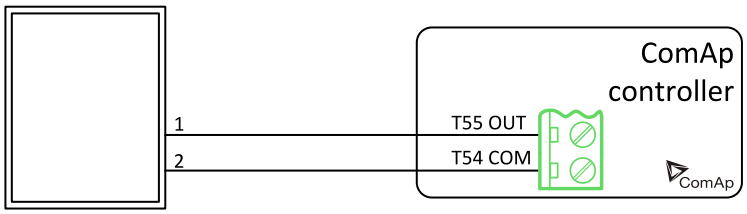
**Voltage Control:**
*Voltage Regulator Character* = POSITIVE
*Voltage Regulator Bias* = -0.44 V
*Voltage Regulator Low Limit* = -2.00 V
*Voltage Regulator High Limit* = 2.00 V

## SINCRO AVR BL4 or AVR BL3




**Voltage Control:**
*Voltage Regulator Character* = NEGATIVE
*Voltage Regulator Bias* = 1.20 V
*Voltage Regulator Low Limit* = 0.00 V
*Voltage Regulator High Limit* = 6.00 V

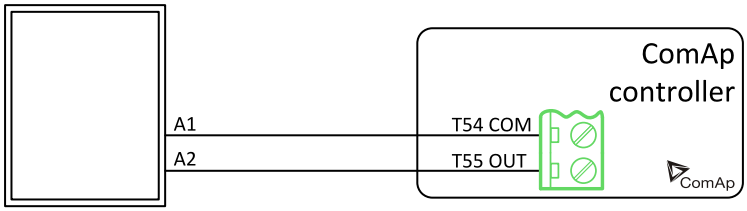
## Stamford AS480




AVRi output is connected instead of external resistor for voltage adjusting.

**Voltage Control:**
*Voltage Regulator Character* = NEGATIVE
*Voltage Regulator Bias* = 1.00 V
*Voltage Regulator Low Limit* = 0.00 V
*Voltage Regulator High Limit* = 2.00 V

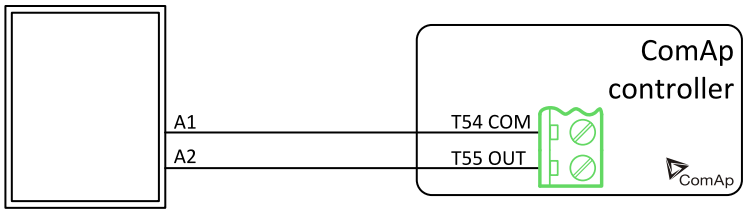
## Stamfrod MX 341




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

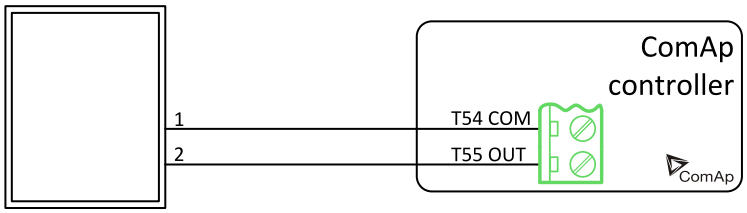
## Stamford SX 440, AS 440, MX 321, SX 421




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 governor interfaces

> **IMPORTANT: Read carefully Speed governor instructions before connecting controller Speed governor interface! It is not sufficient to use suggested wiring settings, it is necessary as well to adjust speed governor settings!**

## 8.4.1 Electronic engines interface

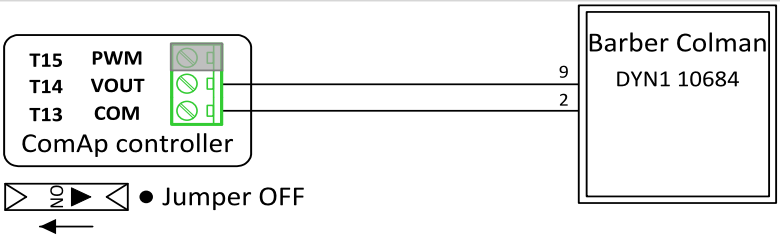
All below mentioned interface examples describe analog interface even if they are (in some cases) used for Electronic Control Units (electronic engines) with CAN data bus. There are several possibilities to connect CAN bus interface between Electronic engine and ComAp controller. Refer to ComAp Electronic 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.

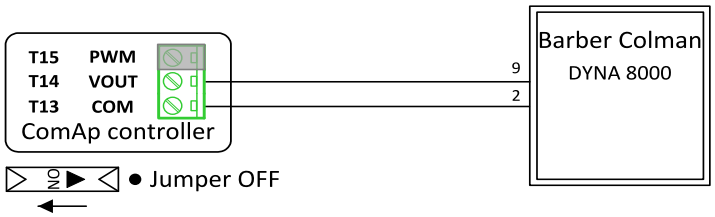
## 8.4.3 Speed governors interfaces alphabetically

### Barber Colman DYN1 10684



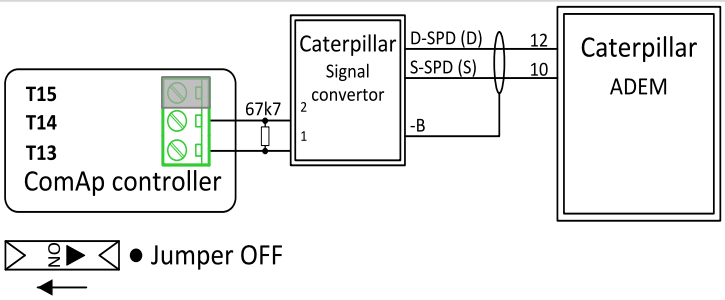

**Speed/Load control:**
*Speed Govovernor Bias* = 6,00 V
*Speed Regulator Character* = POSITIVE
*Speed Governor Low Limit* = 4 V
*Speed Governor High Limit* = 8 V

### Barber Colman DYNA 8000



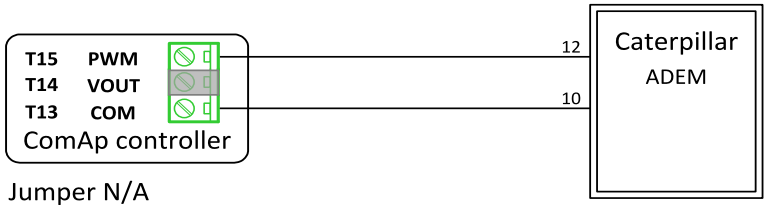

**Speed/Load control:**
*Speed Governor Bias* = 6,00 V
*Speed Regulator Character* = POSITIVE
*SpeedGovernor Low Limit* = 4 V
*Speed Governor Hi Limit* = 8 V

### 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:**

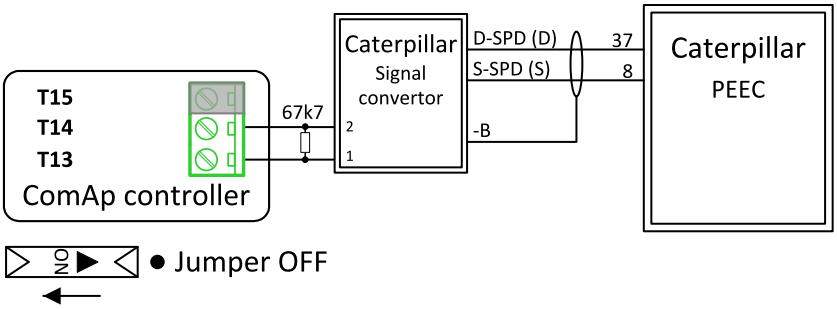
*Speed Gov overnor Bias* = 5,10 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 0 V

*Speed Governor High Limit* = 10 V

## Caterpillar PEEC + Signal convertor




**Speed/Load control:**

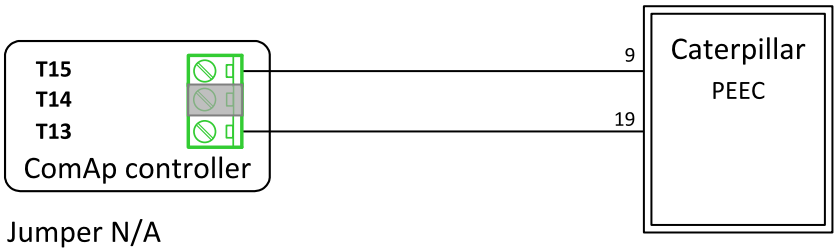
*Speed Governor Bias* = 5,10 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 0 V

*Speed Governor High Limit* = 10 V

## Caterpillar PEEC

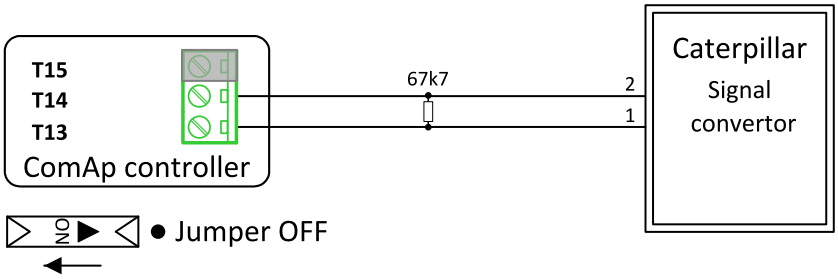



**Speed/Load control:**

*Speed Governor PWM rate* = 500 Hz

## Caterpillar Signal Converter

It is not necessary to use Caterpillar Signal Converter with InteliGen 200 Use direct PWM output instead.




Potentiometer turns clockwise (droop 0%)

**Speed/Load control:**

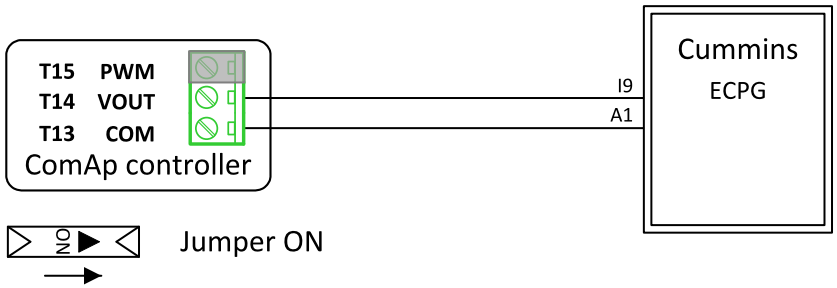
*Speed Governor Bias* = 5,10 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 0 V

*Speed Governor High Limit* = 10 V

## Cummins ECPG

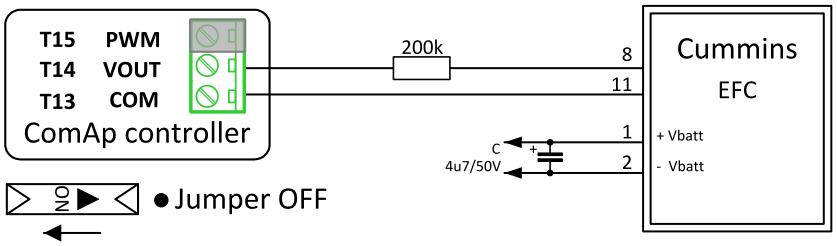



**Speed/Load control:**

*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:**

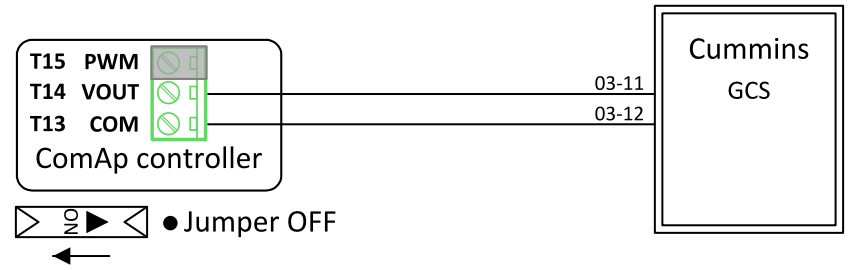
*Speed Governor Bias* = 6,40 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 5 V

*Speed Governor High Limit* = 7,8 V

## Cummins GCS




**Speed/Load ctrl:**

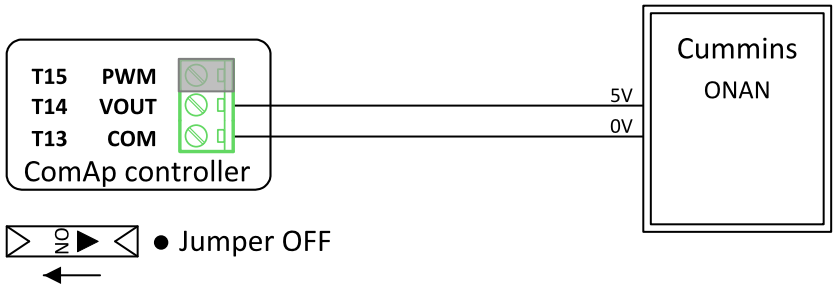
*Speed Governor Bias* = 5,00 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 2,5 V

*Speed Governor High Limit* = 7,5 V

## Cummins ONAN




**Speed/Load ctrl:**

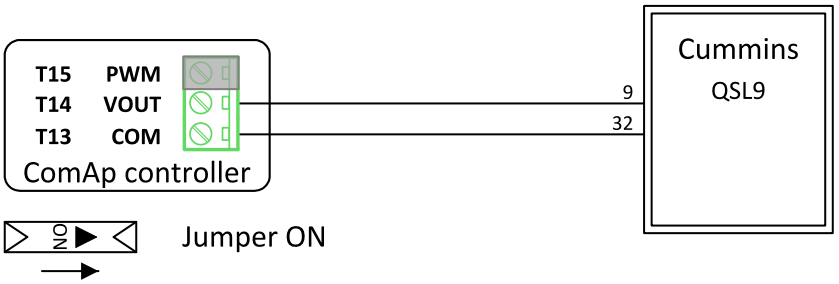
*Speed Govovernor Bias* = 2,50 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 0V

*Speed Governor High Limit* = 5 V

## Cummins QSL9




**Speed/Load ctrl:**

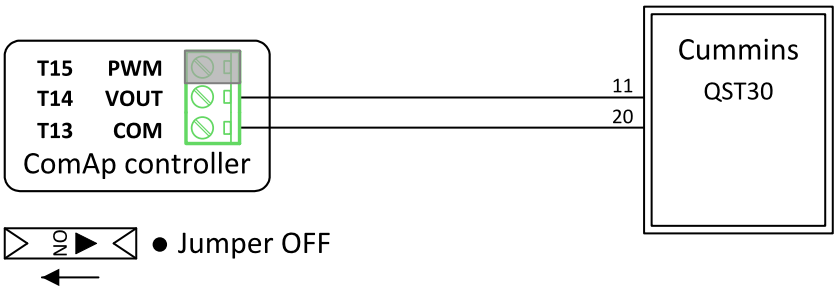
*Speed Governor Bias* = 3,50 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 2,5 V

*Speed Governor High Limit* = 5 V

## Cummins QST30

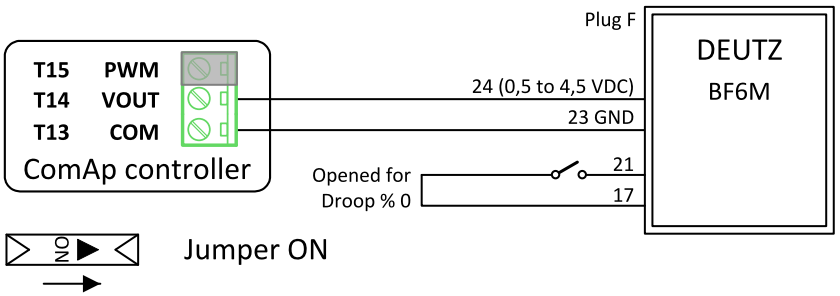



**Speed/Load ctrl:**

*Speed Governor Bias* = 5,00 V

*Speed Regulator Character* = POSITIVE

## DEUTZ BF6M




**Speed/Load ctrl:**

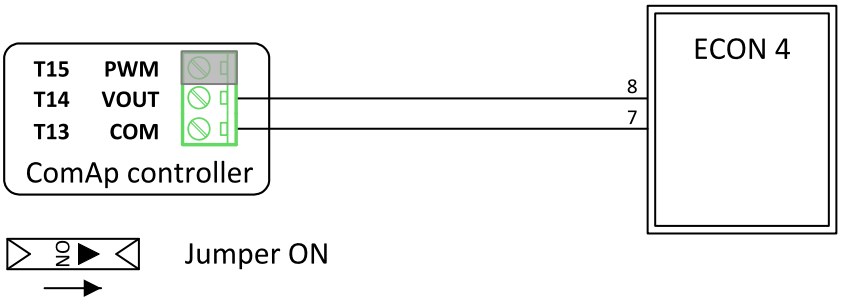
*Speed Governor Bias* = 2.50 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 0.5 V

*Speed Governor High Limit* = 4.5 V

## ECON 4




**Speed/Load ctrl:**

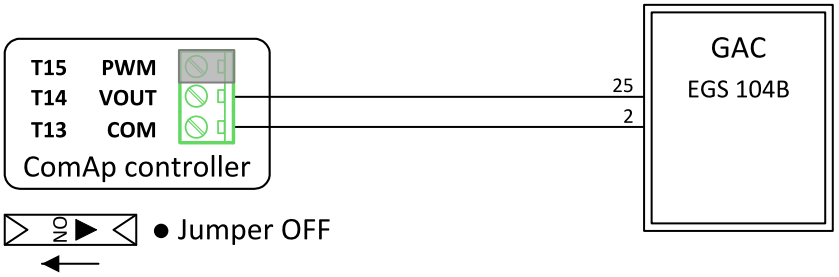
*Speed Governor Bias* = 5,1 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 0,0 V

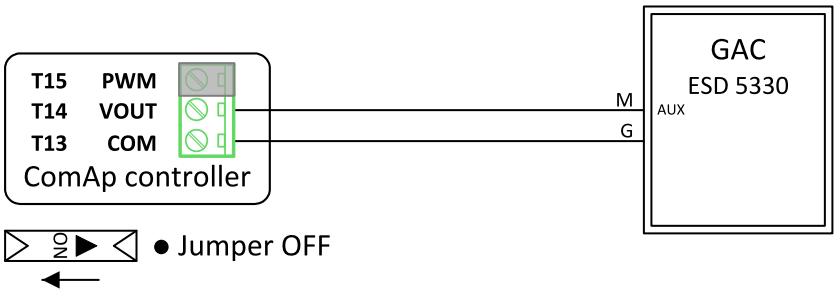
*Speed Governor High Limit* = 10 V

## GAC EGS 104B



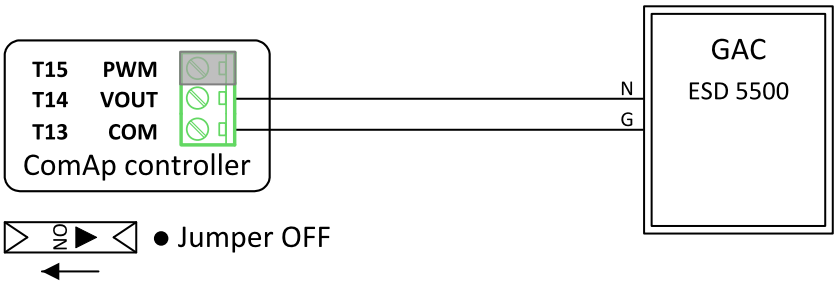

**Speed/Load ctrl:**
*Speed Governor Bias* = 5,00 V
*Speed Regulator Character* = NEGATIVE
*Speed Governor Low Limit* = 4 V
*Speed Governor High Lim* = 6 V

## GAC ESD 5330



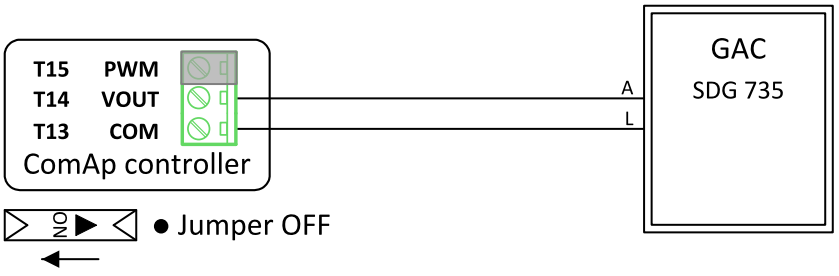

**Speed/Load ctrl:**
*Speed Gov Bias* = 5,00 V
*Speed Regulator Character* = NEGATIVE

## GAC ESD 5500



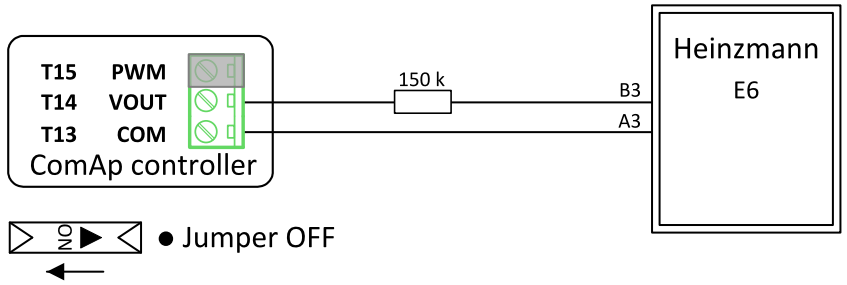

**Speed/Load ctrl:**
*Speed Governor Bias* = 5,00 V
*Speed Regulator Character* = NEGATIVE
*Speed Governor Low Limit* = 4 V
*Speed Governor High Limit* = 6 V

## GAC SDG 735



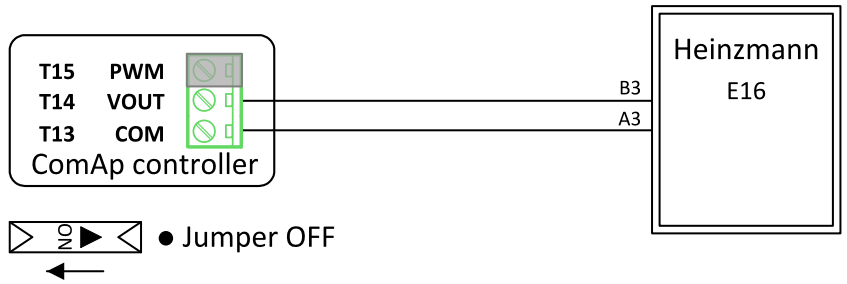

**Speed/Load ctrl:**
*Speed Governor Bias* = 5,00 V
*Speed Regulator Character* = NEGATIVE
*Speed Governor Low Limit* = 2,5 V
*Speed Governor High Limit* = 7,5 V
*Tau act.* = 1

## Heinzmann E6



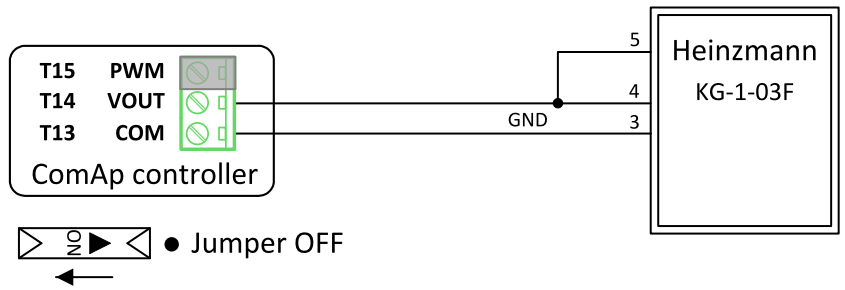

**Speed/Load ctrl:**
*Speed Governor Bias* = 5,00 V *Speed Regulator Character* = POSITIVE

## Heinzmann E16



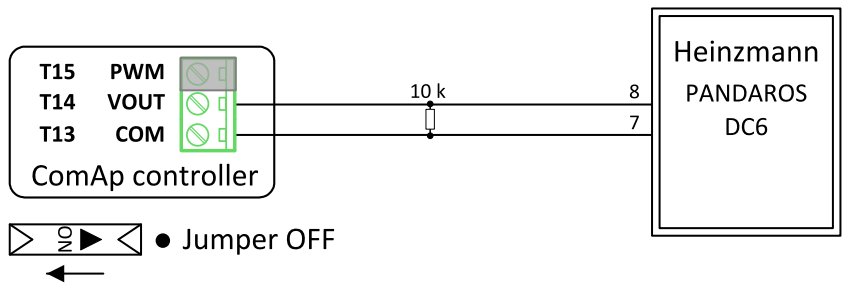

**Speed/Load ctrl:**
*Speed Governor Bias* = 0,00 V *Speed Regulator Character* = POSITIVE

## Heinzmann KG-1-03F




**Speed/Load ctrl:**
*Speed Governor Bias* = 0,00 V
*Speed Regulator Character* = POSITIVE

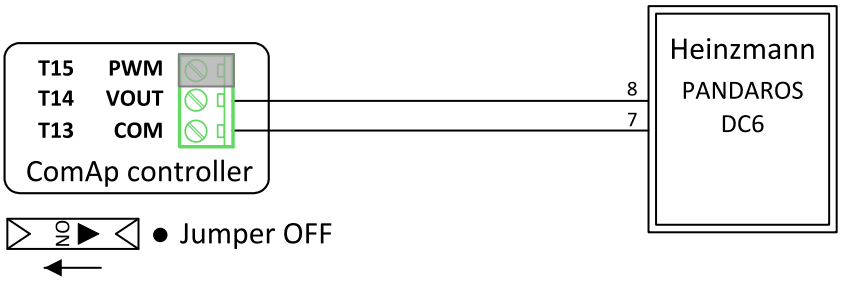
## Heinzmann PANDAROS DC6




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:**

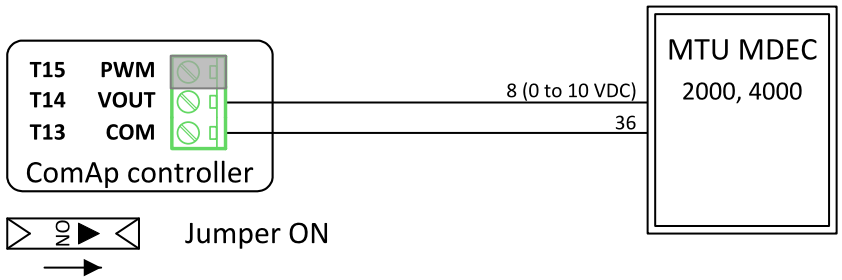
*Speed Governor Bias* = 2,7 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 0 V

*Speed Governor High Limit* = 6 V

## MTU MDEC 2000, 4000




**Speed/Load ctrl:**

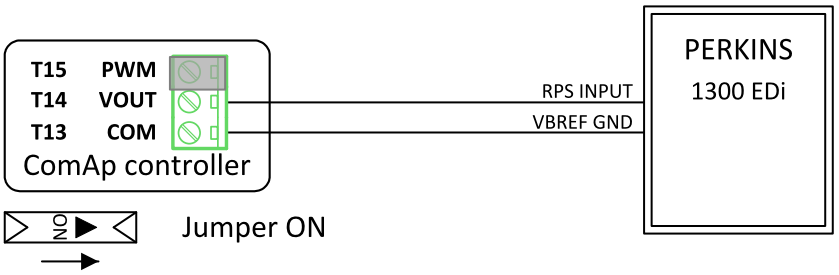
*Speed Governor Bias* = 4,90 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 0 V

*Speed Governor High Limit* = 10 V

## PERKINS 1300 EDi




**Speed/Load ctrl:**

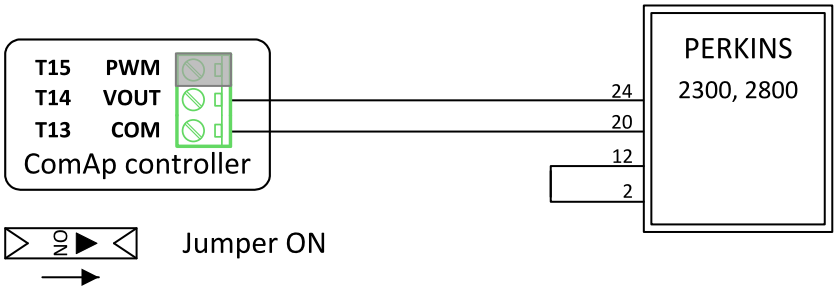
*Speed Governor Bias* = 2,50 V

*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:**

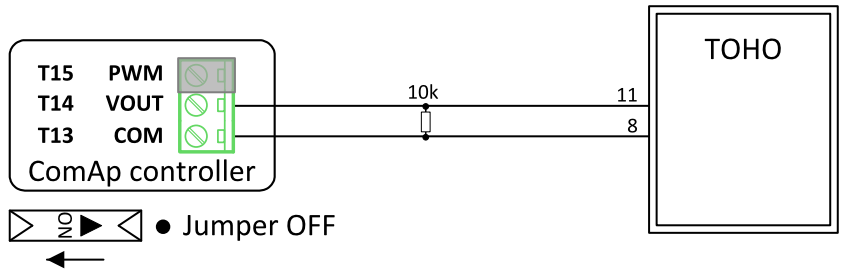
*Speed Governor Bias* = 2,50 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 0,5 V

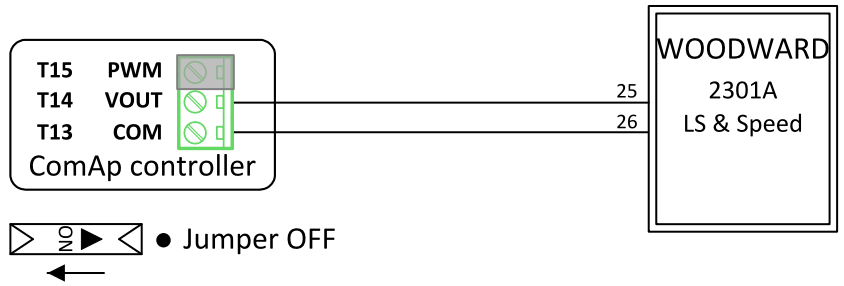
*Speed Governor High Limit* = 4,5 V

## TOHO



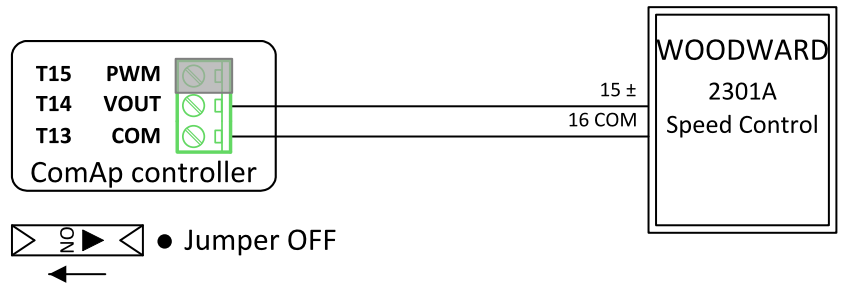

**Speed/Load ctrl:**
*Speed Governor Bias* = 4,00 V
*Speed Regulator Character* = POSITIVE

## WOODWARD 2301A LS and Speed



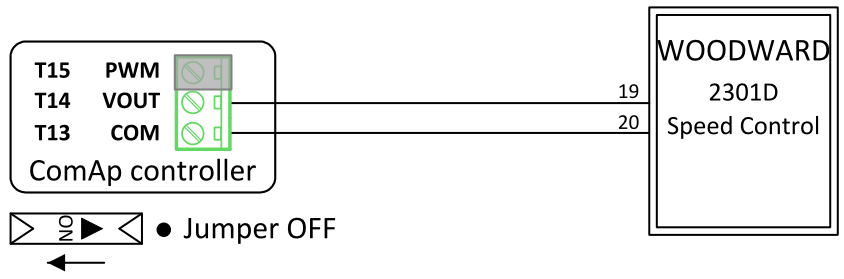

**Speed/Load ctrl:**
*Speed Governor Bias* = 5,00 V
*Speed Regulator Character* = POSITIVE

## WOODWARD 2301A Speed Control




**Speed/Load ctrl:**
*Speed Governor Bias* = 5,00 V
*Speed Regulator Character* = POSITIVE

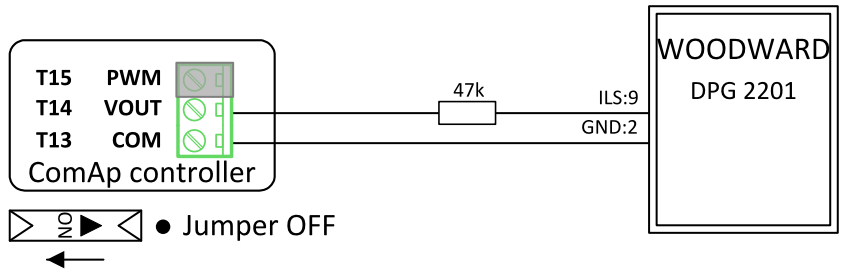
## WOODWARD 2301D Speed Control




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:**

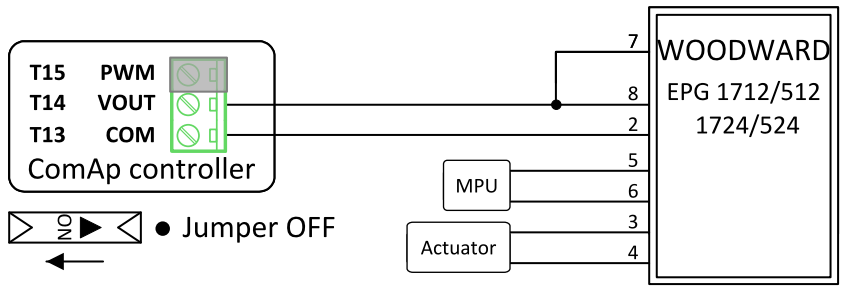
*Speed Governor Bias* = 2,50 V

*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:**

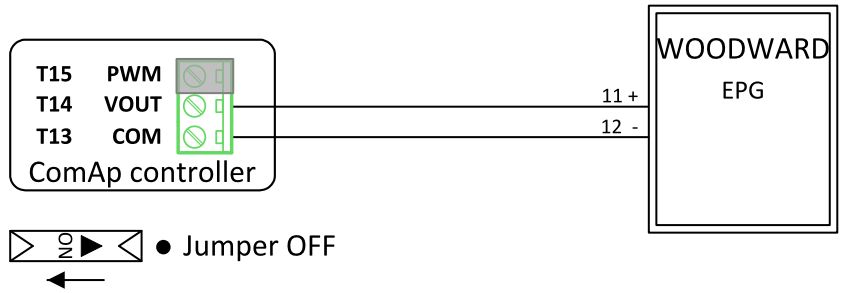
*Speed Governor Bias* = 3,1 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = 6,5V

*Speed Governor High Limit* = 0,0 V

## WOODWARD EPG




For Woodward EPG speed governor (revision F) are limits:

Speed Governor Low Limit = -3 V

Speed Governor High Limit = + 2 V

Speed Governor Bias = - 0,5 V

**Speed/Load ctrl:**

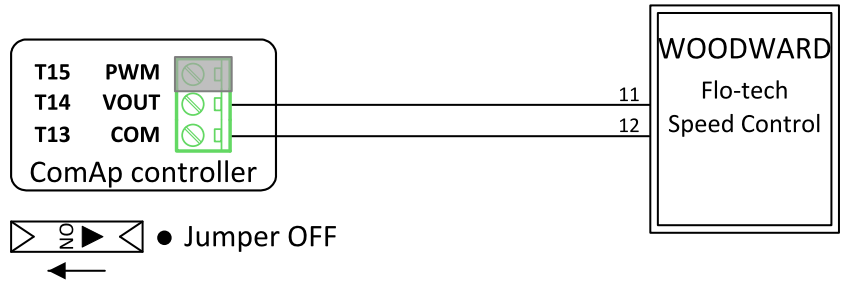
*Speed Governor Bias* = 0,00 V

*Speed Regulator Character* = POSITIVE

*Speed Governor Low Limit* = - 3 V

*Speed Governor High Limit* = 3 V

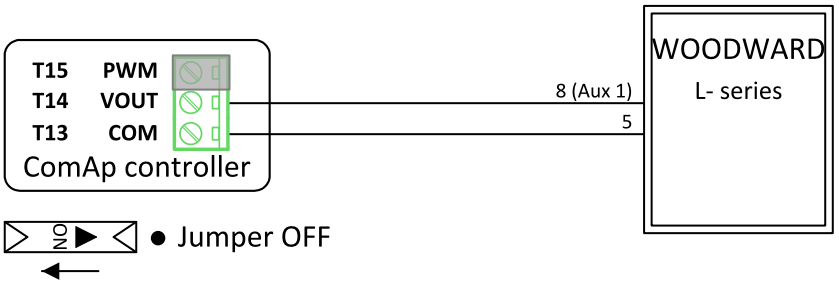
## WOODWARD Flo - tech Speed Control




**Speed/Load ctrl:**

*Speed Governor Bias* = 0,00 V

### WOODWARD L - series




**Speed/Load ctrl:**

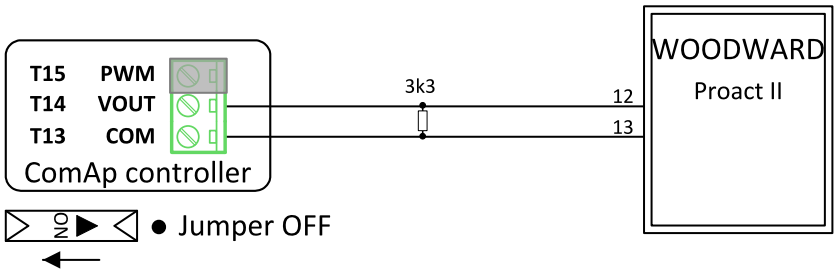
*Speed Governor Bias* = 2,50 V

*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 ..... 862
8.5.2 CAN modules ..... 877

## 8.5.1 Plug-In modules

Communication modules ..... 863
Extension modules ..... 874

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-Ethernet | CM-4G-GPS | CM-GPRS | CM-RS232-485 | EM-BIO8-EFCP |
|---|---|---|---|---|---|
| CM-Ethernet | ✗ | ✓ | ✓ | ✓ | ✓ |
| CM-4G-GPS | ✓ | ✗ | ✗ | ✓ | ✓ |
| CM-GPRS | ✓ | ✗ | ✗ | ✓ | ✓ |
| CM-RS232-485 | ✓ | ✓ | ✓ | ✗ | ✓ |
| EM-BIO8-EFCP | ✓ | ✓ | ✓ | ✓ | ✓ |

# Communication modules

CM-RS232-485 ..... 863
CM-Ethernet ..... 865
CM-GPRS ..... 867
CM-4G-GPS ..... 870

### CM-RS232-485

CM-RS232-485 is optional plug-in card to enable InteliGen 200 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 8.221 CM-RS232-485 interface

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

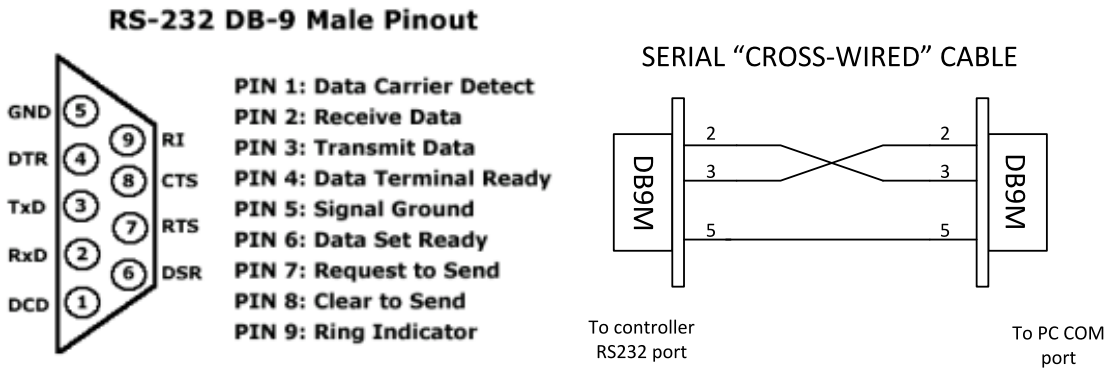



Image 8.222 Pinout of RS-232 line

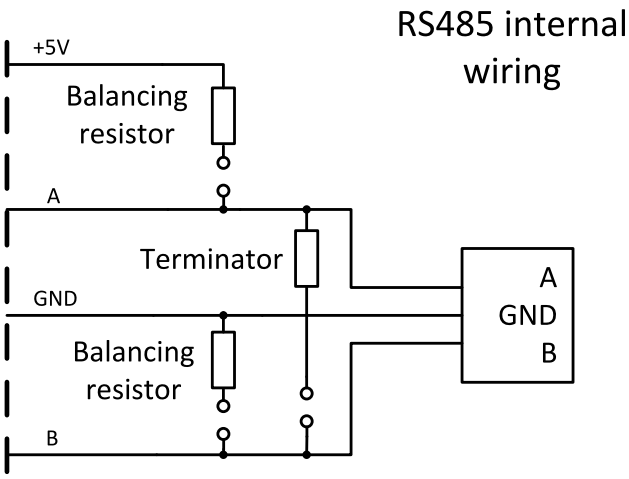



Image 8.223 Pinout of RS-485 line




Image 8.224 Jumpers description

***Note:*** *Balancing resistors shall be both closed at only one device in whole RS485 network.*

Maximal distance of line is 10m for RS232 line and 1200m for RS485 line.

Terminator 120Ω

Balancing resistor +5V

## Technical data

| | |
|---|---|
| **Power consumption** | 40 mA / 8 VDC<br>26 mA / 12 VDC<br>14 mA / 24 VDC<br>10 mA / 36 VDC |
| **Isolation** | Galvanic separation |

## Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Instal package to computer or open PSI to instal it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

### CM-Ethernet

CM-Ethernet is a plug-in card with Ethernet 10/100 Mbit interface in RJ45 connector. It provides an interface for connecting a PC with through ethernet/internet network, for sending active e-mails and for integration of the controller into a building management (MODBUS TCP and SNMP protocols). This card also enables to monitor and control the gen-set over web browser from any location with internet access using appropriate security measures.

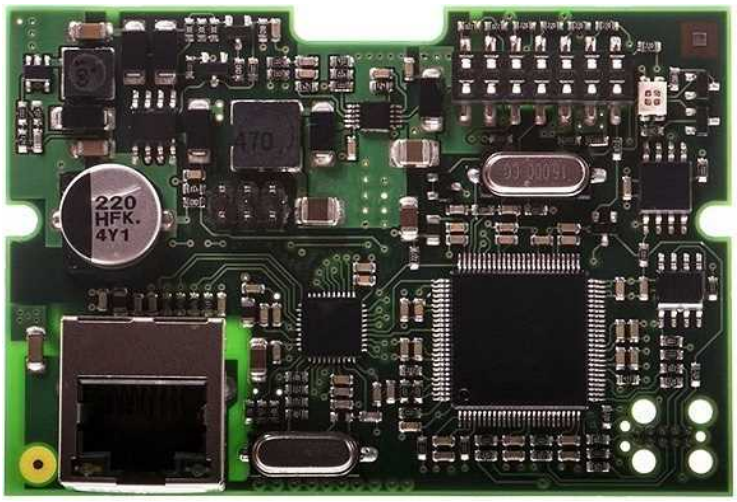



Image 8.225 CM-Ethernet interface

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

Use an Ethernet UTP cable with a RJ45 connector for linking the module with your Ethernet network. The module can also be connected directly to a PC using cross-wired UTP cable.

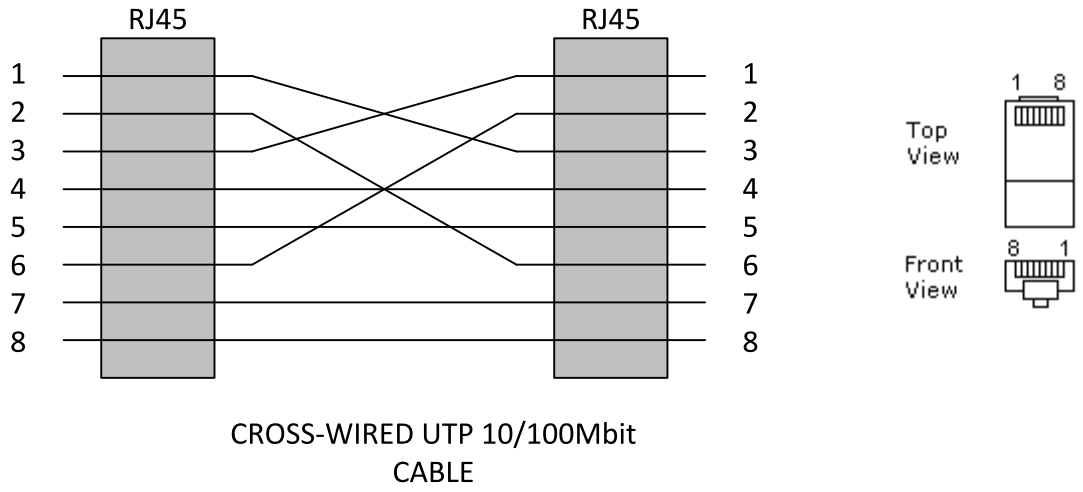



Image 8.226 Cross-wired cable

## Technical data

| | |
|---|---|
| **Power consumption** | 120 mA / 8 VDC<br>82 mA / 12 VDC<br>35 mA / 24 VDC<br>25 mA / 36 VDC |

## Module setup

All settings related to the module are to be adjusted via the controller setpoints. The respective setpoints are located in the setpoint **Group: CM-Ethernet (page 494)**.

All actual operational values like actual IP address etc. are available in controller values in a specific group as well.

## Status LED

| Blinking frequency | Color |
|---|---|
| 1 Hz | Green - everything is OK<br>Red - some of following errors occurred:<br>▶ unplugged ethernet cable<br>▶ module cannot connect to AirGate<br>▶ module can not obtain IP address from DHCP |
| 10 Hz | Green - firmware is currently being programmed<br>Red - no firmware present in the module |

## Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Instal package to computer or open PSI to instal it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

### CM-GPRS

CM-GPRS plug-in module is a GSM/GPRS modem which can works in two modes of operation based on the settings in the setpoint **Mode (page 482)**.

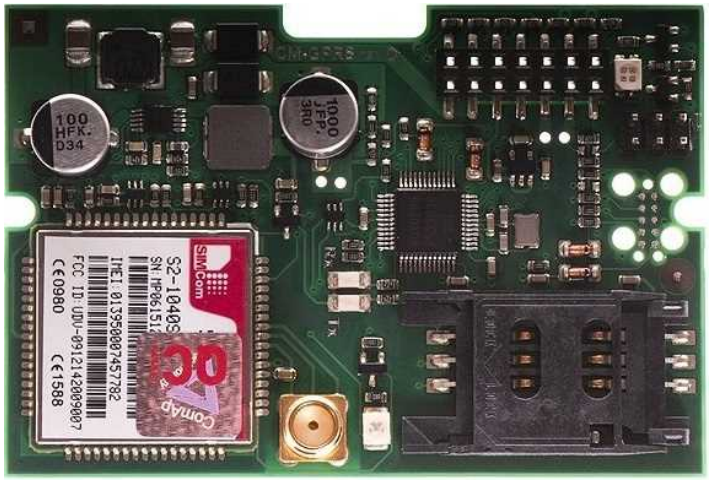


Image 8.227 CM-GPRS module

**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<br>18 mA / 12 VDC<br>10 mA / 24 VDC<br>12 mA / 36 VDC |

### SIM card settings

SIM card to be used in CM-4G-GPS or CM-GPRS modules must be adjusted as follows:

- SMS service enabled
- Packet data (Internet access) enabled (when required for the selected mode of operation)
- PIN code security disabled

### How to start using CM-GPRS module

- You will need a controller, CM-GPRS module, antenna and SIM card with SMS and packet data service.

Make sure that your SIM supports the packet data network type you want to use. I.e. if you want to use the module in GPRS (2,5G) network you have to confirm with the operator that the particular SIM card does support 2,5G network.

- Contact your mobile operator for getting packet data APN (APN = Access Point Name), username and password.

**Example:** APN Name = "internet", UserName = [blank], Password = [blank].

- Make sure SIM card does not require PIN code. Use any mobile phone to switch the SIM PIN security off.
- Place the SIM card into slot on CM-GPRS card
- Connect the antenna to Cellular module antenna connector.
- Switch off the controller.
- Insert CM-GPRS module into controller
- Power up the controller.
- Select the mode of CM-GPRS module by adjusting setpoint Mode.
- Enter correct APN Name, APN User Name and APN User Password in controller's setpoint group CM-GPRS which is accessible by PAGE button from any measurement screen on controller. Setpoints can be set on controller's front panel keyboard or by InteliConfig.
- Switch the controller off and on.
- Wait for approx 2 - 4 minutes for first connection of the system to AirGate. AirGate will generate automatically the AirGate ID value. Then navigate to measurement screens where you will find signal strength bar and AirGate ID identifier.

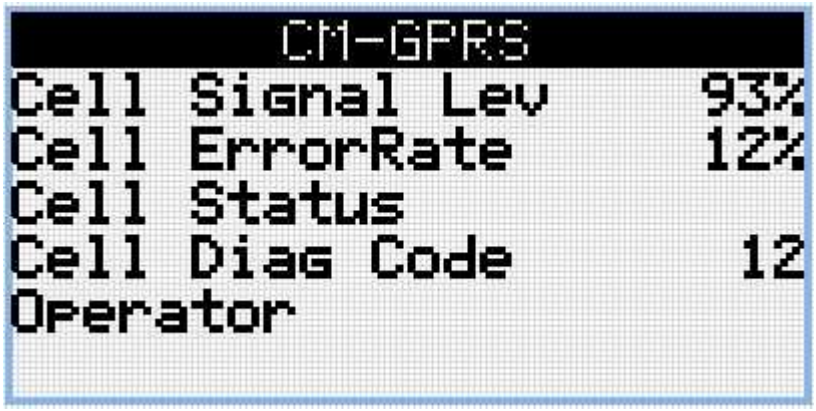



Image 8.228 Main screen of CM-GPRS module




Image 8.229 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 |
| 23 | SIMCom: can´t detect module speed |
| 24 | SIMCom: HW reset issued |
| 25 | PUK is required |
| 26 | Error of SIM card detected |
| 27 | ME909s: can't set module bps |
| 28 | ME909s: can't set link configuration |
| 29 | ME909s: can't do power-off |
| 30 | ME909s: can't do power-on |
| 31 | ME909s: can't do hardware reset |
| 32 | ME909s: ME909s not started |
| 33 | ME909s: switch off issued |

| | |
|---|---|
| 34 | ME909s: switch on issued |
| 35 | ME909s: HW reset issued |
| 36 | ME909s: can't switch echo off |
| 37 | ME909s: can't find out state of registration |
| 38 | ME909s: GSM signal not found |
| 39 | ME909s: no SIM memory for SMS |
| 40 | ME909s: waiting for registration |
| 41 | Can't read operator name |
| 42 | ME909s: can't set flow control |
| 43 | APN not typed |
| 255 | Only running communication is needed to indicate |

AirGate Diag – Diagnostic Code for AirGate connection

| Code | Description |
|---|---|
| 0 | Waiting for connection to AirGate Server |
| 1 | Controller registered, waiting for authorization |
| 2 | Not possible to register, controller blacklisted |
| 3 | Not possible to register, server has no more capacity |
| 4 | Not possible to register, other reason |
| 5 | Controller registered and authorized |

## Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Instal package to computer or open PSI to instal it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

### CM-4G-GPS

CM-4G-GPS plug-in module containing a GPS receiver and GSM/WCDMA/LTE modem which can works in two modes of operation based on the settings in the setpoint **Mode (page 482)**.




Image 8.230 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.

Supported 4G bands are as follows:

- FDD LTE: Band 1, Band 2, Band 3, Band 4, Band 5, Band 7, Band 8, Band 20, all bands with diversity
- WCDMA/HSDPA/HSUPA/HSPA+: Band 1, Band 2, Band 5, Band 8, all bands with diversity
- GSM/GPRS/EDGE: 850 MHz/900 MHz/1800 MHz/1900 MHz

## Technical data

| | |
|---|---|
| **Power consumption** | 55 mA / 8 VDC<br>35 mA / 12 VDC<br>8 mA / 24 VDC<br>5 mA / 36 VDC |

## SIM card settings

SIM card to be used in CM-4G-GPS or CM-GPRS modules must be adjusted as follows:

- SMS service enabled
- Packet data (Internet access) enabled (when required for the selected mode of operation)
- PIN code security disabled

## How to start using CM-4G-GPS module

- You will need a controller, CM-4G-GPS module, antenna and SIM card with SMS and packet data service.

***Note:*** *Make sure that your SIM supports the packet data network type you want to use. - i.e. if you want to use the module in LTE (4G) network you have to confirm with the operator that the particular SIM card supports 4G network.*

- Contact your mobile operator for getting packet data APN (APN = Access Point Name), username and password.

**Example:** APN Name = "internet", UserName = [blank], Password = [blank].

- Make sure SIM card does not require PIN code. Use any mobile phone to switch the SIM PIN security off.
- Place the SIM card into slot on CM-4G-GPS card
- Connect the antenna to Cellular module antenna connector.
- If you want to use the built-in GPS receiver connect also an **active** GPS antenna to the GPS antenna connector.
- Switch off the controller.
- Insert CM-4G-GPS module into controller
- Power up the controller.
- Select the mode of CM-4G-GPS module by adjusting setpoint Mode.
- Enter correct APN Name, APN User Name and APN User Password in controller's setpoint group CM-4G-GPS which is accessible by PAGE button from any measurement screen on controller. Setpoints can be set on controller's front panel keyboard or by InteliConfig.
- Switch the controller off and on.
- Wait for approx 2 - 4 minutes for first connection of the system to AirGate. AirGate will generate automatically the AirGate ID value. Then navigate to measurement screens where you will find signal strength bar and AirGate ID identifier.




Image 8.231 Main screen of CM-4G-GPS module




Image 8.232 Screen of AirGate

GSM Diag Code – Common list of diagnostic codes for cellular modules

## GSM Diag Code – Common list of diagnostic codes for cellular modules

| Code | Description |
|---|---|
| 0 | OK. No error. |
| 1 | Not possible to hang up. |
| 2 | Modul is switched off |
| 3 | Module is switched on |
| 4 | Module – error in initialization |
| 5 | Module – not possible to set the APN |
| 6 | Module – not possible to connect to GPRS network |
| 7 | Module – not possible to retrieve IP address |
| 8 | Module – not accepted DNS IP address |
| 9 | Error in modem detection |
| 10 | Error in initialization of analog modem |
| 11 | SIM card is locked (Possibly PIN code required, PIN needs to be deactivated) or unknown status of SIM locking |
| 12 | No GSM signal |
| 13 | Not possible to read the SIM card parameters |
| 14 | GSM modem did not accepted particular initialization command, possibly caused by locked SIM card |
| 15 | Unknown modem |
| 16 | Bad answer to complement initialization string |
| 17 | Not possible to read GSM signal strength |
| 18 | CDMA modem not detected |
| 19 | No CDMA network |
| 20 | Unsuccessful registration to CDMA network |
| 21 | SIMCom/ME909s: can´t read FW version |
| 22 | SIMCom: GSM signal not found |
| 23 | SIMCom: can´t detect module speed |
| 24 | SIMCom: HW reset issued |
| 25 | PUK is required |
| 26 | Error of SIM card detected |
| 27 | ME909s: can't set module bps |
| 28 | ME909s: can't set link configuration |
| 29 | ME909s: can't do power-off |
| 30 | ME909s: can't do power-on |
| 31 | ME909s: can't do hardware reset |
| 32 | ME909s: ME909s not started |
| 33 | ME909s: switch off issued |
| 34 | ME909s: switch on issued |

| | |
|---|---|
| 35 | ME909s: HW reset issued |
| 36 | ME909s: can't switch echo off |
| 37 | ME909s: can't find out state of registration |
| 38 | ME909s: GSM signal not found |
| 39 | ME909s: no SIM memory for SMS |
| 40 | ME909s: waiting for registration |
| 41 | Can't read operator name |
| 42 | ME909s: can't set flow control |
| 43 | APN not typed |
| 255 | Only running communication is needed to indicate |

AirGate Diag – Diagnostic Code for AirGate connection

| Code | Description |
|---|---|
| 0 | Waiting for connection to AirGate Server |
| 1 | Controller registered, waiting for authorization |
| 2 | Not possible to register, controller blacklisted |
| 3 | Not possible to register, server has no more capacity |
| 4 | Not possible to register, other reason |
| 5 | Controller registered and authorized |

### Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Instal package to computer or open PSI to instal it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

## Extension modules

EM-BIO8-EFCP ..... 874

### EM-BIO8-EFCP

EM-BIO8-EFCP is optional plug-in card. Through this card controller can accommodate one AC current (CT) measuring input (1A or 5A input) and up to 8 binary inputs or outputs. In InteliConfig PC configuration tool it is possible to easily choose if particular I/O will be binary input or output.




Image 8.233 EM-BIO8-EFCP interface

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

**IMPORTANT: Earth fault current measurement is supported by controller only in slot A.**

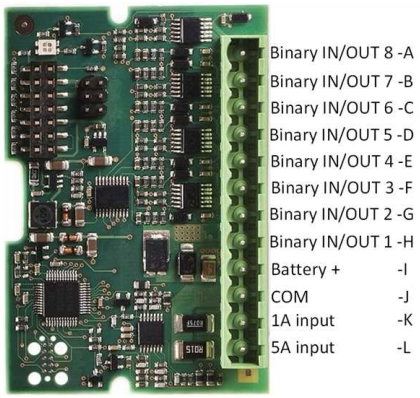



Image 8.234 Overview of EM-BIO8-EFCP

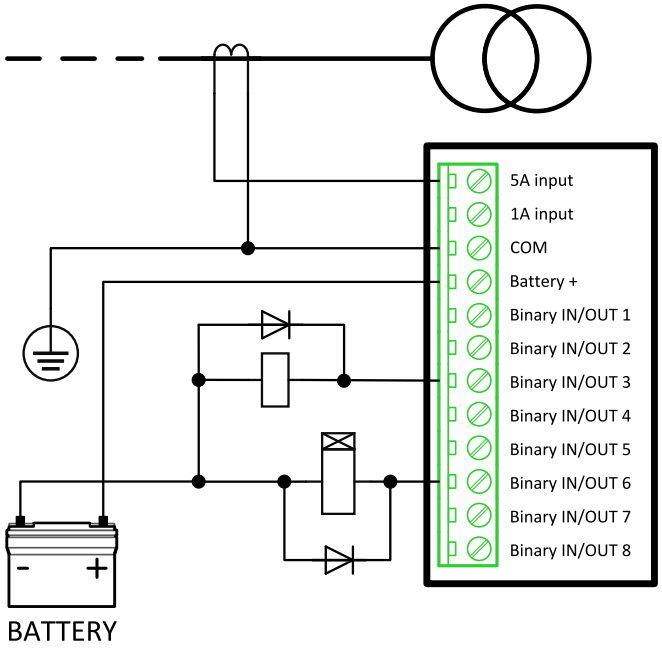



Image 8.235 EM-BIO8-EFCP wiring

## EM-BIO8-EFCP technical data

## Power supply

| | |
|---|---|
| **Power supply range** | 8-36 VDC |
| **Power consumption** | 40 mA / 8 VDC<br>27 mA / 12 VDC<br>22 mA / 24 VDC<br>19 mA / 36 VDC |

## Binary inputs

| | |
|---|---|
| **Number** | Up to 8, non-isolated |
| **Close/Open indication** | 0-2 VDC close contact<br>>6 VDC open contact |

## Binary outputs

| | |
|---|---|
| **Number** | Up to 8 , non-isolated |
| **Max. current** | 0,5A |
| **Switching to** | positive supply terminal |

## 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 509)** time elapses, the **Earth Fault Current Protection (page 508)**, **Sd Earth Fault Current (page 819)** alarm and **AL EARTH FAULT (PAGE 680)** output are activated. Earth Fault protection is not active when gen-set does not run and when the **Earth Fault Current Protection (page 508)** is disabled.

> **IMPORTANT: Earth fault current measurement is not intended to protect human health, but the machines!**

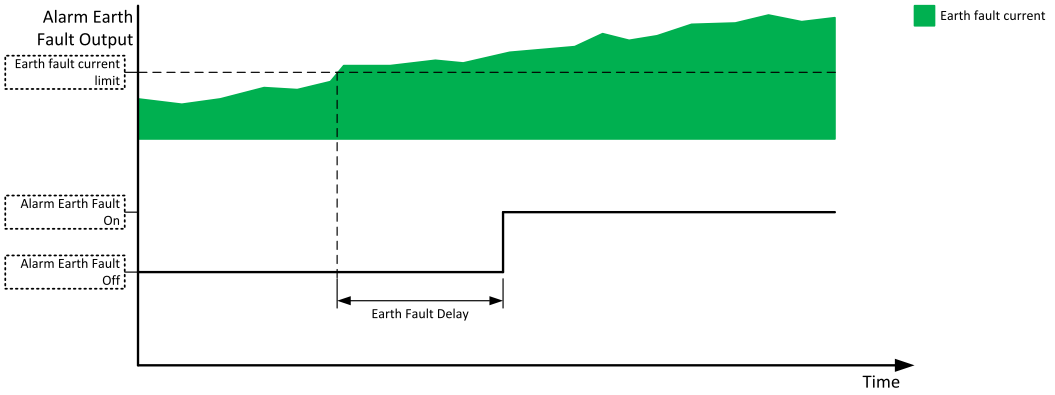



Image 8.236 Earth fault current protection

### Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Instal package to computer or open PSI to instal it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is reestablished again automatically when the update process is finished.

## 8.5.2 CAN modules

Communication modules ..... 878
Extension modules ..... 883

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.

# Communication modules

I-LB+ ..... 878

### I-LB+

I-LB+ is communication modules for communication with all devices connected to CAN2 bus. Speed for direct/modem connection can be up to 57600 bps. I-LB+ can be connected with PC via USB, RS232 or RS485.




Image 8.237 I-LB+

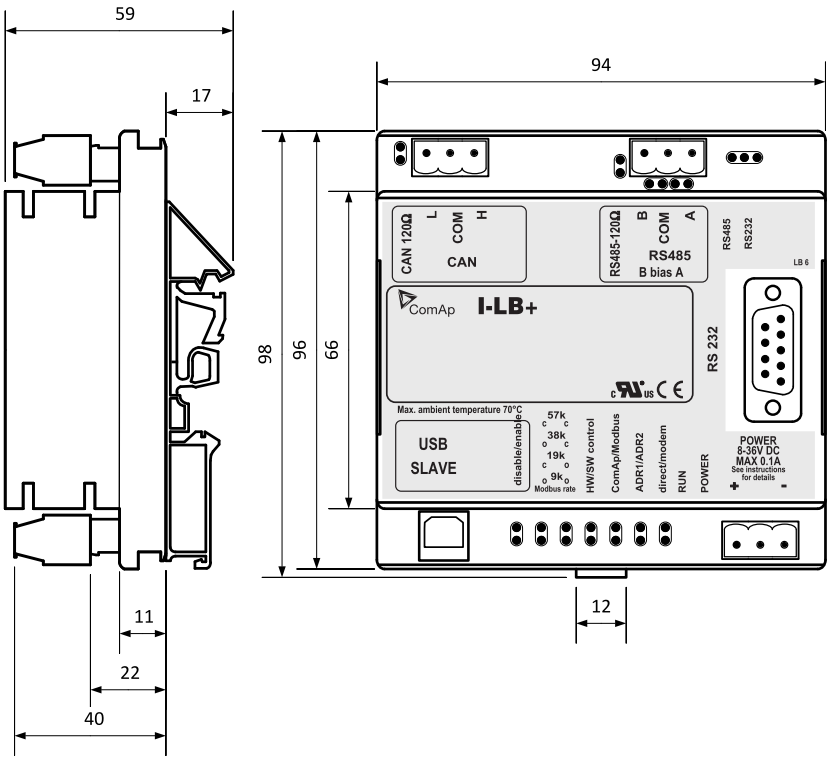
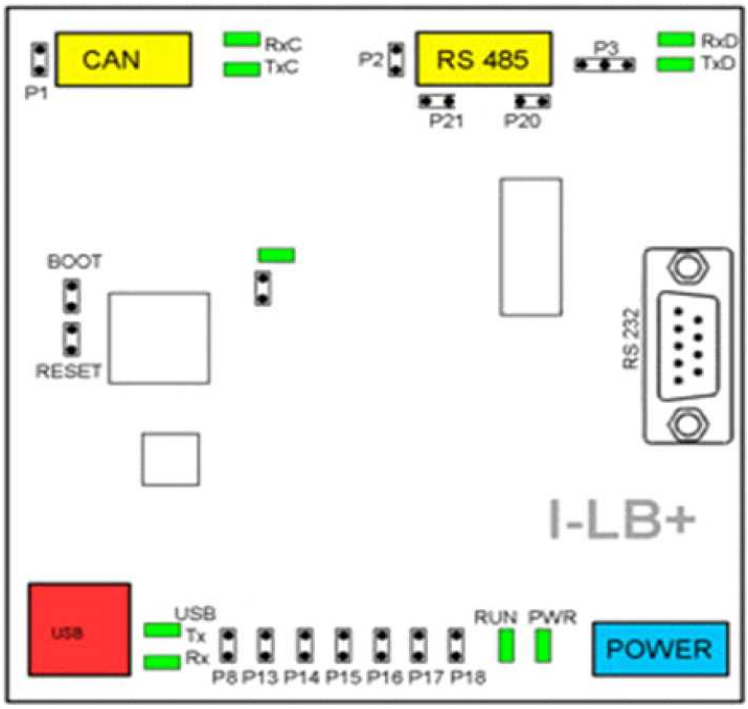



Image 8.238 I-LB+ dimensions

***Note:*** *All dimensions are in mm.*

## Terminals




| | |
|---|---|
| POWER | Power supply |
| CAN | CAN 1 line |
| USB | USB line |
| RS232 | RS485 line |
| J13 - J18 | SW / HW control |
| BOOT | Programming |
| RESET | Programming / reset |
| P1 | Terminating resistor |
| P2 | Terminating resistor |
| P3 | RS485 or RS232 |
| P8 | USB enable/disable |
| P13 | Communication speed |
| P14 | Communication speed |
| P15 | Modem control (HW / SW) |
| P16 | Protocol (Modbus/ComAp) |
| P17 | CAN address |
| P18 | Connection (direct/modem) |

| | |
|---|---|
| P20 | Bias - A |
| P21 | Bias - B |
| RxC,TxC | CAN data |
| RxD, TxD | RSxxx data |
| Tx,Rx USB | USB data |
| RUN | Power |
| PWR | Module state |

**CAN1 termination (P1)**

I-LB+ has included CAN terminating resistor (120 ohm). Close jumper P1 to connect terminating resistor to CAN bus, open jumper P1 to disconnect terminating resistor.

**RS232 or RS485 termination (P2)**

I-LB+ has included RS232/RS485 terminating resistor (120 ohm). Close jumper P2 to connect terminating resistor to RS232/RS485 bus, open jumper P2 to disconnect terminating resistor.

**Select RS mode (P3)**

Jumper P3 selecting RS mode. When jumper P3 is connected to 1-2(from left side), RS485 mode is activated. When jumper P3 is connected to 2-3, RS232 mode is actives.

**ComAp / Modbus (P16)**

Jumper P16 selects between ComAp PC tools and third party PC SW for monitoring with Modbus interface. ComAp PC tools are selected when P16 is opened; Modbus is selected when P16 is closed.

**Modbus rate (P13 and P14)**

Modbus rate is set by jumpers P13 and P14; description is in the table bellow.

| Modbus rate | P13 | P14 |
|---|---|---|
| 9600 bps | Open | Open |
| 19200 bps | Close | Open |
| 38400 bps | Open | Close |
| 57600 bps | Close | Close |

**Direct / Modem (P18)**

Select between direct connection via RS232 or RS485 and modem connection type. For modem connection is jumper P18 closed, for direct connection is jumper P18 opened.

**ADR1 / ADR2 (P17)**

Select device address. ADR1 is selected if P17 is opened and ADR2 is selected if P17 is closed.

**SW / HW control (P15)**

Select SW or HW modem control. Jumper P15 is opened for HW modem control and closed for SW modem control.

**RS485 bias resistor (P20 and P21)**

Jumpers P20 and P21 are opened if the bias resistors (560R) are not requested. Closed jumper connects bias resistor to the line A (P20) or B (P21).

### USB interface enable/disable (P8)

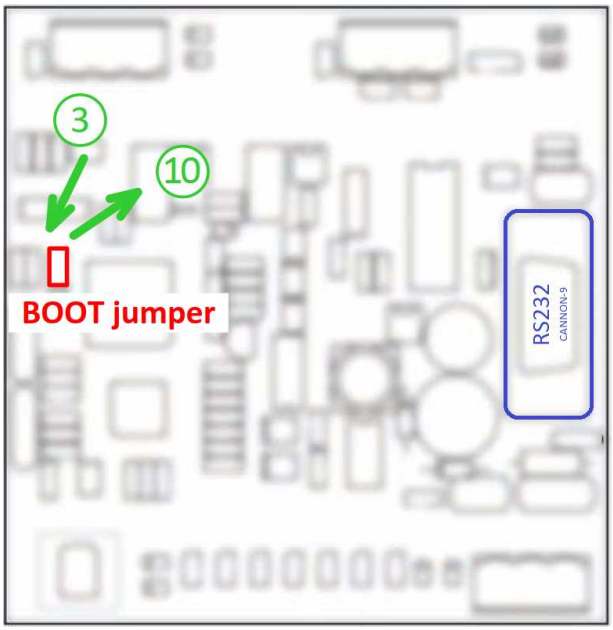
Jumper P8 has to be set to enable USB interface. Opened jumper disables USB interface (disabled USB doesn't occupies a communication channel on the CAN bus i.e. there are still 3 free communications channels on the CAN bus). USB interface allows only local communication (modbus is not implemented in this interface).

## Default jumpers settings

| Jumper | Description | State |
|---|---|---|
| P1 | CAN terminating resistor | Opened - not connect |
| P2 | RS485 terminating resistor | Opened - not connect |
| P3 | RS232 or RS485 | 1 - 2 RS485 activated, 2 - 3 RS232 activated |
| P8 | USB enable/disable | Opened - disabled |
| P13 | Modbus rate | Opened |
| P14 | Modbus rate | Opened - 9600 bps |
| P15 | HW or SW modem control | Opened - HW control |
| P16 | ComAp or Modbus | Opened - ComAp protocol |
| P17 | ADR1 or ADR2 | Opened - ADR1 |
| P18 | Direct or Modem | Opened - Direct |

## Programming firmware

1. Disconnect all terminals from the unit.
2. Disassemble the unit.
3. Put the BOOT jumper on a pin.
4. Connect the unit with PC via RS232-null modem cable : launch




5. Connect power supply of the module
6. Launch FlashPgr.exe PC software
7. In FlashPrg program choose card 90F352 and load FW for the module
8. Set the proper COM port (connected with the unit) and press Start button

9. Wait till process is done (If the process doesn't start – after 60 second the "Timeout" will be evaluated. In this case please check:
   - Proper connection with the unit
   - COM port selection
   - Unit's power supply is according manual
   - BOOT jumper is set on, try again from point 3
10. After successful programming, disconnect the power supply from the unit and remove the BOOT jumper
11. Assemble the unit again
12. Module FW is upgraded

## LED indication

| LED | Description State | State |
|---|---|---|
| RxC | No data are received on the CAN line | Dark |
| | Data are received on the CAN line | Blink |
| TxC | No data are transmitted on the CAN line | Dark |
| | Data are transmitted on the CAN line | Blink |
| RxD | No data are received on the RS232 or RS485 line | Dark |
| | Data are received on the RS232 or RS485 line | Blink |
| TxD | No data are transmitted on the RS232 or RS485 line | Dark |
| | Data are transmitted on the RS232 or RS485 line | Blink |
| TxUSB | No data are received on USB | Dark |
| | Data are received on USB | Blink |
| RxUSB | No data are transmitted on USB | Dark |
| | Data are transmitted on USB | Blink |
| PWR | No power supply | Dark |
| | Power supply OK | Continuous light |
| RUN | When at least one controller is active on the CAN bus | Continuous light |
| | After connection power supply - no controller detected on the CAN bus (during communication speed detection). | Blink |

## Wiring

I-LB+ has to be connected to modem via standard modem cable (full RS232) where the DSR (Data Set Ready) signal detects modem presence (when MODEM (HW) type selected). Three-wire RS232 cable (TxD, RxD, GND) can be used (e.g. for GSM modems) when MODEM (SW) type is selected.

## Technical data

## General data

| | |
|---|---|
| Power supply | 8 to 36 V DC |
| Current consumption | 100 mA at 24 V |
| Interface to controller | CAN2 |

| | |
|---|---|
| Interface to modem or PC | RS232, RS485, USB |
| Storage temperature | - 40 °C to + 80 °C |
| Operating temperature | - 30 °C to + 70 °C |
| Dimensions (WxHxD) | 95x96x43 mm (3,7”x3,8”x1,7”) |

# Extension modules

Inteli AIN8 ..... 883
Inteli IO8/8 ..... 889
IGS-PTM ..... 896

## Inteli AIN8

Inteli AIN8 module is extension module equipped with analog inputs. Inteli AIN8 module is connected to controller by CAN1 bus.




Image 8.239 Inteli AIN8

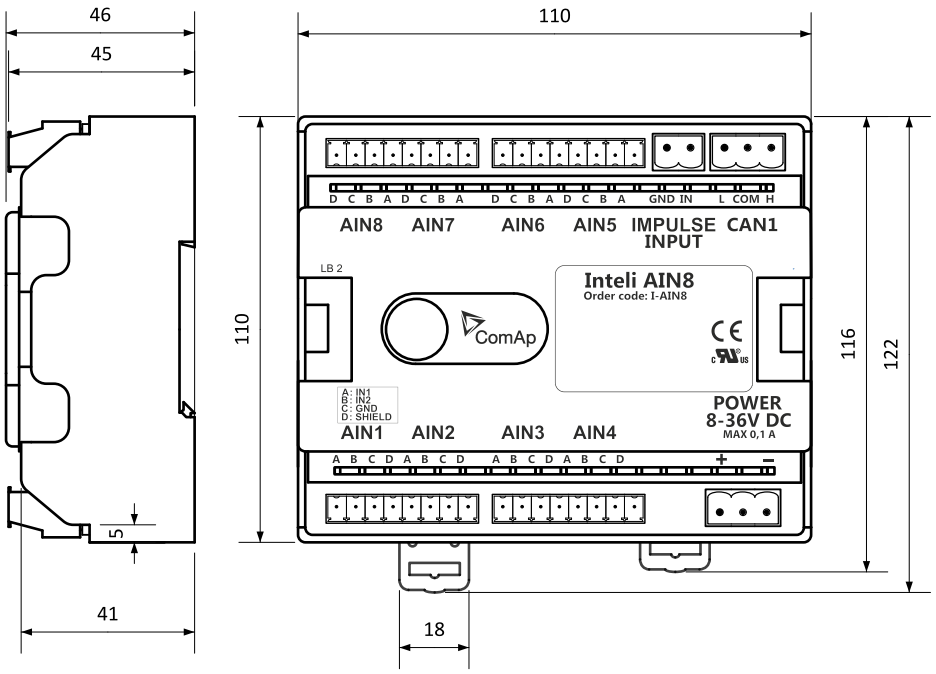
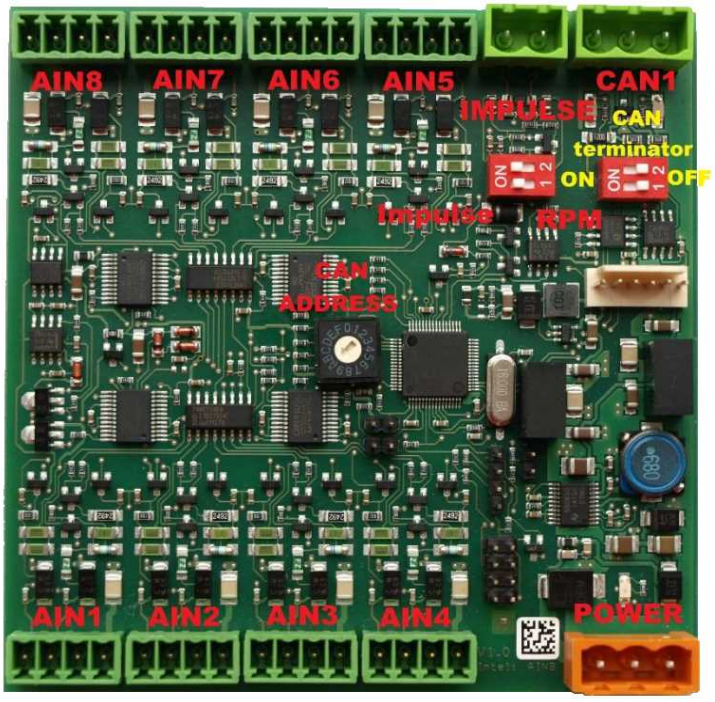



Image 8.240 Inteli AIN8 dimensions

***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) | 0-5V |
| PT100 [°C] (fix) | NI1000 [°F] (fix) | 0-10V |
| PT1000 [°C] (fix) | | 4-20mA passive |
| NI100 [°C] (fix) | 0-2400ohm | 4-20mA active |
| NI1000 [°C] (fix) | 0-10k ohm | 0-20mA passive |
| PT100 [°F] (fix) | +-1V | +-20mA active |
| PT1000 [°F] (fix) | 0-2.4V | |

## CAN address

DIP switch determinates CAN address for analog inputs.



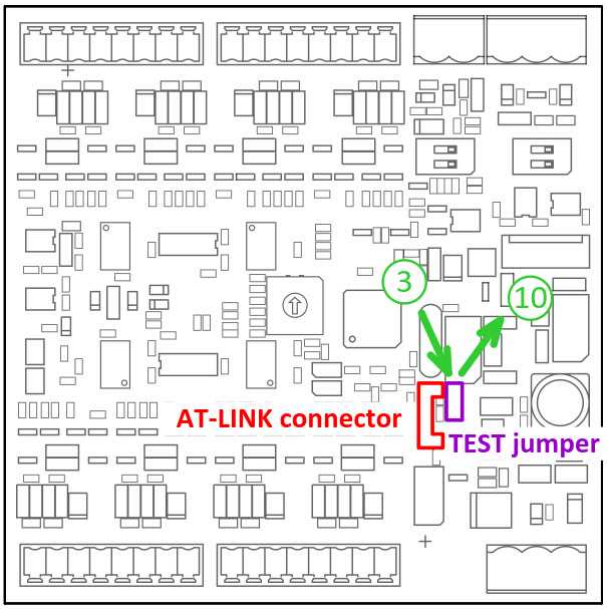

***Note:*** *In case of setting the CAN address to zero, the appropriate group of signals is deactivated.*

## Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Separate the top cover of module
3. Put the TEST jumper on a pins

4. Connect the unit with PC via RS232-null modem cable and AT-Link conv




5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli AIN8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press Start button
9. Wait till process is done (If the process doesn't start – after 60 second the "Timeout" will be evaluated. In this case please check:
   - You have proper connection with the unit
   - COM port selection is correct
   - Module has power supply, (no CAN bus connection, status LED lights continuously)
10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blinking)
12. Module FW is upgraded

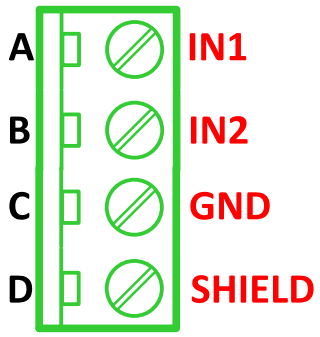
## LED indication

| LED status | Description |
|---|---|
| Dark | Fw in module does not work correctly. |
| Flashing | Module does not communicate with controller (in case non-zero CAN address). |
| Lights | Power supply is in the range and the communication between Inteli AIN8 and controller works properly.<br>Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller). |

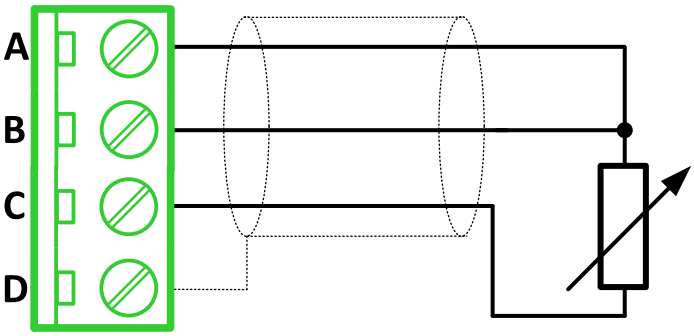
## Wiring

The following diagrams show the correct connection of sensors.

**Terminator**

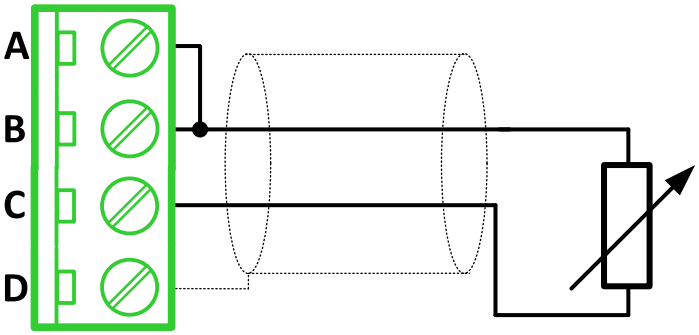



**Resistance sensor - 3 wires**



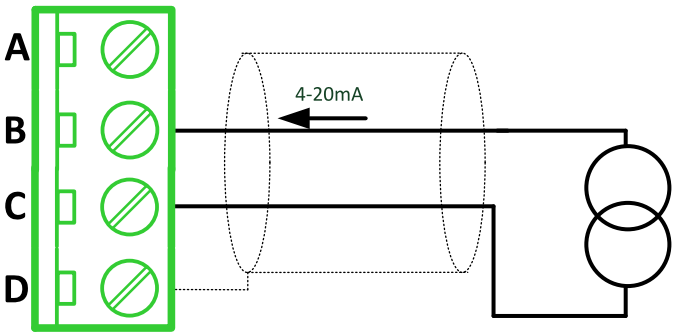

***Note:*** *Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400 Ω, 0 – 10 kΩ*

**Resistance sensor - 2 wires**



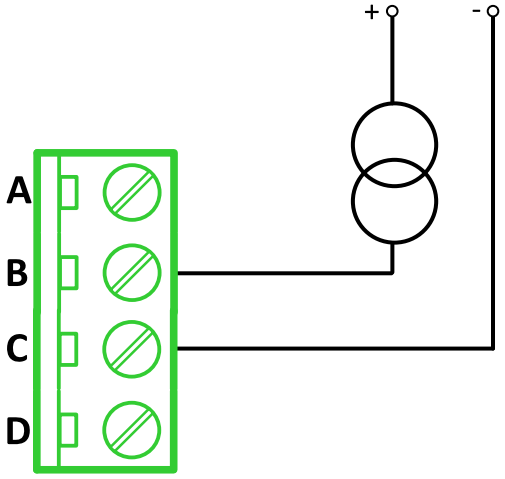

***Note:*** *Ranges: Pt100, Pt1000, Ni100, Ni1000, 0 – 2400 Ω, 0 – 10 kΩ*

**Current sensor - active**



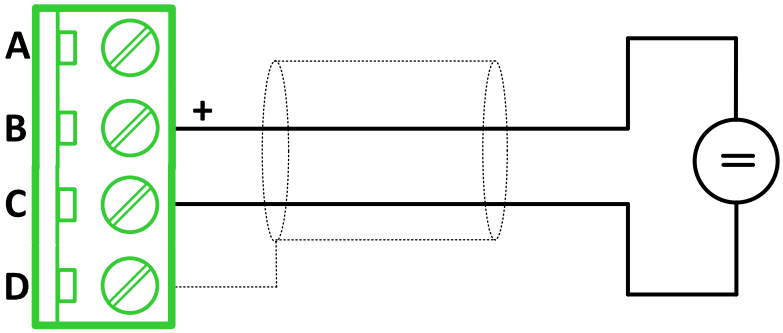

***Note:*** *Ranges: ±20 mA, 4 – 20 mA*

**Current sensor - passive**




***Note:*** *Ranges: 0 – 20 mA, 4 – 20 mA*

**Voltage sensor**




***Note:*** *Ranges: ±1 V, 0 – 2,5 V, 0 – 5 V, 0 – 10 V*

## Technical data

## General data

| | |
|---|---|
| Power supply | 8 to 36 V DC |
| Current consumption | 35 mA at 24 V ÷ 100 mA at 8 V |
| Interface to controller | CAN1 |
| Protection | IP20 |
| Storage temperature | - 40 °C to + 80 °C |
| Operating temperature | - 30 °C to + 70 °C |
| Dimensions (WxHxD) | 110x110x46 mm (4,3”x4,3”x1,8”) |
| Weight | 221,5 grams |

## Analog inputs

| | |
|---|---|
| Number of channels | 8 |
| Voltage | Range 0-10 V<br>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<br>Accuracy: ± 0,5 % of actual value + ± 2 Ω |

## Inteli IO8/8

Inteli IO8/8 module is an extension module equipped with binary inputs, binary outputs and analog outputs.

Inteli IO8/8 is the name of the module, but it is possible to configure the module (by internal switch) to two configurations:

- Inteli IO8/8 - 8 binary inputs, 8 binary outputs and 2 analog outputs
- Inteli IO16/0 - 16 binary inputs, 0 binary outputs and 2 analog outputs

The detection of communication speed is indicated by fast flashing of status LED. Once the speed is detected the module remains set for the speed even when the communication is lost. Renewal of communication speed detection is done by reset of the module.




Image 8.241 Inteli IO8/8

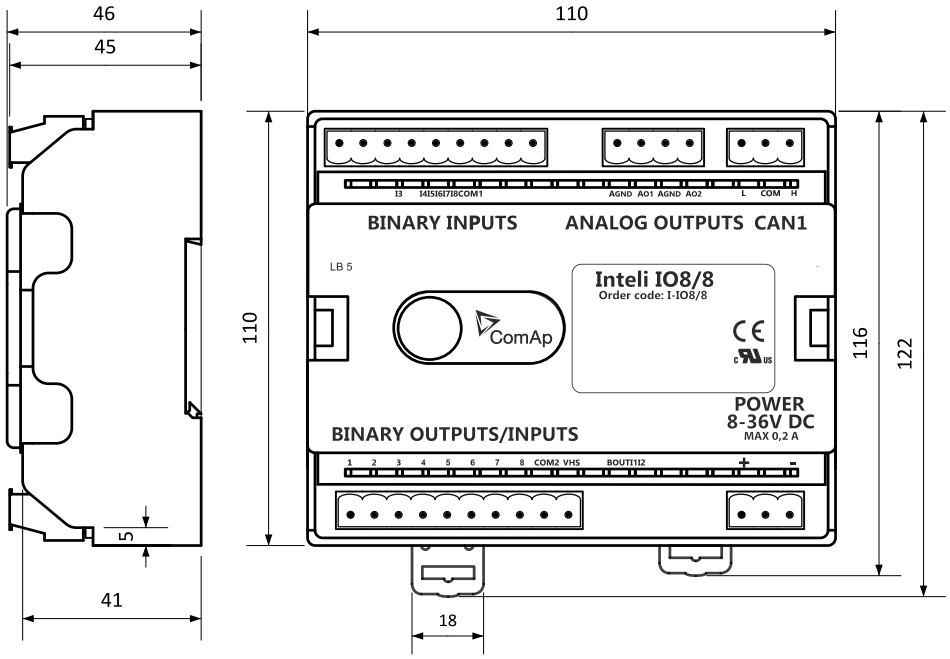
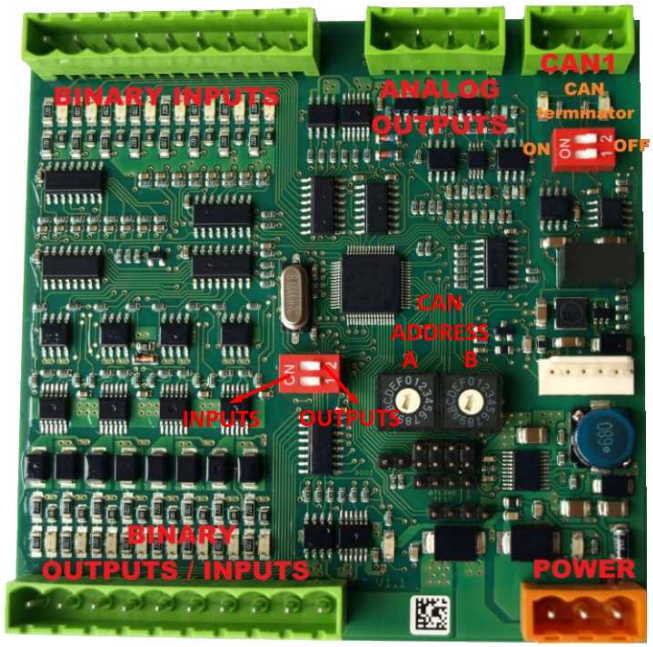



Image 8.242 Inteli IO8/8 dimensions

***Note:*** *All dimensions are in mm.*

## Terminals




| | |
|---|---|
| Binary inputs | 8 binary inputs |
| Binary outputs | 8 binary outputs (8 binary inputs) |
| Analog outputs | 2 analog outputs |
| CAN | CAN1 line |
| Power | Power supply |
| Binary inputs LEDs | 8 LEDs for binary input indication |

| | |
|---|---|
| Binary outputs LEDs | 8 LEDs for binary output indication |
| CAN LED | Indication transmitted or received data |
| Status | LED indication of correct function |
| CAN terminator | Terminating CAN resistor (active in position “ON” - switch both switches) |

## Inputs and outputs

### Binary inputs

- 8 channels
- can be configured as:
  - pull up
  - pull down

All 8 inputs are configured to one type together.

All inputs can be configured to any logical function or protection.

### Binary outputs

- 8 channels
- can be configured as:
  - High side switch
  - Low side switch

Always all 8 inputs are configured to one type (HSS/LSS) together. All 8 outputs can be modified to inputs by switch on the PCB ( Inteli IO8/8 to Inteli IO16/0).

### Analog outputs

- 2 channels
- can be configured as:
  - voltage 0-10V
  - current 0-20mA
  - PWM (level 5V, with adjustable frequency from 200Hz to 2400Hz, with step 1Hz)

All inputs/outputs can be configured to any logical function or protection.

## Output state check

Output state check function evaluates in real time the state of binary outputs and adjusted (required) state. In case of failure (different state of required state and real state) history record and alarm are issued (type of the alarm is set by “Protection upon module failure” - (No protection / Warning / Shutdown)).

This function is designed for short-circuit or other failure, which causes change of set state of binary output.

## CAN address

In Inteli IO8/8 mode CAN address for binary inputs is determined by DIP switch A, CAN address for binary output and analog outputs is determined by DIP switch B.

In Inteli IO16/0 mode CAN address for binary inputs is determined by DIP switch A, first group of 8 input has address A, second group of 8 inputs has address A+1. CAN address of analog outputs is set by DIP switch B.

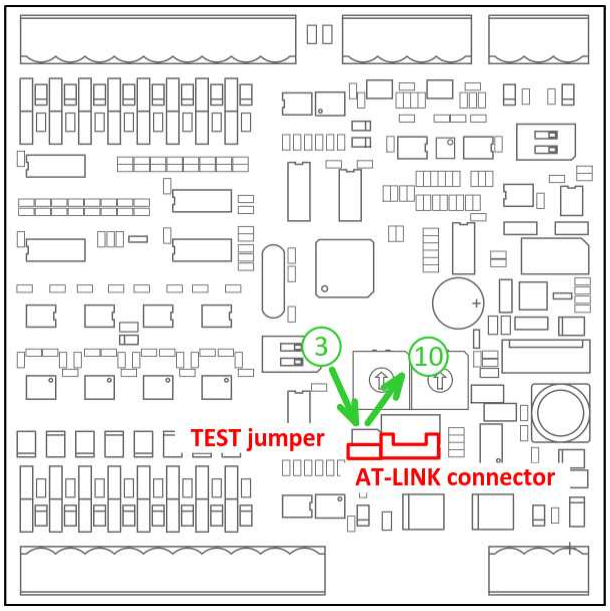



***Note:*** *In case of setting the CAN address to zero, the appropriate group of signals is deactivated.*

## Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Separate the top cover of module
3. Put the TEST jumper on a pins
4. Connect the unit with PC via RS232-null modem cable and AT-Link conv




5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli IO8/8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press Start button
9. Wait till process is done (If the process doesn't start – after 60 second the "Timeout" will be evaluated. In this case please check:
   - You have proper connection with the unit
   - COM port selection is correct
   - Module has power supply, (no CAN bus connection, status LED lights continuously)
10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blinking)
12. Module FW is upgraded

## LED indication

### Binary input

Each binary input has LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

### Binary output

Each binary output has LED which indicates output signal. Binary output LED is shining when binary output is set. When this LED is shining, then module is configured as 8 binary inputs and 8 binary outputs. When this LED is dark, then the module is configured as 16 binary inputs.

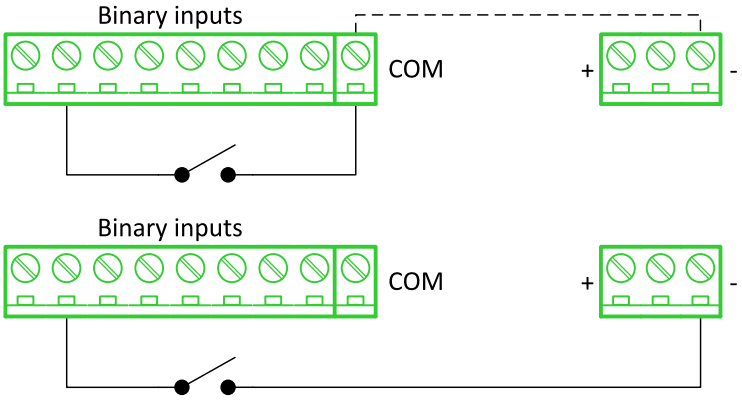
### LED at power connector - status LED

| LED status | Description |
|---|---|
| Dark | Fw in module does not work correctly. |
| Flashing | Module does not communicate with controller (in case non-zero CAN address). |
| Lights | Power supply is in the range and the communication between Inteli IO8/8 and controller works properly.<br>Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller). |

## Wiring

The following diagrams show the correct connection of inputs and outputs.

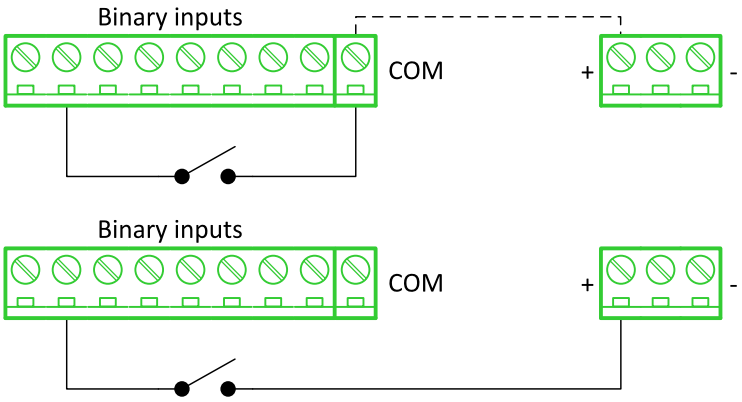
### Binary inputs - pull up




There are two options of wiring. On upper picture you can see case when binary input is connected between BIN2 and COM (COM is connected internally to the GND (-) - dashed line).

On lower picture is case of wiring between BIN2 and GND (-). Both ways are correct.

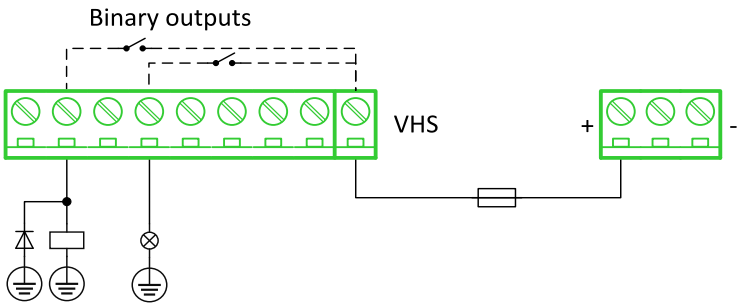
**Binary inputs - pull down**




There are two options of wiring. On upper picture you can see case when binary input is connected between BIN2 and COM (COM is connected internally to the Ucc (+) - dashed line).

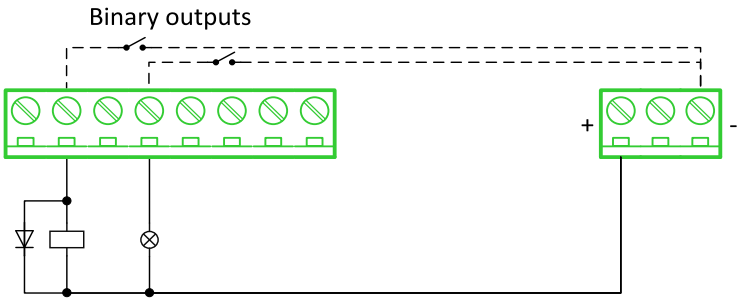
On lower picture is case of wiring between BIN2 and Ucc (+). Both ways are correct.

**Binary outputs - high side**



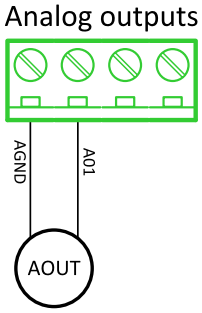

When high side setting of outputs is chosen - binary output must be connected to the minus potential directly Terminal VHS (voltage High side) has to be connected to positive potential directly. Maximal current of each binary output is 500 mA. Size of fuse depends on load.

**Binary outputs - low side**




When low side setting of outputs is chosen - binary output must be connected to the plus potential of power supply directly. Minus potential is connected internally - dashed line.

**Analog outputs**



***Note:*** *Limit of analog ground (AGND) is 100mA.*

**IMPORTANT: Terminator for analog output has special analog ground (AGND), which must not be connected to the GND.**

## Technical data

## General data

| | |
|---|---|
| Power supply | 8 to 36 V DC |
| Current consumption | 35 mA at 24 V ÷ 100 mA at 8 V |
| Interface to controller | CAN1 |
| Protection | IP20 |
| Storage temperature | - 40 °C to + 80 °C |
| Operating temperature | - 30 °C to + 70 °C |
| Dimensions (WxHxD) | 110x110x46 mm (4,3”x4,3”x1,8”) |
| Weight | 240 grams |

## Analog outputs

| | |
|---|---|
| Number of channels | 2 |
| Voltage | Range 0-10 V<br>Accuracy: ± 20 mV + ±0,5 % of actual value<br>Imax 5 mA |
| Current | Range: 0-20 mA<br>Accuracy: ± 100 µA + ±0,5 % of actual value<br>Rmax 500 Ω |
| PWM | Level 5 V<br>Frequency - adjustable 200÷2400 Hz<br>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 8.243 IGS-PTM

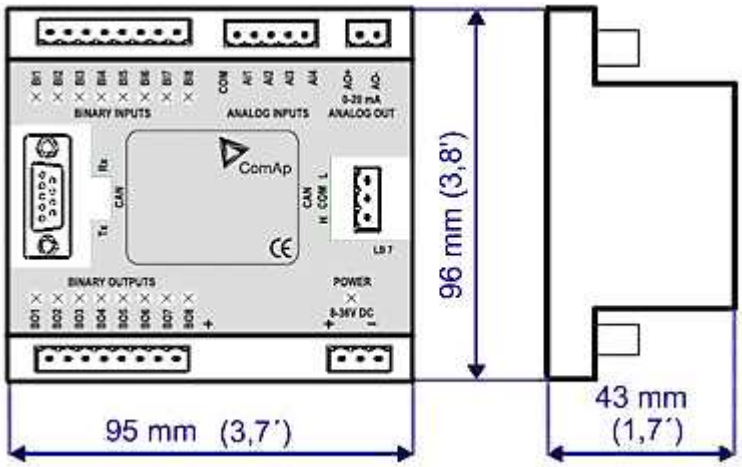
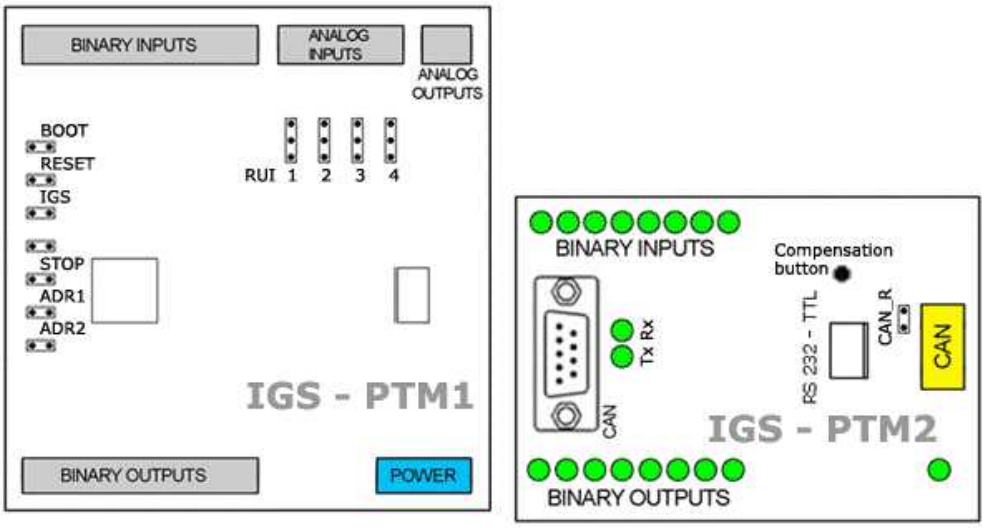



Image 8.244 IGS-PTM dimensions

## Terminals




| | |
|---|---|
| Binary inputs | 8 binary inputs |
| Analog inputs | 4 analog inputs |
| Analog outputs | 1 analog output |
| Binary outputs | 8 binary outputs |
| CAN | CAN1 line |
| RS232-TTL | Interface for programming |
| Power | Power supply |

## Analog inputs

Analog inputs can be configured for:

- Resistance measurement
- Current measurement
- Voltage measurement

The type of analog inputs is configured via jumpers RUI located on lower PCB.

| RUI | Analog input configuration |
|---|---|
| 1 - 2 | Resistance measuring |
| 2 - 3 | Current measuring |
| no jumper | Voltage measuring |

## Supported sensors

| Sensors | |
|---|---|
| PT100 [°C] (fix) | User curves |
| NI100 [°C] (fix) | 0-100 mV |
| PT100 [°F] (fix) | 0-2400 ohm |
| NI100 [°F] (fix) | ±20 mA |

## CAN address

### Controller type selection

The type of controller to be used with IGS-PTM must be selected via jumper labeled IGS accessible at the lower PCB.

| IGS jumper | Controller type |
|---|---|
| OPEN | IL-NT, IC-NT |
| CLOSE | IG-NT, IS-NT, InteliGen |

### Address configuration

If InteliGen controller type is selected (by IGS jumper), address of IGS-PTM could be modified via jumpers labeled ADR1 and ADR2.

| ADR1 | ADR2 | ADR offset | BIN module | BOUT module | AIN module |
|---|---|---|---|---|---|
| Open | Open | 0 (default) | 1 | 1 | 1 |
| Close | Open | 1 | 2 | 2 | 2 |
| Open | Close | 2 | 3 | 3 | 3 |
| Close | Close | 3 | 4 | 4 | 4 |

## Programing firmware

Firmware upgrade is via AT-link (TTL). For programming is necessary to close jumper BOOT. RESET jumper is used to reset the device. Close jumper to reset the device. For programming is used FlashProg PC tool.

## LED indication

### Binary input

Each binary input has LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

### Binary output

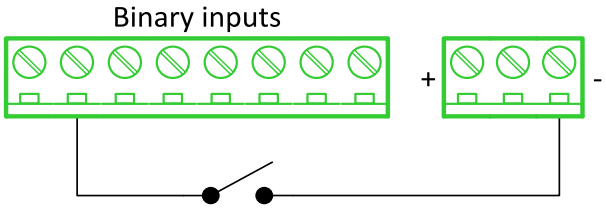
Each binary output has LED which indicates output signal. Binary output LED is shining when binary output is set.

### LED at power connector - status LED

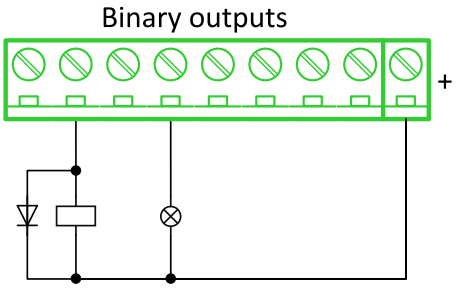
| LED status | Description |
|---|---|
| Dark | No required power connected. |
| Quick flashing | Program check failure. |
| One flash and pause | Compensation fail. |
| Three flashes and pause | Compensation successful. |
| Flashes | There is no communication between IGS-PTM and the controller. |
| Lights | Power supply is in the range and communication between IGS-PTM and controller properly works. |

## Wiring

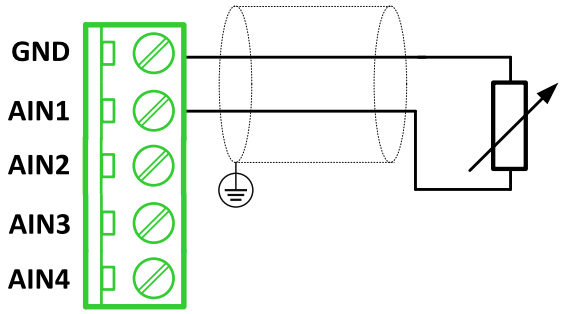
### Binary inputs




### Binary outputs



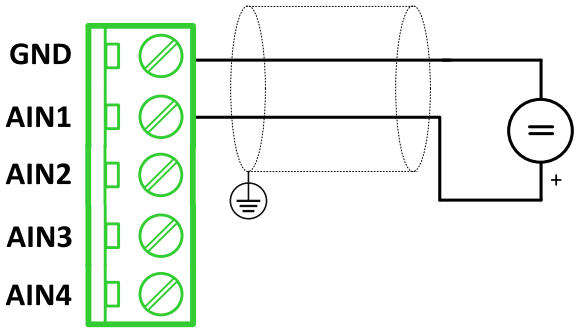

### Resistance sensor




***Note:*** *Range: 0- 2400 Ω*

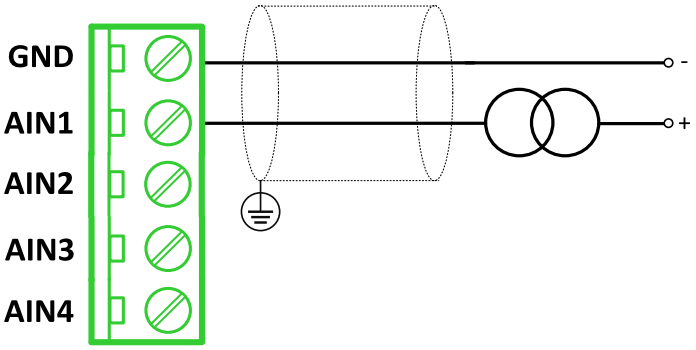
**IMPORTANT: Physical analog input range is 0-250 Ω. In sensor configuration in PC tool it is necessary to chose 0-2400 Ω sensor HW type to ensure proper function of analog input.**

### Voltage sensor




***Note:*** *Range 0-100 mV*

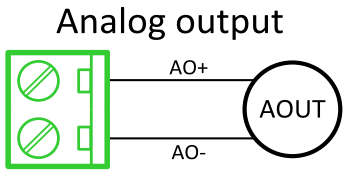
**Current sensor - passive**




***Note:*** *Range: ± 0-20 mA*

**IMPORTANT: Physical analog input range is 0-20mA. In sensor configuration in PC tool it is necessary to chose +- 20mA active sensor HW type to ensure proper function of analog input.**

**Analog outputs**




***Note:*** *Range: 0 to 20 mA ± 0,33 mA*

## Technical data

## General data

| | |
|---|---|
| Power supply | 8 to 36 V DC |
| Current consumption | 100 mA at 24V ÷ 500 mA |
| Interface to controller | CAN1 |
| Protection | IP20 |
| Storage temperature | - 40 °C to + 80 °C |
| Operating temperature | - 30 °C to + 70 °C |
| Dimensions (WxHxD) | 95×96×43 mm (3.7'×3.8'×1.7') |

## Analog inputs

| | |
|---|---|
| Number of channels | 8 |
| Voltage | Range 0-100 mV<br>Accuracy: 1,5 % ± 1 mV out of measured value |
| Current | Range: 0-20 mA<br>Accuracy: 2.5 % ± 0,5 ohm out of measured value |
| Resistive | Range: 0- 250 Ω<br>Accuracy: 1 % ± 2 ohm out of measured value |

## Analog outputs

| | |
|---|---|
| Number of channels | 1 |
| Current | Range: 0 to 20 mA ± 0,33 mA<br>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<br>Accuracy: 1,5 % ± 1 mV out of measured value |
| Current | Range: 0-20 mA<br>Accuracy: 2.5 % ± 0,5 ohm out of measured value |
| Resistive | Range: 0- 250 Ω<br>Accuracy: 1 % ± 2 ohm out of measured value |

### IGL-RA15

Remote annunciator (IGL-RA15) is designed as an extension signaling unit.

The unit is equipped with a fully configurable tri color (red, orange, green) LED for intuitive operation together with high functionality.




Image 8.245 IGL-RA15

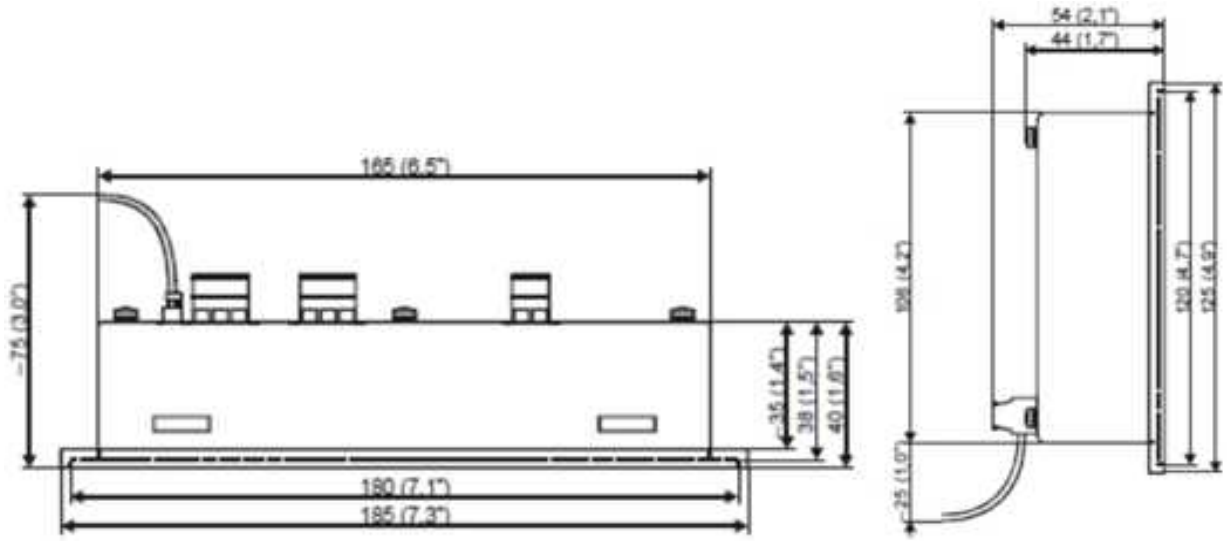



Image 8.246 IGL-RA15 dimensions

## Terminals

| | |
|---|---|
| Horn | Horn |
| CAN | CAN1 line |
| Power | Power supply |

## CAN address

| Address | Jumper A | Jumper B |
|---|---|---|
| 1 | OPEN | OPEN |
| 5+6 | CLOSED | OPEN |
| Customer defined | CLOSED | CLOSED |

SW changing of CAN1 address is enabled only when both jumpers are closed. Any one of these addresses (1+2 or 3+4 or 5+6 or 7+8) can be set by following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- Press Lamp test sixteen times
- Set the address up by pressing Horn reset.
  - The number of red luminous LEDs means the CAN1 addresses (two for addresses 1+2, four for addresses 3+4, six for addresses 5+6 and eight for addresses 7+8)
- Press Lamp test

## LED indication

Each LED color is adjusted independently of controller output settings. If controller output 1 is set as “Common Shutdown” it doesn’t mean red LED1 color for iGL-RA15. The LEDs color can by adjust by following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- Press Horn reset to change the LED1 color (green, yellow, red)

- Press Lamp test to switch to the next LED color adjusting
- Continue to adjust all LEDs color
- After LED15 color adjusting press three times Lamp test

***Note:*** *If there is no operator action during address setting, color adjusting or timeout setting, the unit returns to normal operation without changes saving.*

**Status LED**

The signals LEDs are handled like binary outputs. It means all what can be configured to binary outputs can be also configured to the LEDs of IGL-RA15.

| LED status | Description |
|---|---|
| Lights | Configured logical output is active on the controller |
| Dark green LED | Configured logical output is not active on the controller |
| Dark yellow or red LED | Configured logical output is not active on the controller and horn reset was pressed. |
| Yellow or red LED blinks | Configured logical output is not active on the controller and horn reset was still not pressed. |

**Power LED**

| LED status | Description |
|---|---|
| Blinking green | The unit is OK and the communication to the master controller is OK. |
| Blinking red | The unit is OK, but the communication to the master controller is not running. |
| Blinking yellow | EEPROM check not passed OK after power on |
| Yellow | Horn timeout or controller address adjustment |

## Horn setting

The horn output is activated if any of red or yellow LED is on. Output is on until pressing Horn reset or horn timeout counts down. The timeout can by set by following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- Press Lamp test fifteen times
- Set the horn timeout by pressing Horn reset.
  - The number of green luminous LEDs means timeout in 10 s (any for disabling horn output, 1 for 10s timeout, 2 for 10s timeout, 15 for disabling horn timeout).
  - Press Lamp test two times

***Note:*** *If there is no operator action during address setting, color adjusting or timeout setting, the unit returns to normal operation without changes saving.*

**The horn is activated if:**

- Some of red or yellow LED lights up or
- At the end of the extended lamp test. See chapter **Lamp and horn test (page 904)**

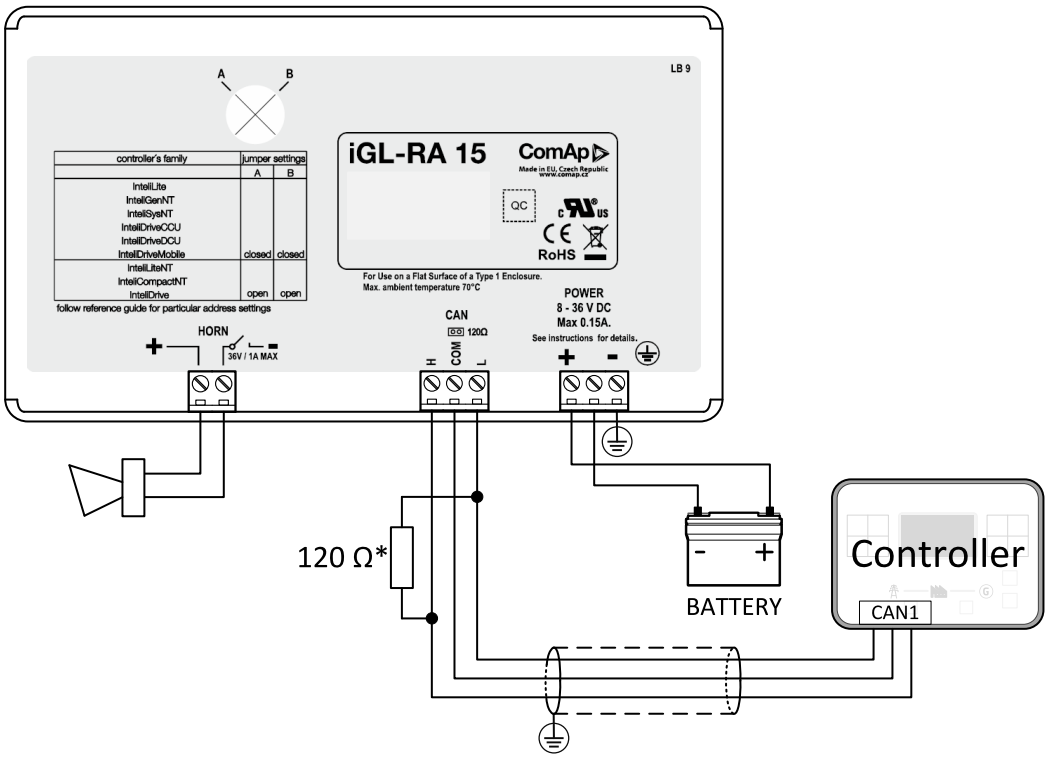
**The horn can be silenced:**

- By pressing horn reset button or
- It silences automatically after adjusted time

## Lamp and horn test

Pressing and holding lamp test button for less than 2 s execute the basic lamp test. All LEDs light up with the configured colour. If the button is hold longer than 2 s, an extended test is started. Every LED is tested step-by-step in green colour and then in red colour. The horn is activated at the end of the test. After that the unit returns to normal operation. The horn can be silenced with horn reset.

## Wiring




* terminator resistor only when iGL-RA 15 is the last unit on the CAN1 bus.

***Note:*** *The shielding of the CAN bus cable has to be grounded at one point only!*

***Note:*** *See the section **Technical data (page 904)** for recommended CAN bus cable type*

## Technical data

## General data

| | |
|---|---|
| Power supply | 8 to 36 V DC |
| Current consumption | 0.35-0.1A (+1Amax horn output) depends on supply voltage |
| Protection | IP65 |
| Humidity | 85% |
| Storage temperature | - 30 °C to + 80 °C |
| Operating temperature | - 20 °C to + 70 °C |
| Dimensions (WxHxD) | 180x120x55 mm |
| Weight | 950 g |

## Horn output

| | |
|---|---|
| Maximum current | 1.0 A |
| Maximum switching voltage | 36 V DC |

## CAN bus interface

| | |
|---|---|
| Galvanic separated | |
| Maximal CAN bus length | 200 m |
| Speed | 250 kBd |
| Nominal impedance | 120 Ω |
| Cable type | twisted pair (shielded) |
| Following dynamic cable parameters are important especially for maximal 200 meters CAN bus length | |
| Nominal Velocity of Propagation | min. 75 % (max. 4,4 ns/m) |
| Wire crosscut | min.0,25 $mm^2$ |
| Maximal attenuation (at 1 MHz) | 2 dB/100m |
| Recommended Industrial Automation & Process Control Cables | |
| BELDEN (www.belden.com) | ▶ 3082A DeviceBus for Allen-Bradley DeviceNet<br>▶ 3083A DeviceBus for Allen-Bradley DeviceNet<br>▶ 3086A DeviceBus for Honeywell SDS<br>▶ 3087A DeviceBus for Honeywell SDS<br>▶ 3084A DeviceBus for Allen-Bradley DeviceNet<br>▶ 3085A DeviceBus for Allen-Bradley DeviceNet<br>▶ 3105A Paired EIA Industrial RS485 cable |
| LAPP CABLE (www.lappcable.com) | ▶ Unitronic BUS DeviceNet Trunk Cable<br>▶ Unitronic BUS DeviceNet Drop Cable<br>▶ Unitronic BUS CAN<br>▶ Unitronic-FD BUS P CAN UL/CSA |