ComAp
The heart of smart control

InteliGen 500 G2

Controller for multiple gen-set applications

SW version 2.1.0

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Global Guide

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1.1 Clarification of Notation

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

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

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

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

1.2 About this Global Guide

This manual contains important instructions for InteliGen 500 G2 family controllers which must be followed during installation and maintenance of the controllers.

This manual provides general information how to install and operate InteliGen 500 G2 controllers.

This manual is dedicated for:

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

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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.

1.3.1 General security recommendations and set of measures

1. Production mode
   - Disable production mode BEFORE the controller is put into regular operation.
2. User accounts
   - Change password for the existing default administrator account or replace that account with a completely new one BEFORE the controller is put into regular operation mode.
   - Do not leave PC tools (e.g. InteliConfig) unattended while a user, especially administrator, is logged in.
3. AirGate Key
   - Change the AirGate Key BEFORE the device is connected to the network.
   - Use a secure AirGate Key – preferably a random string of 8 characters containing lowercase,

uppercase letters and digits.

- Use a different AirGate Key for each device.

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. By 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 using MODBUS/TCP in unprotected networks (e.g. Internet).
5. SNMP
   - The SNMP protocol (port UDP/161) version 1 and version 2 are not encrypted. They are intended to be used only in closed private network infrastructures.
   - Avoid using SNMP v1 and v2 in unprotected networks (e.g. Internet).

1.3.2 Used open source software

Name of SW	Modificated	Type	License condition web address
CMSIS-FreeRTOS	NO	MIT	https://github.com/ARM-software/CMSIS-FreeRTOS/blob/develop/License/license.txt
FatFS	NO	BSD	http://elm-chan.org/fsw/ff/00index_e.html
STpackage (HAL, USB)	YES	MCD-ST Liberty SW V2	http://www.st.com/content/ccc/resource/legal/legal_agreement/license_agreement/group0/39/50/32/6c/e0/a8/45/2d/DM00218346/files/DM00218346.pdf/jcr:content/translations/en.DM00218346.pdf
mbedTLS	NO	Apache-2.0	http://www.apache.org/licenses/LICENSE-2.0
Adafruit GFX	NO	BSD	https://github.com/adafruit/Adafruit-GFX-Library/blob/master/license.txt
Noto Sans font	YES	SIL Open Font License	https://scripts.sil.org/cms/scripts/page.php?site_id=nrsi&id=OFL_web
heatshrink	NO	ISC License	https://github.com/atomicobject/heatshrink/blob/master/LICENSE
CMSIS	NO	BSD	https://github.com/pfalcon/ARM-CMSIS-BSD/blob/master/CMSIS/CMSIS%20END%20USER%20LICENCE%20AGREEMENT.pdf
CMSIS RTOS2 wrapper (cmsis_os2.c)	YES	Apache-2.0	www.apache.org/licenses/LICENSE-2.0 Copyright (c) 2013-2019 Arm Limited. All rights reserved.
LWIP	NO	BSD	http://lwip.wikia.com/wiki/License

Name of SW	Modificated	Type	License condition web address
			Copyright (c) 2001-2004 Swedish Institute of Computer Science. All rights reserved
GCC Runtime Library	NO	GNU General Public License v3	Copyright © 2007 Free Software Foundation, Inc. https://www.gnu.org/licenses/gpl-3.0.txt Copyright notice to the exception: Copyright © 2009 Free Software Foundation, Inc. https://fsf.org/ https://www.gnu.org/licenses/gcc-exception-3.1.html
QR Code generator library	NO	MIT	https://www.nayuki.io/page/qr-code-generator-library

1.4 General warnings

1.4.1 Remote control and programming

在发电机组需要进行维护时，

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

Make sure:

- Disconnect remote control
- Disconnect binary outputs

1.4.2 SW and HW versions compatibility

SW version 2.x.x is not compatible with the InteliGen 500 and it is not possible to upload the FW to the controller. At the same time, older SW versions 1.x.x are not compatible with InteliGen 500 G2.

1.4.3 Dangerous voltage

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

Always connect grounding terminals!

Under no circumstances should you disconnect controller CT terminals!



1.4.4 Adjusting the setpoints

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

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

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

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

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

1.5 Functions and protections

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

Description	ANSI code	Description	ANSI code
Master unit	1	**Voltage unbalance / Negative sequence voltage**	47
Stopping device	5	**Incomplete sequence relay**	48
Multi-function device	11	**Temperature monitoring**	49T
Overspeed	12	**Overcurrent**	50/50TD
Underspeed	14	**Earth fault (module IGL-RA15 required)**	50G
Speed and frequency matching device	15	**Breaker failure**	50BF
Data communication device	16	**Overcurrent IDMT**	51
Starting-to-running transition contactor	19	**AC circuit breaker**	52
Distance relay	21	**Power factor**	55
Synchronizing check	25	**Overvoltage**	59
Thermal relay	26	**Aux Overvoltage**	59X
Undervoltage	27	**Pressure switch**	63
Aux Battery Under Voltage	27X	**Liquid level switch**	71
Overload (real power)	32P	**Alarm relay*** **	74
Reverse power	32R	**Vector shift**	78
Master sequence device	34	**Reclosing relay**	79
Undercurrent	37	**Overfrequency**	81O
Excitation loss	40	**Underfrequency**	81U
Unit sequence starting (MINT)	44	**ROCOF**	81R
Current unbalance	46	**Auto selective control/transfer**	83

1.6 Certifications and standards

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

c UL us LISTED

CE

UK CA

Supplier's Declaration of Conformity **47 CFR § 2.1077 Compliance Information**
Unique identifier: IG4500XXBAA
Responsible Party:
Kevin Counts
10 N Martingale Rd #400
60173 - Schaumburg, IL
USA

Tel: +1 815 636 2541
E-mail: info.us@comap-control.com
FCC Compliance Statement This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

1.7 Document history

Revision number	Related sw. version	Date	Author
3	2.1.0	15.11.2023	Michal Slavata
2	2.0.0	17.2.2023	Petr Chvojka
1	2.0.0	30.9.2022	Jan Liptak

1.8 Symbols in this manual



3 x Phases

Active current sensor



AirGate


Alternating current


Analog modem


Battery


Binary output


Breaker contact

Breaker contact


Breaker


Breaker


Breaker


Capacitor

Coil


Connector - female


Connector - male


Contact


Contactor



Controller simplified



Module simplified


Current measuring



Current measuring


Diode


Ethernet male


Ethernet female


Fuel solenoid


Fuse


Fuse switch



Generator


Generator schematic


Grounding


GSM


GSM modem


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


Wi-fi / WAN / LAN

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2.1 General description

InteliGen 500 G2 is a paralleling controller with 5" color display for advanced and more complex diesel gen-set applications supporting both single and multiple gen-sets running in mains connected or island operations. It is a direct successor of InteliGen 500 and the InteliGen NT(C) GC line.

2.1.1 The key features of InteliGen 500 G2

- StageV and Tier 4 Final ready to easily control the aftertreatment system
  - StageV and Tier4 Final ready by default including customizable lamp behavior and J1939 user-defined messages.
- Cyber security by design to protect your business
  - Controller meets the requirements of ISA 62443 level 2 by design.
- MultiECU support to communicate with more independent J1939 devices
  - Data collection from other electronic devices to the main control unit and more efficient monitoring and troubleshooting.
- Start-up synchronization to minimize the time for starting gen-sets
  - The faster are generators ready, the lower investments to other backups is needed.
- Dynamic spinning reserve to prevent supply drops in the island installations with renewables
  - The support of hybrid applications with InteliSys NTC Hybrid

2.2 Extended Features – InteliGen 500 G2 Suite

It is possible to active additional functions in a controller by using a SW key. There is a dedicated configuration file where the feature are available, for more information **see Extended features on page 157**. The list of key features that might be activated is listed below:

- **Virtual Shared modules* (page 23)**
  - You can share any binary/analog value via CAN with other controllers without additional wiring and physical binary inputs/outputs
- **Forced Value (page 159)**
  - Forced values are also in the standard version replacing Alternative configurations known from the previous generation InteliGen 500. The number of setpoints that can be forced is much higher with the activated SW key.

- **Controller Redundancy* (page 134)**
  - Redundancy known from the IGS-NT family based on the detection of a heartbeat signal, the back-up controller stays in the Emergency MAN state until the main controller fails.
- Higher PLC capacity (**PLC (page 179)**)
  - See the table below for the comparison.
- **Multi ECU (page 170)**
  - Up to 8 ECUs in the configuration (compared to 4 without a SW key)
- Longer even history (**History log (page 165)**)
  - 750 records (compared to 500 without a SW key)
- **Power management (page 203)**
  - 4 starting/stopping load reserves (compared to 2 without a SW key)

2.3 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 of load connected to the mains produce harmonic waveforms with frequencies of multiples of the basic mains frequency and this may result in deformation of the voltage waveforms. The True RMS measurement gives accurate readings of effective values not only for pure sinusoidal waveforms, but also for deformed waveforms.

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

2.4 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.

2.4.1 Supported configuration and monitoring tools

- InteliConfig – complete configuration and single or multiple Gen-sets monitoring
- WebSupervisor – web-based system for monitoring and controlling
  - WebSupervisor mobile – supporting application for smart-phones
- WinScope 1000 – special graphical monitoring software
- InteliSCADA – monitoring and management of ComAp devices

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

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

2.4.2 Configuration parts

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

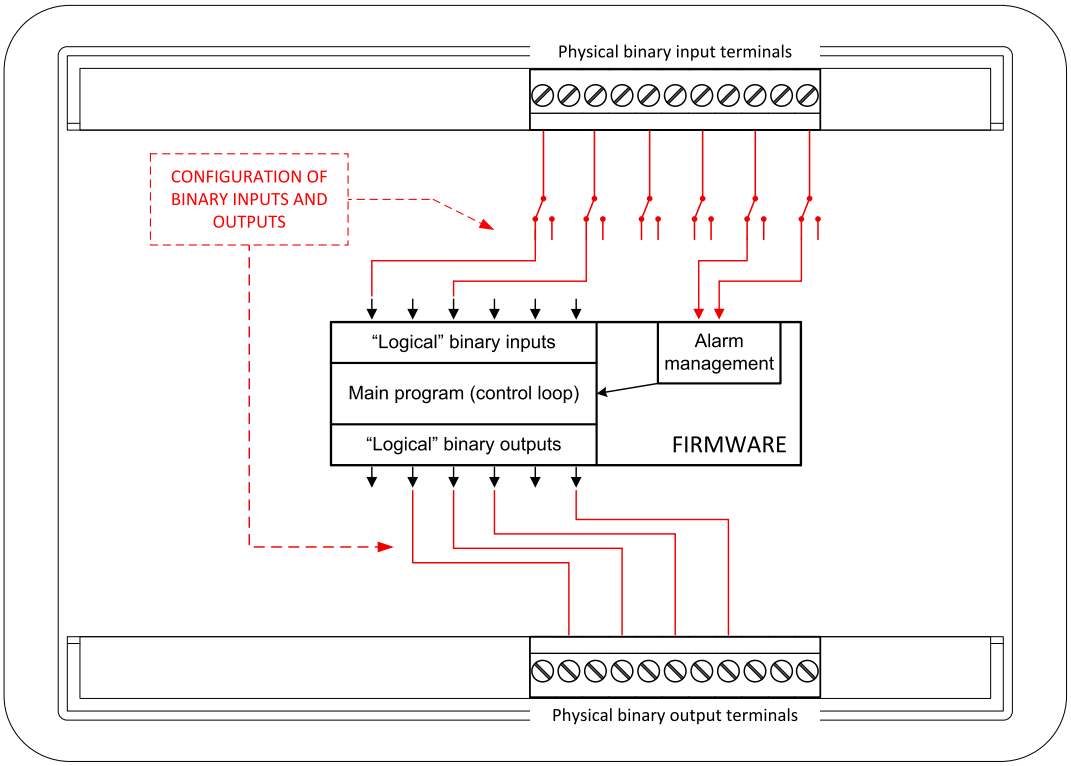


Image 2.1 Principle of binary inputs and outputs configuration

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

Once the configuration is modified, it can be saved to a file for later usage with another controller or for backup purposes. The file is called archive and has the file extension .aig4. An archive contains a full image of the controller at the time of saving (if the controller is online for the PC) except the firmware. Besides configuration it also contains current adjustment of all setpoints, all measured values, a copy of the history log and a copy of the alarm list.

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

2.5 PC Tools

2.5.1 InteliConfig

Configuration and monitoring tool for various ComAp 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 an XLS file
- Controller language translation

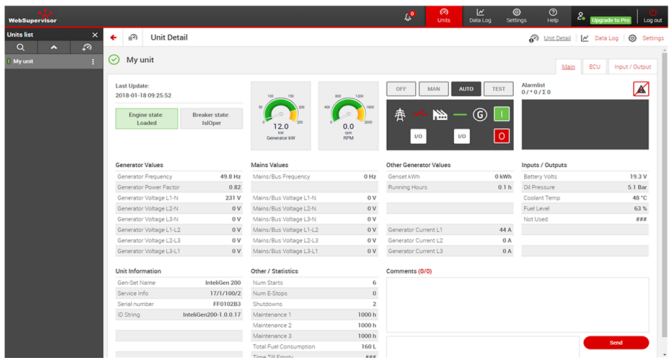


2.5.2 WebSupervisor

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:

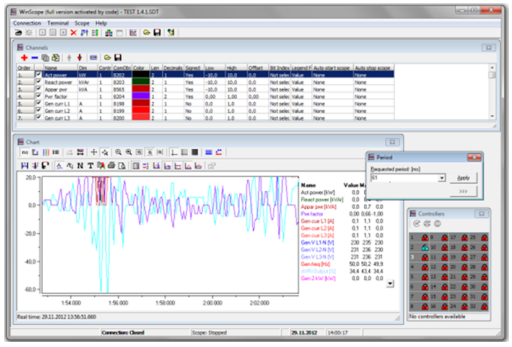
- Login: comaptest
- Password: ComAp123

2.5.3 WinScope 1000

Special graphical controller monitoring software used mainly for commissioning and Gen-set troubleshooting. See more in the WinScope 1000 Reference guide.

This tool provides the following functions:

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



2.5.4 InteliSCADA

InteliSCADA is a Windows based software with modern look and feel that has been developed with current web technologies. See more in the InteliSCADA Global guide.

This tool provides the following functions:

- Basic SCADA in a few minutes (auto-generated SCADA)
- Broad range of instruments with easy and fast configuration
- Fully customizable SCADA diagram
- Browsing of all measured and computed values
- More than 200 images available
- Browsing of controllers' history records
- Multimedia support (IP cam, video, animated images, map, …)
- Industrial security level – sites are protected against stealing of controllers' credentials
- Support of new controllers as well as old important ones
- Simple and less time-consuming SCADA creation
- Modern look and feel
- Reliability

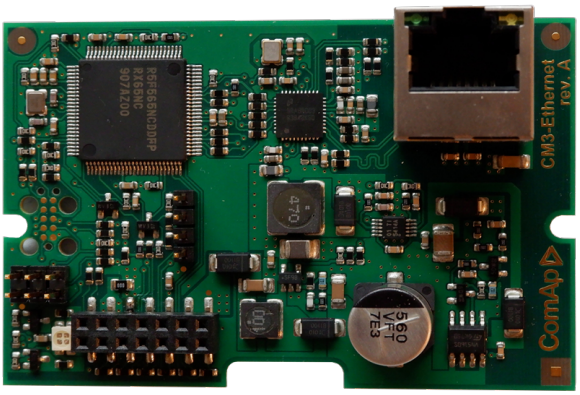


2.6 Plug-in Modules

2.6.1 CM3-Ethernet

Internet/Ethernet module.

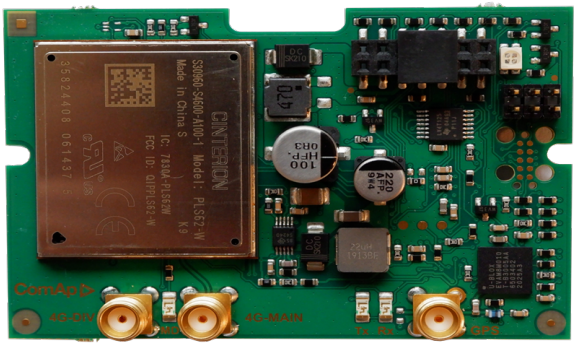
- 10/100 Mbit interface over RJ45 socket
- Remote control and monitoring of the controller via InteliConfig, WebSupervisor
- Modbus TCP support
- Full SNMP support including traps
  - v1, v2c and v3
- Active e-mail sending
- AirGate 2.0 technology support for easy connection – no need of public and static IP address



2.6.2 CM2-4G-GPS

GSM/4G module

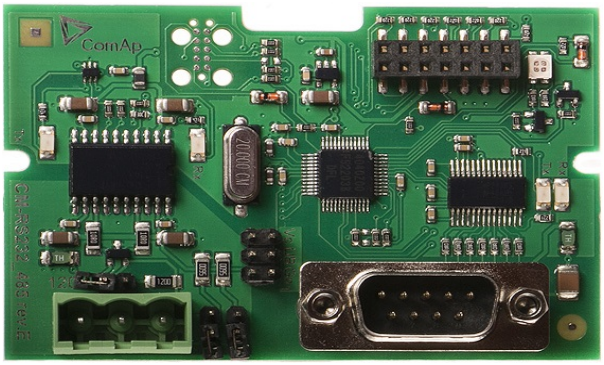
- GSM/4G Internet module and GPS locator
- Global 4G (LTE) module with 3G/2G backup
- Remote control and monitoring of the controller via InteliConfig, WebSupervisor
- Active e-mail and SMS support
- AirGate 2 technology support for easy connection – no need of public and static IP address
- Tracking via GNSS (GPS,GLONASS) module



2.6.3 CM-RS232-485

Communication module with two communication ports.

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

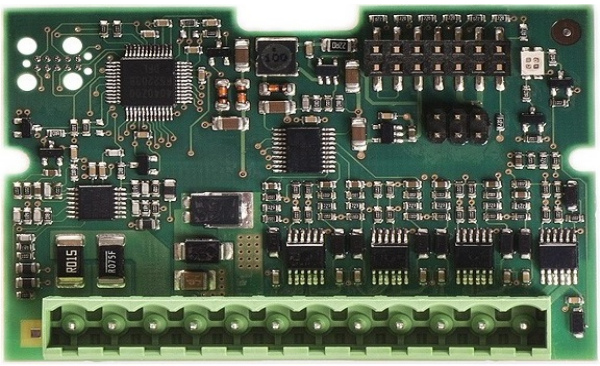


2.6.4 EM-BIO8-EFCP

Hybrid current input and binary input/output extension module.

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

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



2.7 CAN modules

2.7.1 Inteli IO8/8

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

Configuration 8/8

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

Configuration 16/0

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



2.7.2 Inteli AIN8

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

Supported sensors:

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



2.7.3 Inteli AIN8TC

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

- 8 analog input channels for measuring temperature by thermocouples



2.7.4 Inteli AIO9/1

9 Analog Inputs and 1 Analog Output Module

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



2.7.5 Inteli AOUT8

The unit offers the user the flexibility to configure the unit to have 8 analog outputs via switches inside the controller.



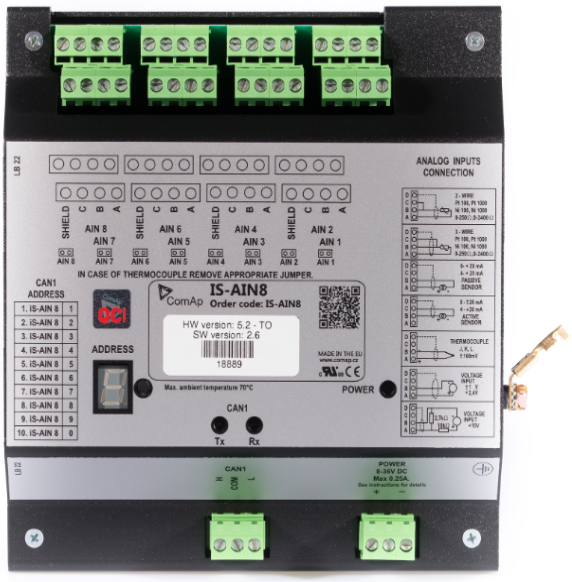
- 8 configurable analog outputs

Outputs are configurable to:

- 0-10 V DC or
- 0/4-20 mA range or
- 1200 Hz PWM
- Up to four I-AOUT8 can be connected to one controller
- UL certified

2.7.6 InteliSys AIN8

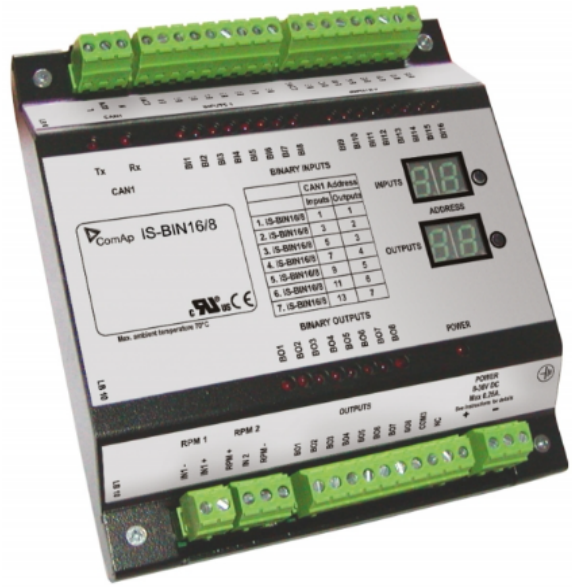
The unit offers the user the flexibility to configure the unit to have 8 analog inputs via switches inside the controller.



- Configurable 8 analog inputs
- Precision of inputs is 1%
- Accept 2/3 wire resistive, current, voltage sensors
- Predefined sensor (Pt100, Pt1000, Ni100, Ni1000, thermocouple type J/K/L, 0-20 mA, 0-10 V)
- Up to 10 IS-AIN8 can be connected to the controller
- UL certified

2.7.7 InteliSys BIN16/8

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



- Configurable 16 galvanically separated inputs
- Configurable 8 outputs
- 2 pulse inputs (frequency measurement or pulse counting)
- LEDs indicate the state of binary inputs and outputs
- Up to 6 IS-BIN16/8 can be connected to the controller
- UL certified

2.7.8 IGS-PTM

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

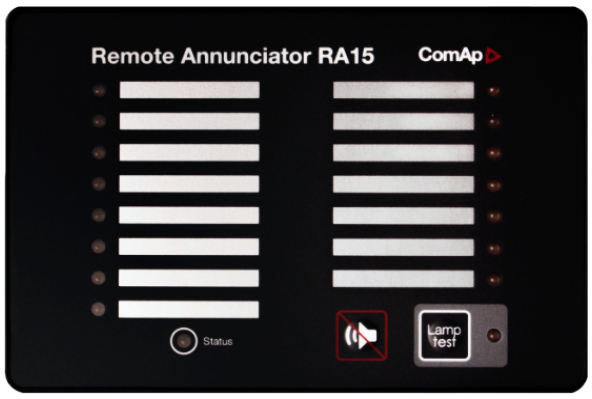


- Configurable 8 binary and 4 analog inputs
- Configurable 8 binary and 1 analog output
- LEDs indicate the state of binary inputs/outputs
- Measures values from Pt100 and Ni100 sensors
- Analog inputs (resistance range 0-250 Ω, voltage range 0-100 mV, current range 0-20 mA – selectable via jumper)
-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

2.7.9 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



2.7.10 I-CR

CAN Repeater Module.

- Intercontroller CAN bus extension (where the maximum distance limit would be exceeded)
- Intercontroller CAN bus bus-tie bridging – makes groups of controllers in segments A and B "invisible" one for another depending on bus-tie breaker state, keeping the PC communication in function for all controllers
- One or more I-CR modules can be used
- Module is compatible with InteliGen 1000 and InteliMains 1010 controllers if CAN Intercontroller Comm Mode is set to 32C/8C
- UL certified



2.7.11 I-CR-R

CAN Redundancy Module.

- Provides intercontroller CAN bus redundancy by adding parallel RS485 communication bus
- Provides intercontroller bus extension as well
- Intended for achieving high reliability of the intercontroller communication in complex applications where the parts of the technology are separated from each other and the intercontroller bus is exposed to a risk of interruption.
- I-CR-R may be used as a redundancy module for a maximum of 20 controllers (counted all controllers on the CAN2 bus)
- Module is compatible with InteliGen 1000 and InteliMains 1010 controllers if CAN Intercontroller Comm Mode is set to 32C/8C



2.8 Virtual Shared modules*

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

Shared modules are virtual modules used for sharing any binary or analog value via CAN2 intercontroller communication.

There are four types of shared modules available: SHBIN, SHBOUT, SHAIN, SHAOUT.

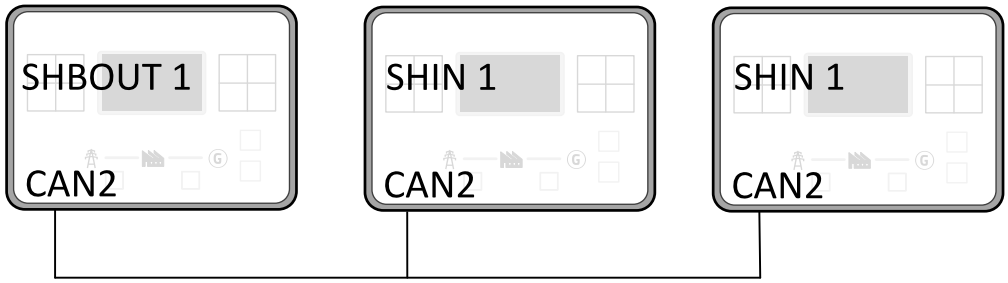


Image 2.2 Example of correct configuration of sharing binary values of CU1 with CU2 and CU3

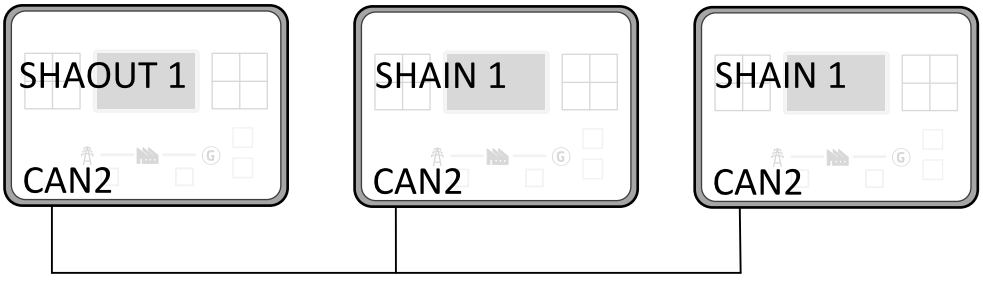


Image 2.3 Example of correct configuration of sharing analog values of CU1 with CU2 and CU3

2.8.1 Binary shared modules

SHBIN

SHBIN virtual modules receives binary values from other controllers via CAN2 intercontroller communication. There are 6 modules, SHBIN-1 to SHBIN-6, which are firmly connected with SHBOUT-1 to SHBOUT-6.

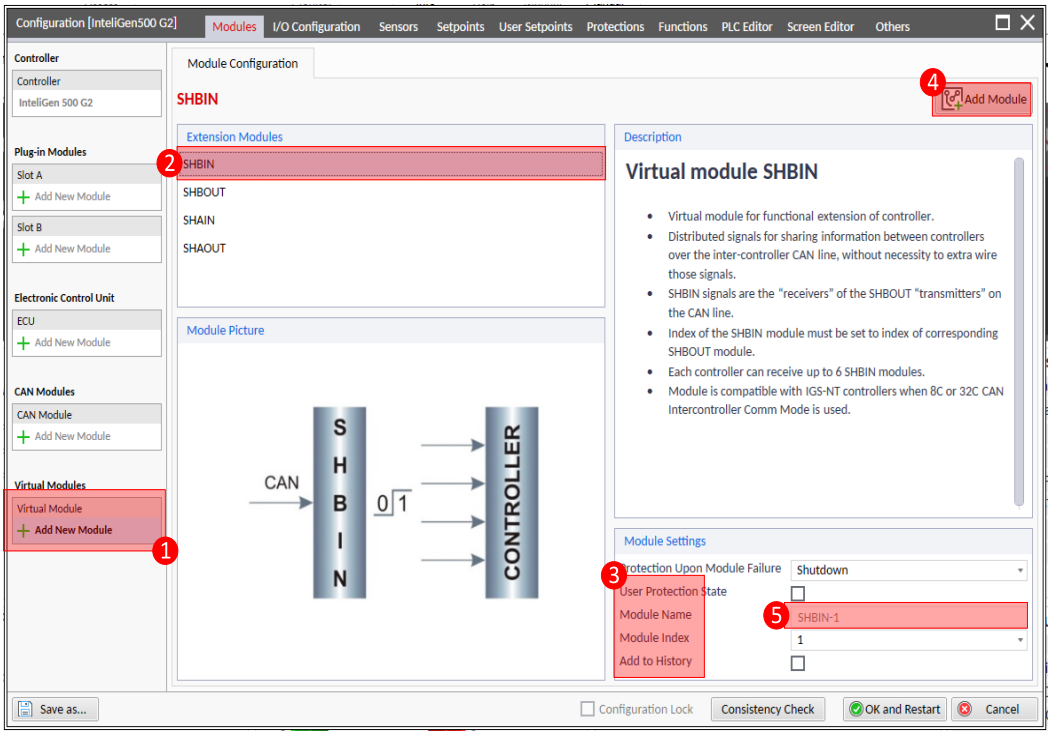
> **IMPORTANT: This means that you need to use module SHBIN-1 if you wish to receive data from SHBOUT-1.**

An alarm **Wrn SHBIN Collision* (page 900)** – is activated in case that more than just one controller has configured SHBOUT module with same module index in CAN topology.

Proper alarm from a range **Wrn SHAIN 1* (page 897)** to **Wrn SHAIN 4* (page 897)** is activated in case that data are not received.

Binary Inputs

- **SHBIN-1 (page 700)**



Configuration of shared module SHBIN

1	Select "Add new module".
2	Select SHBIN module.
3	Select protection type, and whether screens and history columns shall be added.
4	Add module.
5	Select module address.

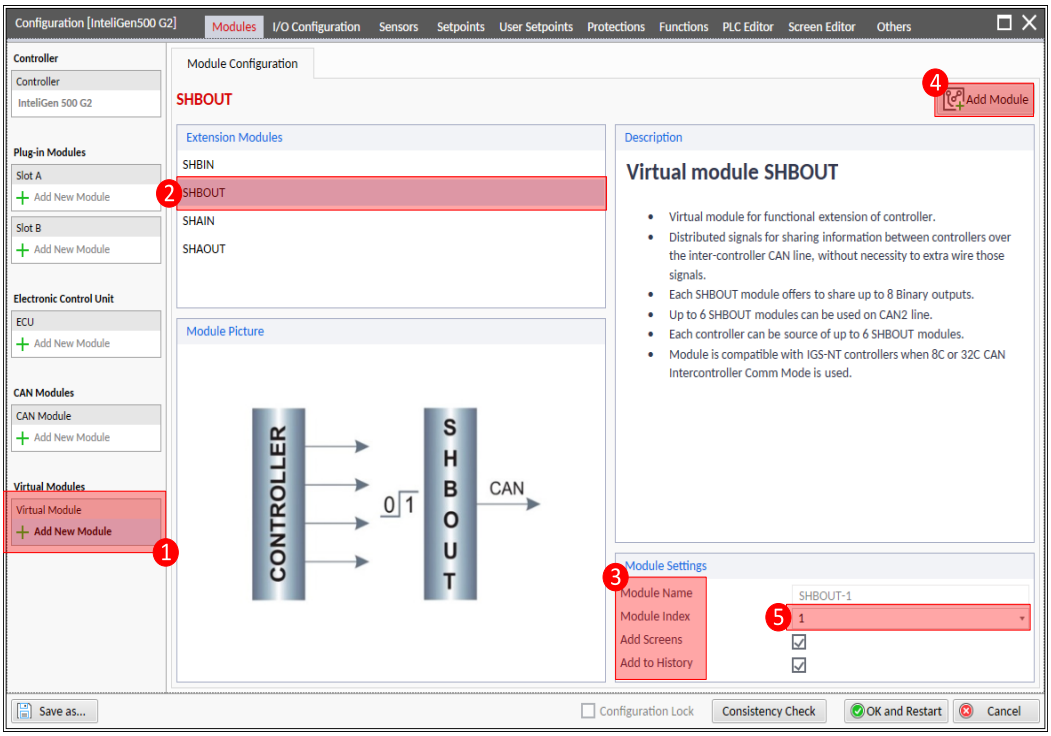
SHBOUT

SHBOUT virtual modules share binary values to other controllers via CAN2 intercontroller communication. There are 6 modules, SHBOUT-1 to SHBOUT-6, which are firmly connected with SHBIN-1 to SHBIN-6.

Note: *This means that you need to use module SHBOUT-1 if you wish to send data to SHBIN-1.*

Binary Outputs

- **SHBOUT-1 (page 703)**



Configuration of shared module SHBOUT

1	Select "Add new module".
2	Select SHBOUT module.
3	Select protection type, and whether screens and history columns shall be added.
4	Add module.
5	Select module address.

2.8.2 Analog shared modules

SHAIN

SHAIN virtual modules receives analog values from other controllers via CAN2 intercontroller communication. There are 2 modules, SHAIN-1 and SHAIN-2, which are firmly connected with SHAOUT-1 and SHAOUT-2.

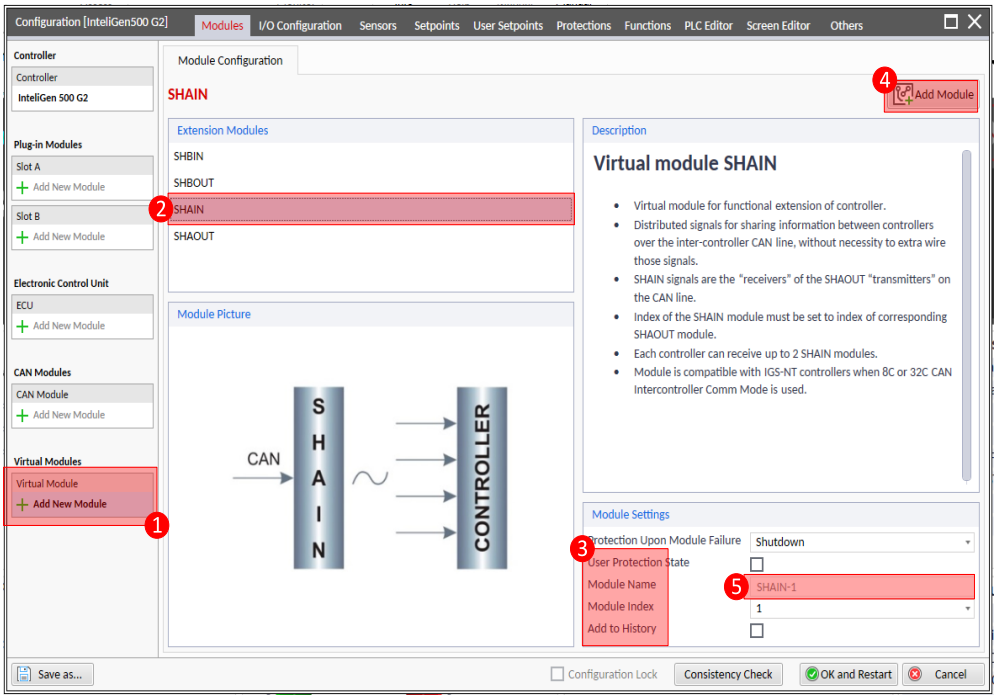
IMPORTANT: This means that you need to use module SHAIN-1 if you wish to receive data from SHAOUT-1.

An alarm **Wrn SHAIN Collision* (page 898)** is activated in case that more than just one controller has configured SHAOUT module with same module index in CAN topology.

Proper alarm from a range **Wrn SHBIN 1* (page 898)** to **Wrn SHBIN 6* (page 899)** is activated in case that data are not received.

Analog Inputs

- **SHAIN-1 1 (page 698)**
- **SHAIN-1 2 (page 698)**
- **SHAIN-1 3 (page 699)**
- **SHAIN-1 4 (page 699)**



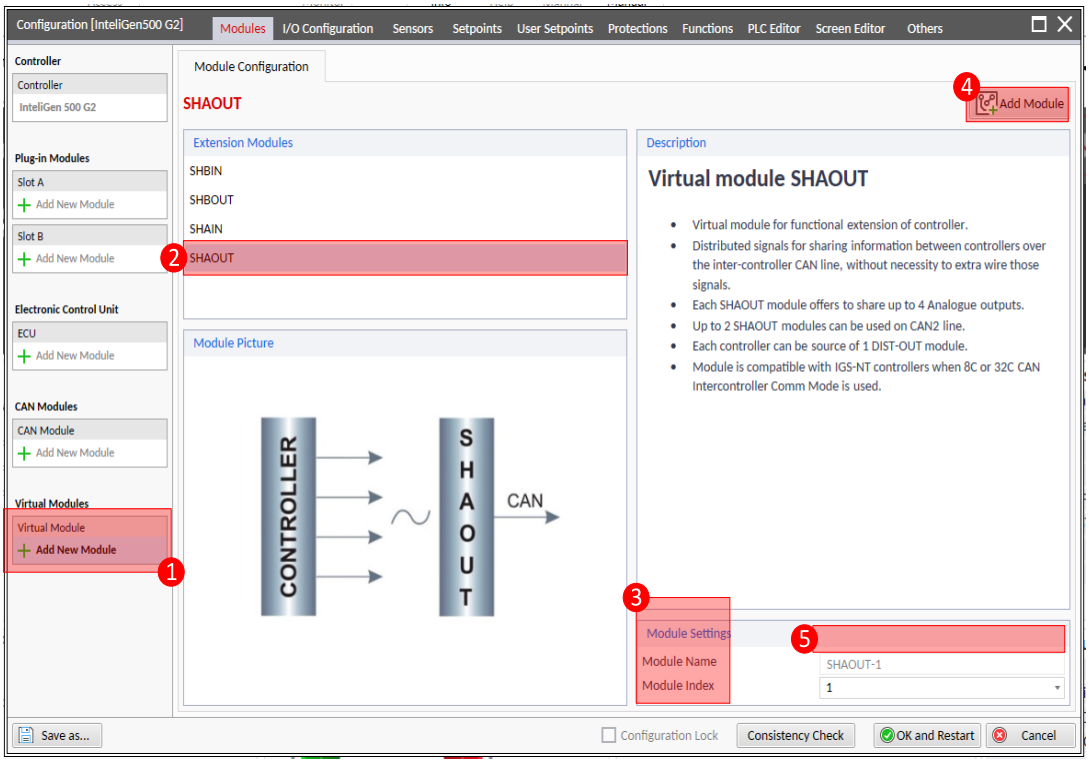
Configuration of shared module SHAIN

1	Select "Add new module".
2	Select SHAIN module.
3	Select protection type, and whether screens and history columns shall be added.
4	Add module.
5	Select module address.

SHAOUT

SHAOUT virtual modules share analog values to other controllers via CAN2 intercontroller communication. There are 2 modules, SHAOUT-1 and SHAOUT-2, whicha re firmly connected with SHAIN-1 and SHAIN-2.

> **IMPORTANT: This means that you need to use module SHAOUT-1 if you wish to send data to SHAIN-1.**



Configuration of shared module SHAOUT

1	Select "Add new module".
2	Select SHAOUT module.
3	Select protection type, and wether screens and history columns shall be added.
4	Add module.
5	Select module address.

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3 Applications overview

3.1 SPtM 28
3.2 MINT 29

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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.

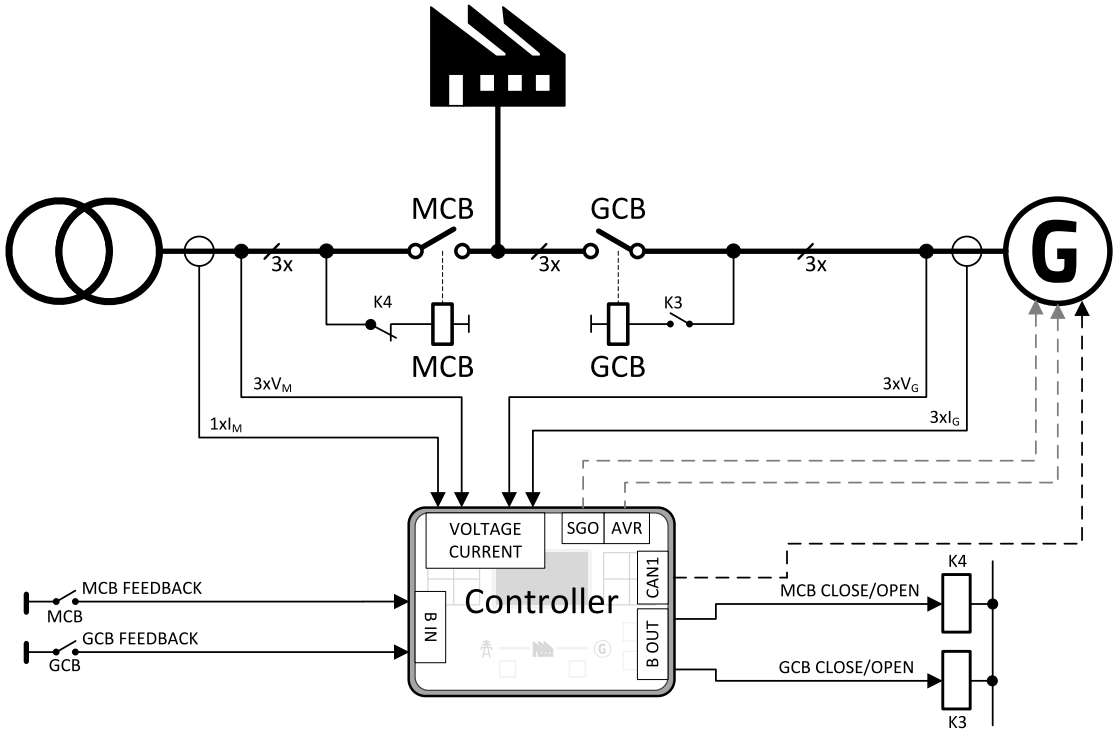


Image 3.1 Single parallel to mains application

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.

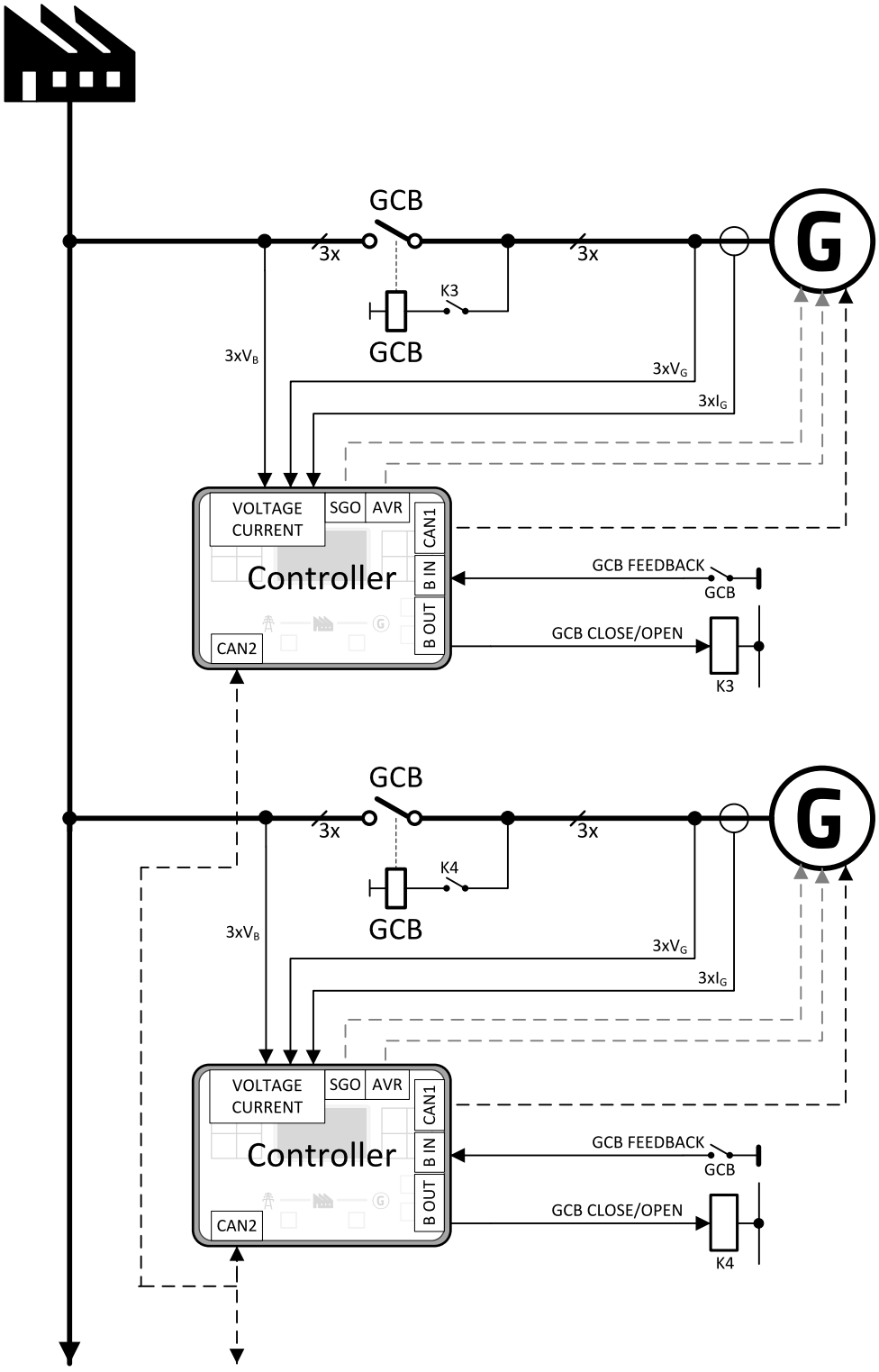


Image 3.2 Multiple island-parallel application without mains

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4 Installation and wiring

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4.2 Controller installation 30
4.3 Terminal Diagram 32
4.4 Recommended wiring 33
4.5 Plug-in module installation 66
4.6 Maintenance 66

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4.1 Package content

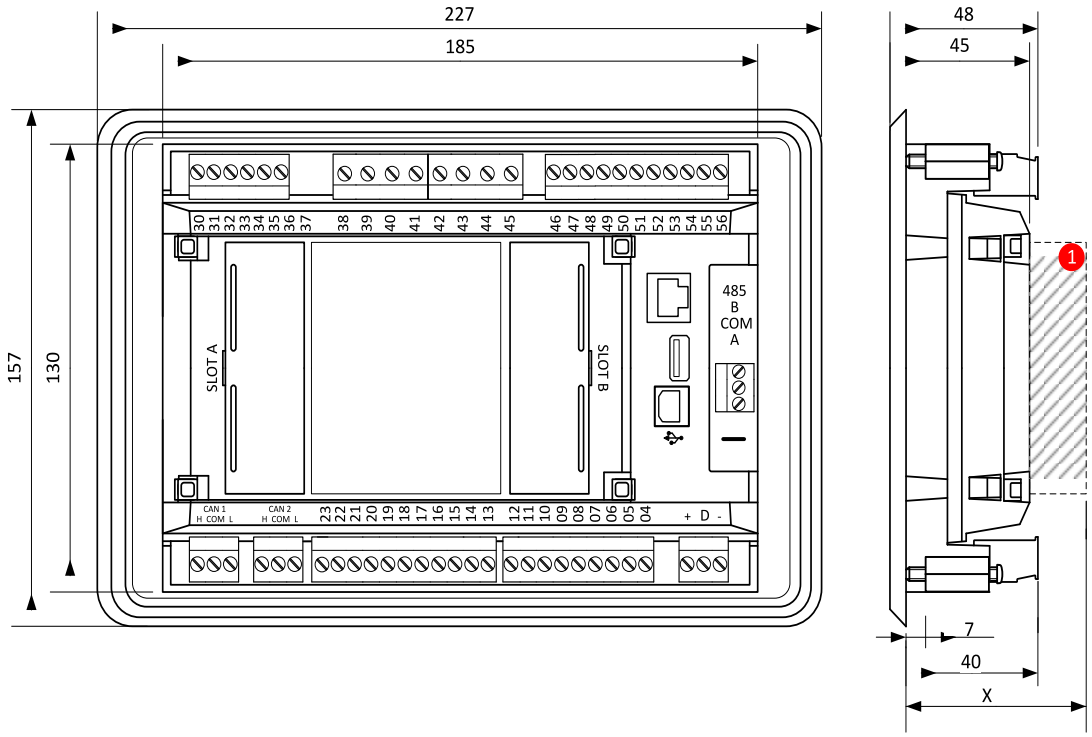
The package contains:

- Controller
- Mounting holders
- Terminal blocks

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

4.2 Controller installation

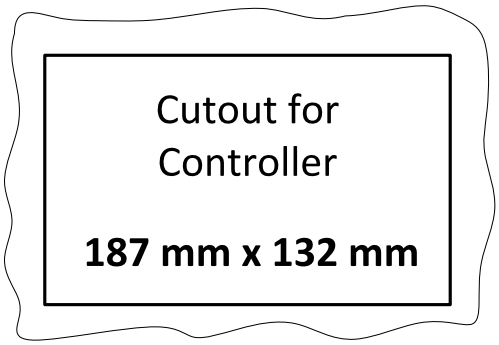
4.2.1 Dimensions



① Plug-in module

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

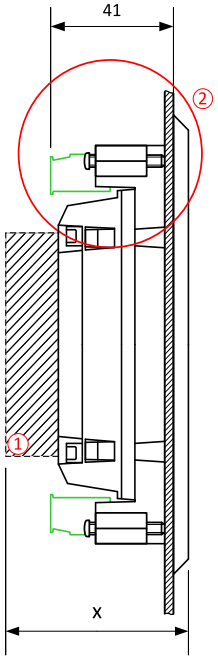
Note: *Dimensions are in millimeters.*



4.2.2 Mounting

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

Panel door mounting



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

4.3 Terminal Diagram

1 CURRENT MEASUREMENT		2 GENERATOR VOLTAGE		3 MAINS VOLTAGE		4 BINARY INPUTS		5 AVR INTERFACE	
T30	COM	T38	N	T42	N	T46	BI1	T55	COM
T31	L1	T39	L1	T43	L1	T47	BI2	T56	OUT
T32	L2	T40	L2	T44	L2	T48	BI3	6 CAN1	
T33	L3	T41	L3	T45	L3	T49	BI4	T29	H
T34	COM					T50	BI5	T28	COM
T35	L1					T51	BI6	T27	L
						T52	BI7		
						T53	BI8		

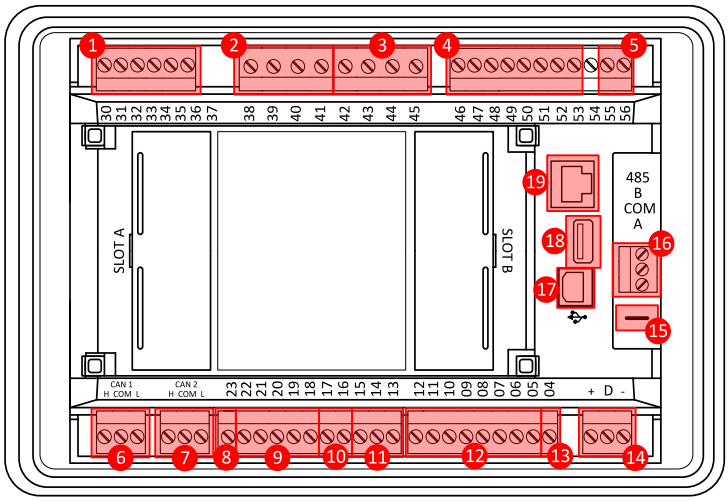
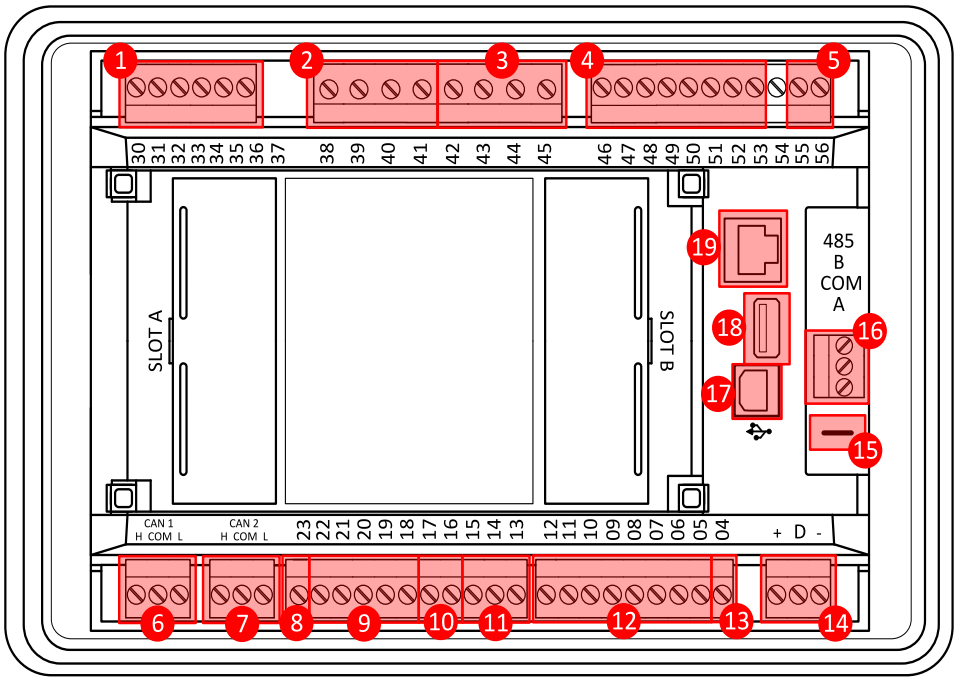


Image 4.1 Terminal diagram for InteliGen 500 G2

7 CAN2		9 ANALOG INPUTS		12 BINARY OUTPUTS		13 E-STOP		16 RS485	
T26	H	T22	AI4	T12	BOUT8	T04	E-STOP	T57	B
T25	COM	T21	AI3	T11	BOUT7	14 POWER SUPPLY, D+		T58	COM
T24	L	T20	AI2	T10	BOUT6	T01	BATT -	T59	A
8 +5 V		T19	AI1	T09	BOUT5	T02	D+	17 USB	
T23	+5 V	T18	ACOM	T08	BOUT4	**T03**	BATT +	18 USB HOST	
10 RPM		11 SPEED GOVERNOR INTERFACE		T07	BOUT3	15 EMC TERMINAL		19 ETHERNET	
T17	RPM IN	T15	PWM	T06	BOUT2	EMC GROUND			
T16	RPM GND	T14	OUT	T05	BOUT1				
		T13	COM						

4.4 Recommended wiring



1	Current inputs	30-37	**Current measurement wiring (page 36)**
2	Generator voltage inputs	38-41	**Voltage measurement SPtM (page 41)**
3	Mains voltage inputs	42-45	**Voltage measurement SPtM (page 41)**
4	Binary inputs	46-52	**Binary inputs (page 56)**
5	AVR	54, 55	**AVR Interface (page 62)**
6	CAN1	H, COM, L	**CAN bus and RS485 wiring (page 62)**
7	CAN2	H, COM, L	**CAN bus and RS485 wiring (page 62)**
8	+5 V	23	**Analog inputs (page 58)**
9	Analog inputs	18-22	**Analog inputs (page 58)**
10	RPM	16, 17	
11	Speed governor	13-15	**Speed governor interface (page 61)**
12	Binary outputs	04-12	**Binary Outputs (page 57)**
13	E-Stop	04	**E-Stop (page 58)**

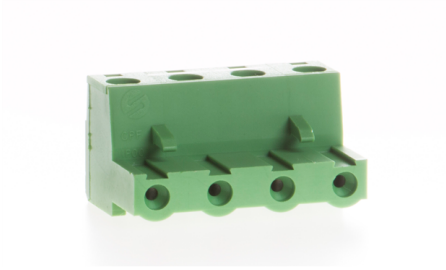
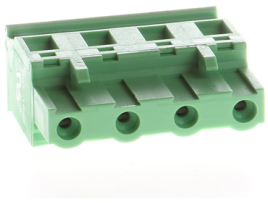
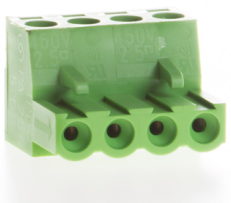
14	Power supply	"+", D, "-"	**Power supply (page 35)**
15	EMC Grounding		
16	RS485	A, B, C	**CAN bus and RS485 wiring (page 62)**
17	USB	USB B	**USB (page 66)**
18	USB Host	USB A	**USB HOST (page 66)**
19	Ethernet	RJ45	**Ethernet (page 65)**

Note: *Wiring terminal markings to included tightening torque: 0.5 N-m (4.5 lb-in)., and wire size: 2 mm^2 (12-26 AWG).*

4.4.1 General

To ensure proper function:

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

Tightening torque, allowable wire size and type, for the Field-Wiring Terminals:	
For Mains Voltage, Generator Voltage and Current terminals	
	Specified tightening torque is 0.56 Nm (5.0 In-lbs)
	use only diameter 0.5 - 2.0 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 0.5 - 2.0 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 the shortest possible cable to the grounding point.

4.4.3 Power supply

To ensure proper function:

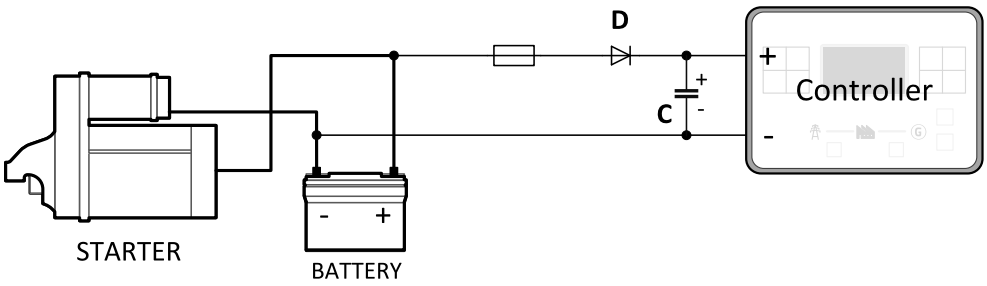
- Use power supply cable min. 1.5 mm^2

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

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

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

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



Note: *Recommended fusing is 5 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.*

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

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

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

Power supply fusing

The controller should never be connected directly to the starting battery. A 5 A fuse should be connected in-line with the battery positive terminal to the controller and CAN modules. Fuse value and type depends on the number of connected devices and wire length. Recommended fuse (not fast) type – T5 A. Not fast types are recommended due to internal capacitors charging during power up.

> **IMPORTANT: 5 A fuse is calculated without BOUT consumption nor extension modules. Real value of fuse depends on consumption of binary outputs and modules.**

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 314)**, **Generator Nominal Voltage Ph-N (page 316)**, **Generator Nominal Voltage Ph-Ph (page 316)**, **Nominal Current (page 312)**, **Gen VT Ratio (page 319)**, **Mains/Bus VT Ratio (page 320)** and **Gen CT Ratio Prim (page 313)** to appropriate setpoints in the Basic Settings group.

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

Current measurement wiring

The number of CT's is automatically selected based on selected value of setpoint **Connection type (page 314)** [3Ph4Wire / High Leg D / 3Ph3Wire / SplPhL1L2 / SplPhL1L3 / Mono Ph].

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

To ensure proper function:

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

3 phase application

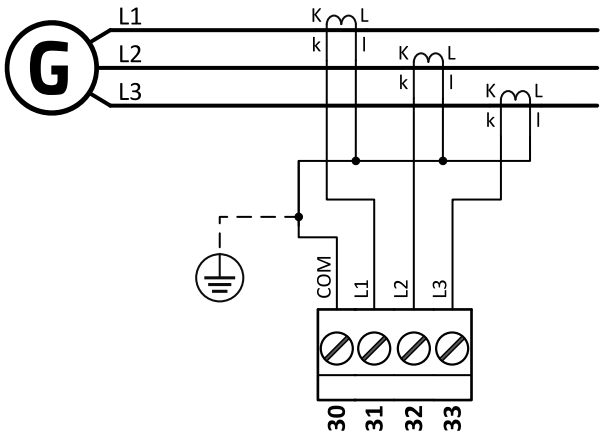


Image 4.2 3 phase application

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

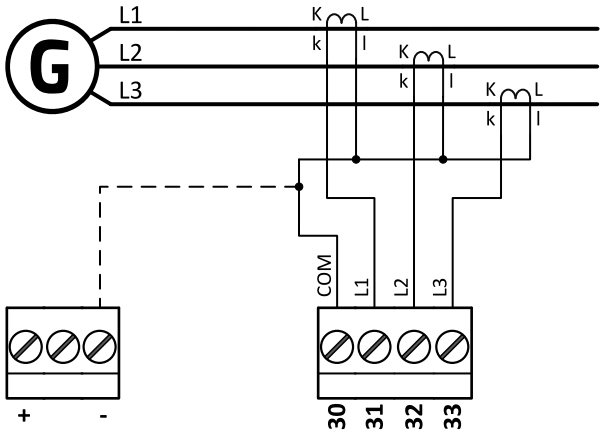


Image 4.3 3 phase application

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

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

SplPhL1L2 application

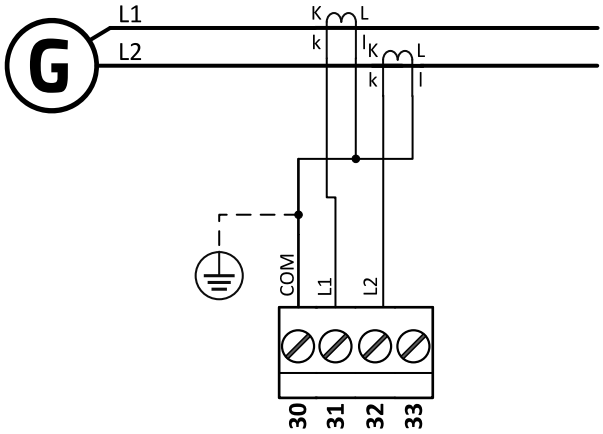


Image 4.4 SplPhL1L2 application

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

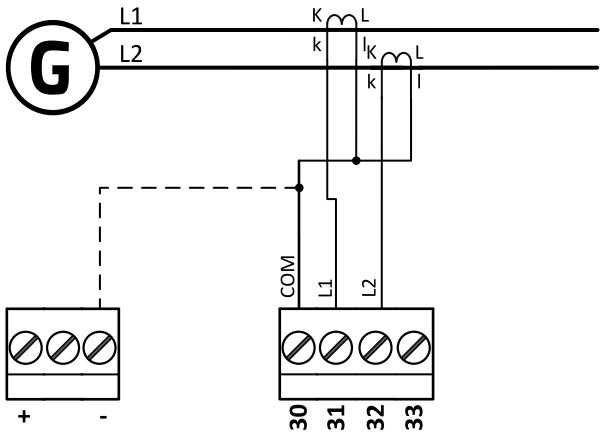


Image 4.5 SplPhL1L2 application

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

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

SplPhL1L3 application

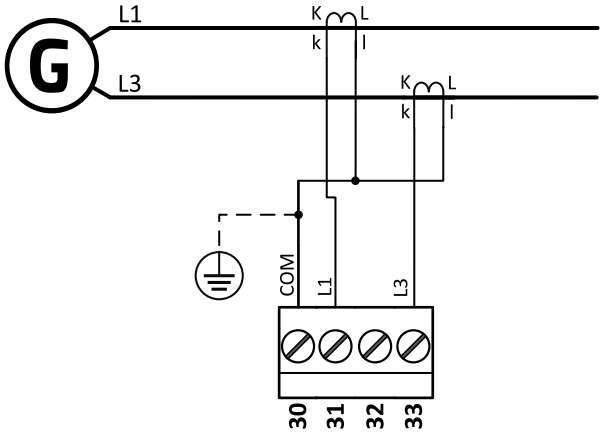


Image 4.6 SplPhL1L3 application

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

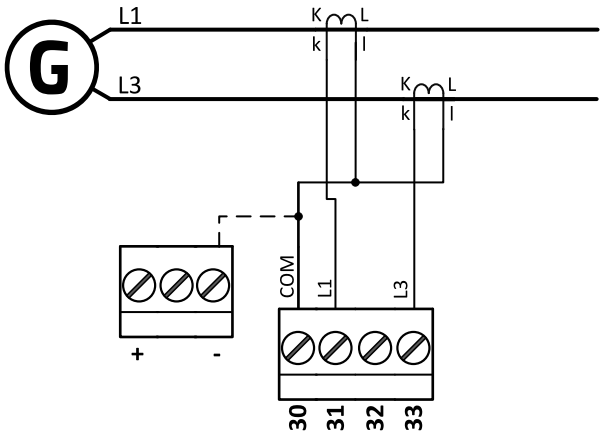


Image 4.7 SplPhL1L3 application

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

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

IMPORTANT: If the second phase of the split phase application is phase L2 use current input 32, if its phase L3 use current input 33.

Mono phase application

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

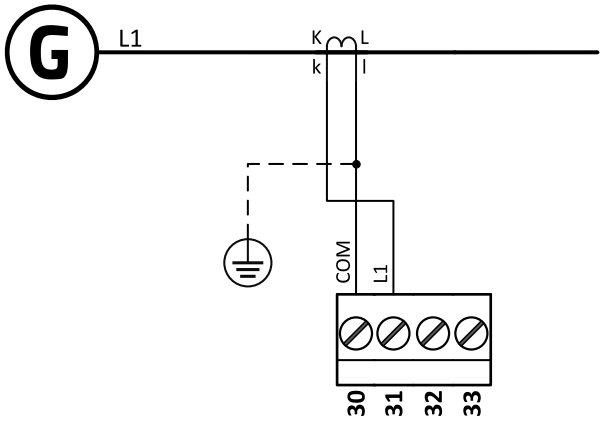


Image 4.8 Mono phase application

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

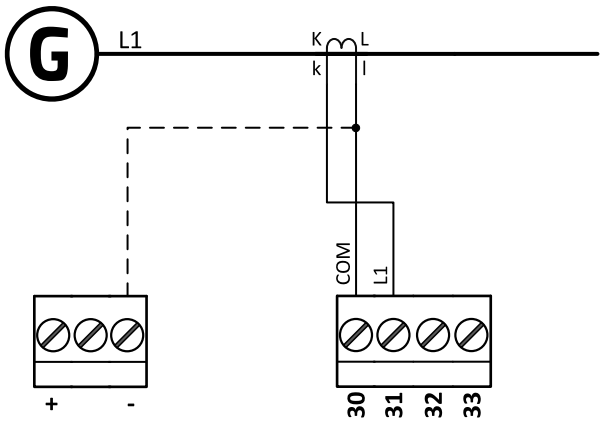


Image 4.9 Mono phase application

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

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

Earth fault current measurement

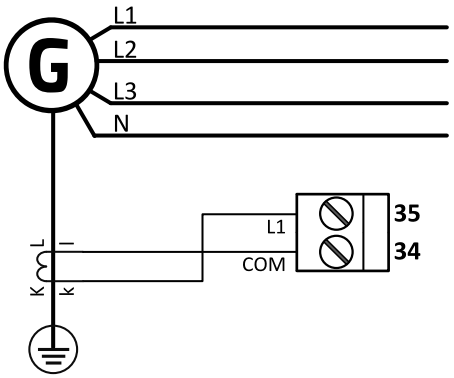


Image 4.10 Typical Earth fault current measurement

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

Mains current measurement

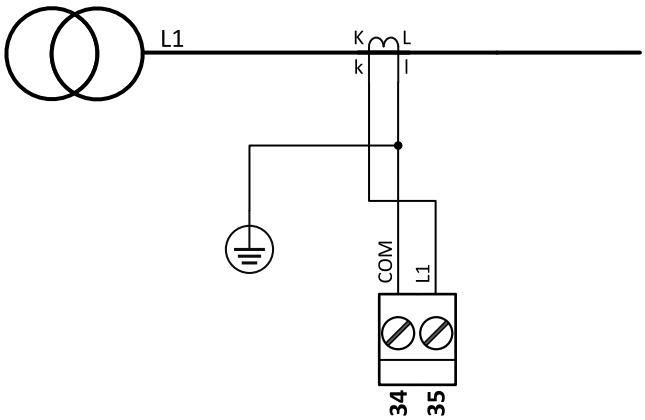


Image 4.11 Typical Mains current measurement

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

Voltage measurement SPtM

There are 6 voltage measurement Connection Type (setpoint **Connection type (page 314)** [3Ph4Wire / High Leg D / 3Ph3Wire / SplPhL1L2 / SplPhL1L3 / Mono Ph]) options, every type matches to corresponding generator connection type.

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

The generator protections are evaluated from different voltages base d on **Connection type (page 314)** setting:

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

ConnectionType: 3 Phase 4 Wires

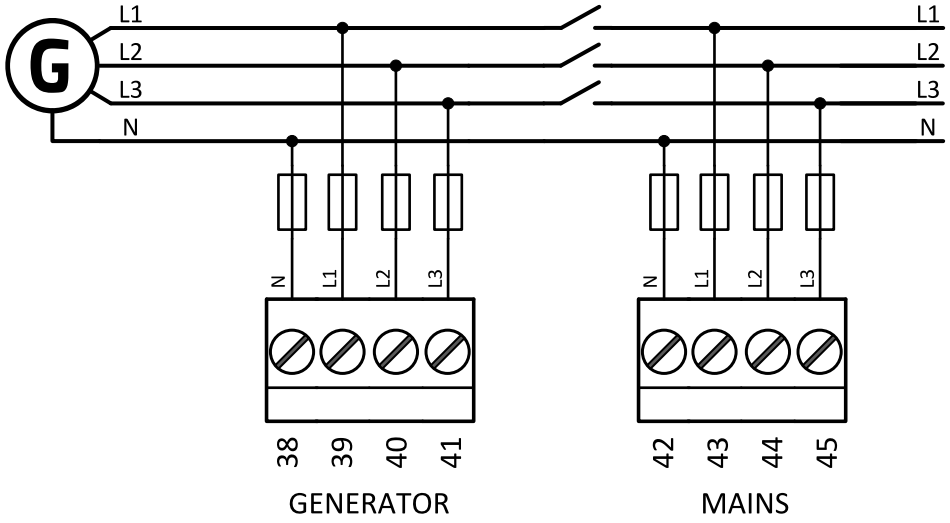


Image 4.12 3 phase application with neutral

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

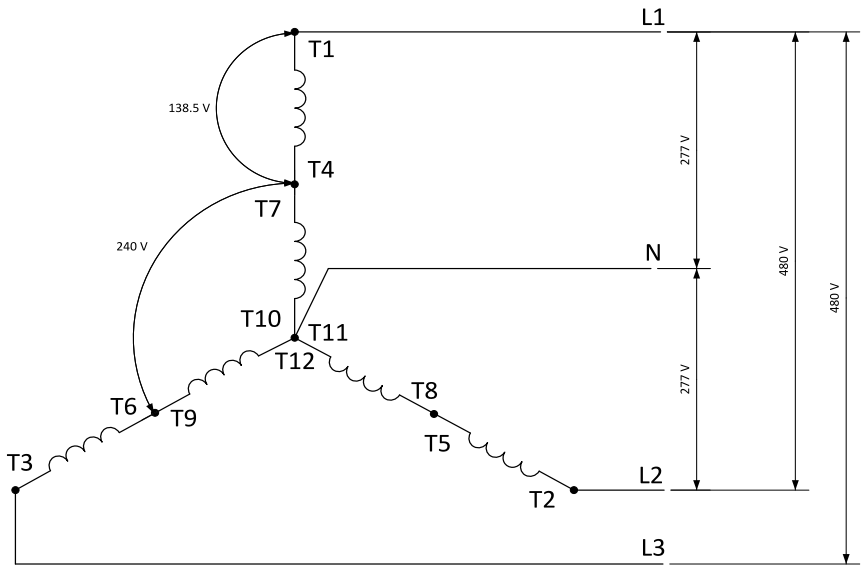


Image 4.13 Typical 3 Phase 4 Wires generator wiring, also known as 3ph High Y

Note: *Connection type 277/480V 3-PHASE,* ***Nominal Voltage 3Ph High Y (page 318)****.*

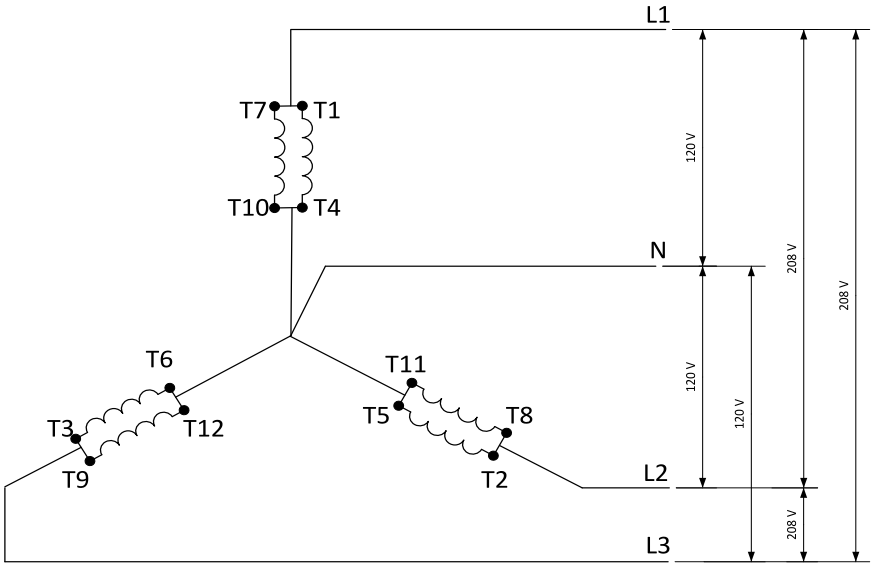


Image 4.14 3 Phase 4 Wires generator wiring, also known as 3ph Low Y

Note: *Connection type 120/208V 3-PHASE,* ***Nominal Voltage 3Ph Low Y (page 317)****.*

ConnectionType: High Leg D

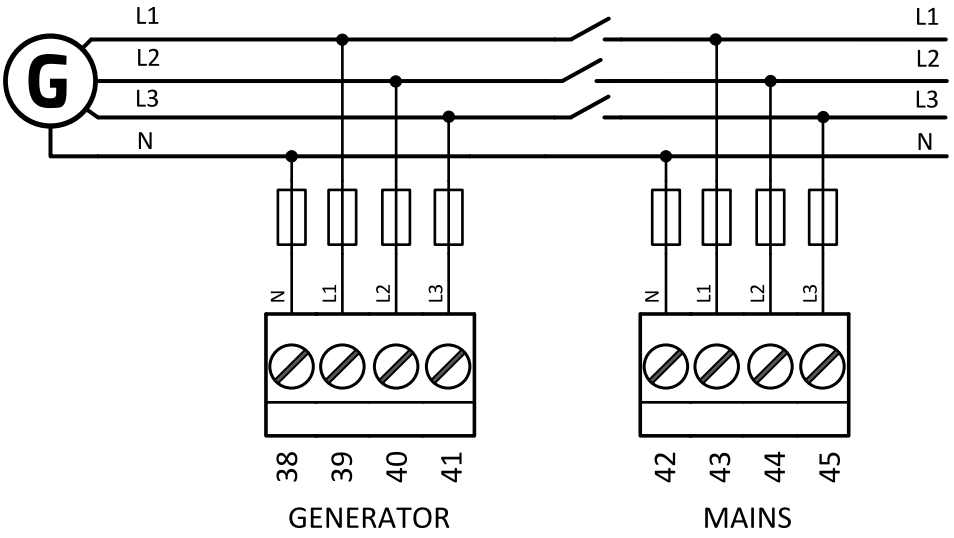


Image 4.15 High Leg Delta application

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

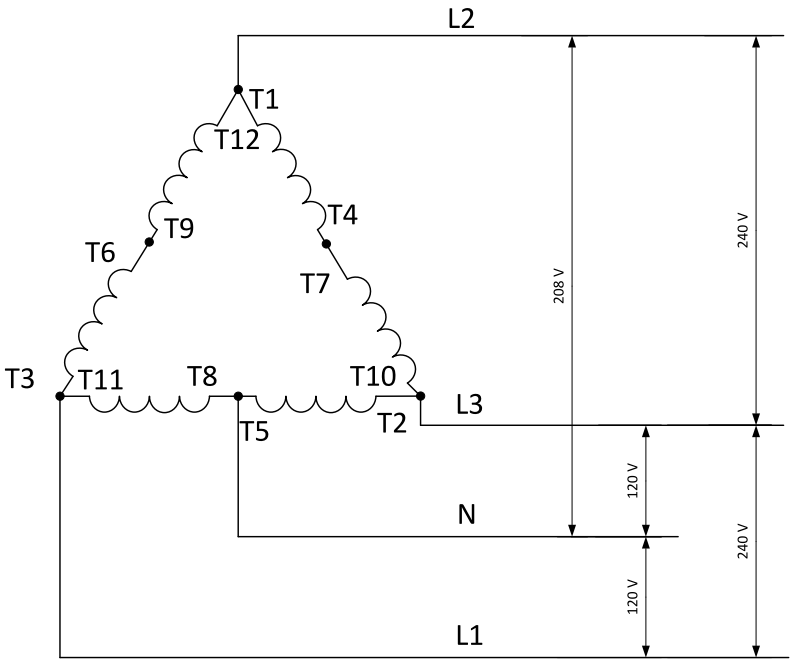


Table 4.1 Typical High Leg D generator wiring

ConnectionType: 3 Phase 3 Wires

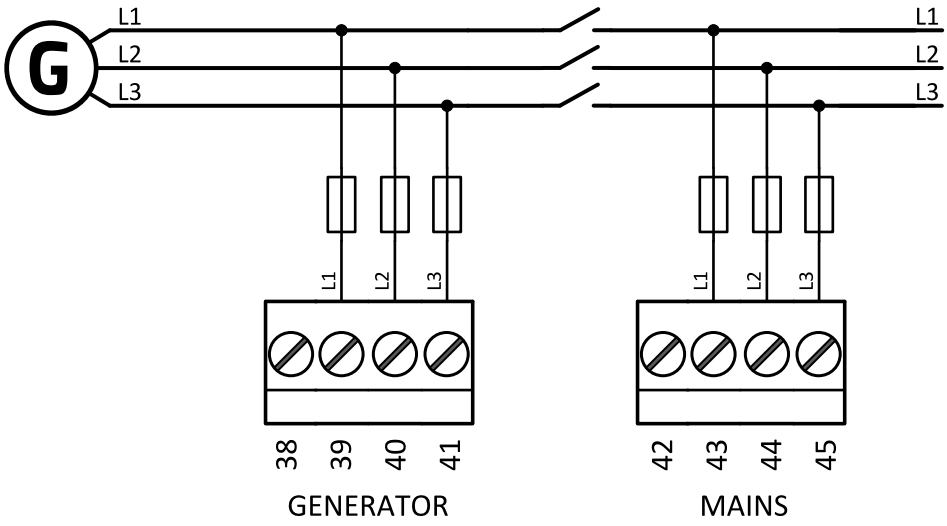


Image 4.16 3 phase application without neutral

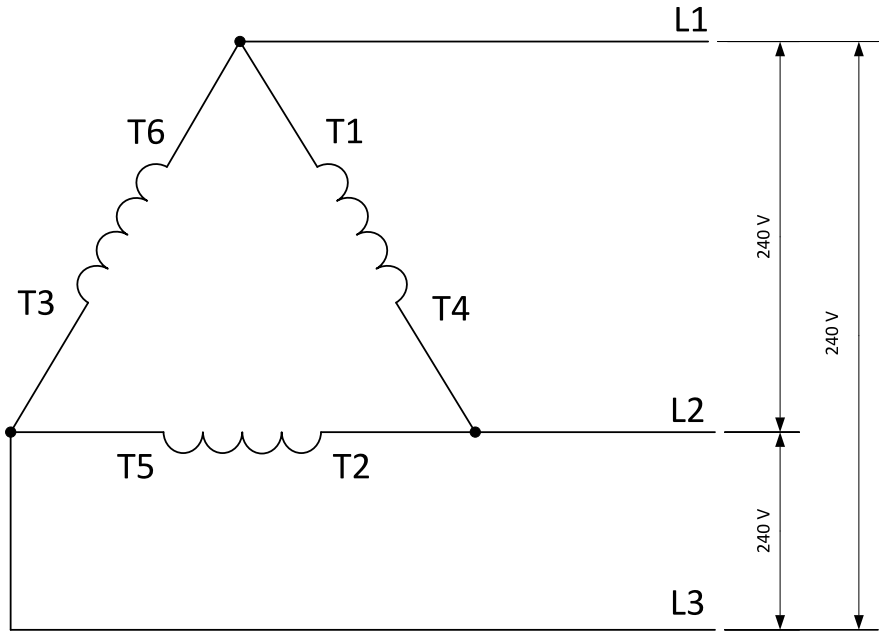


Image 4.17 Typical 3 Phase 3 Wires generator wiring

ConnectionType: SplPhL1L3

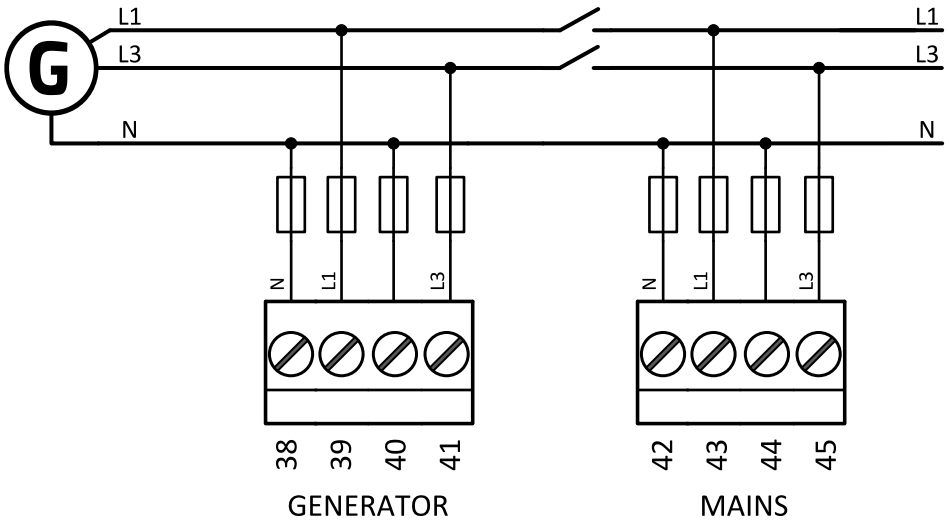


Image 4.18 Split phase application (SplPhL1L3)

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

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

ConnectionType: SplPhL1L2

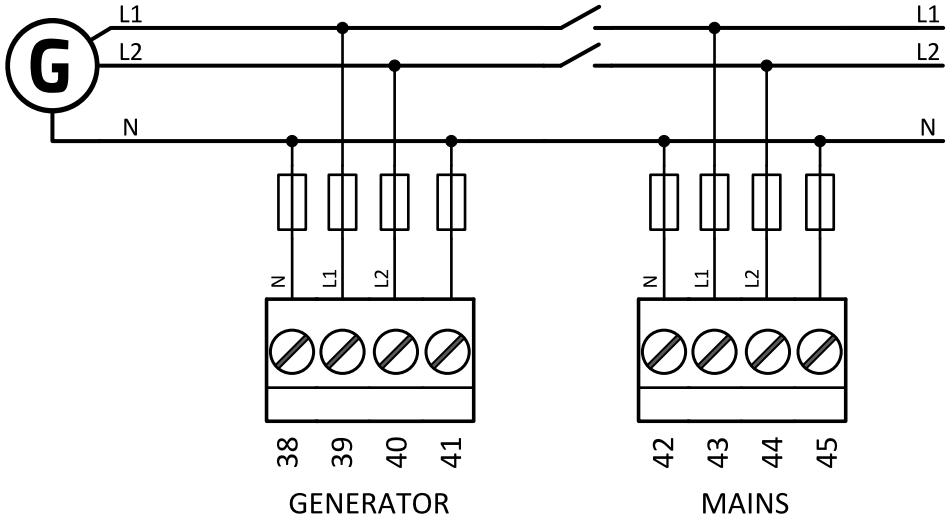


Image 4.19 Split phase application (SplPhL1L2)

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

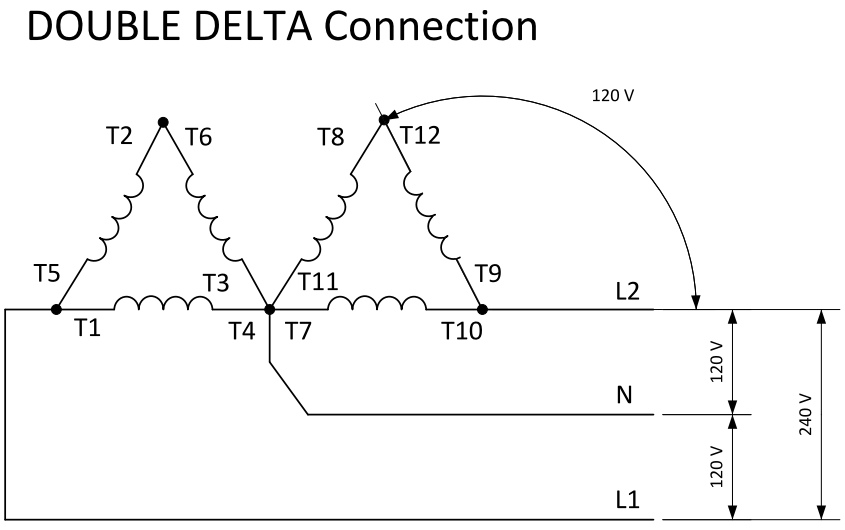


Image 4.20 Typical Split Phase generator wiring

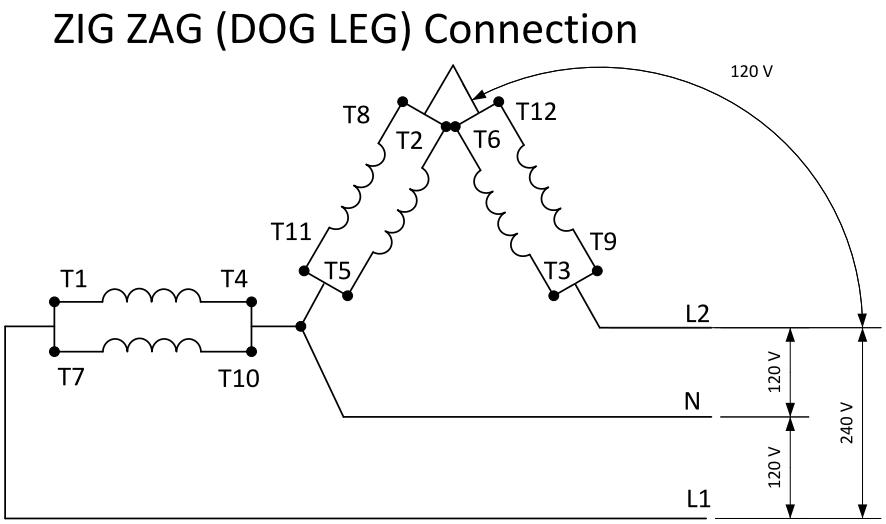


Image 4.21 Typical Split Phase generator wiring

Note: *Connection type 120/240V 1-PHASE,* ***Nominal Voltage SplitPhase (page 319)****.*

ConnectionType: Mono Phase

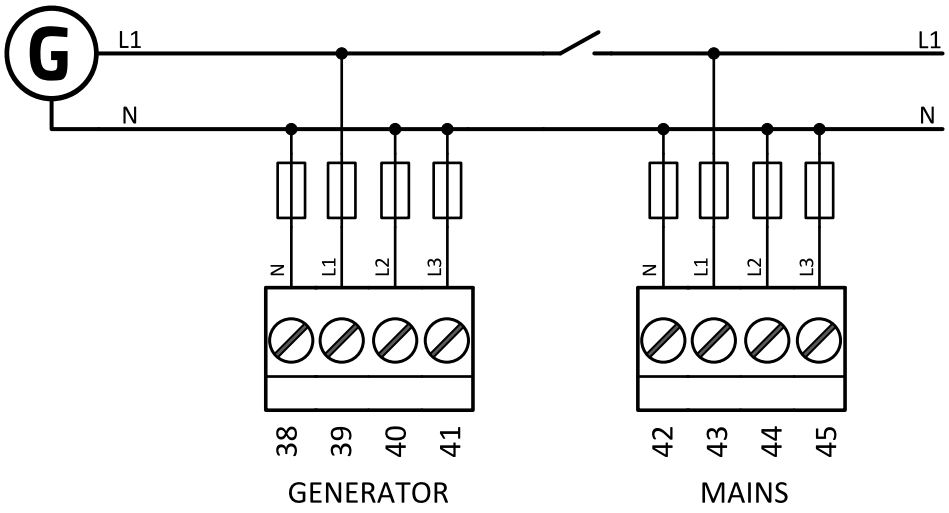


Image 4.22 Mono phase application

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

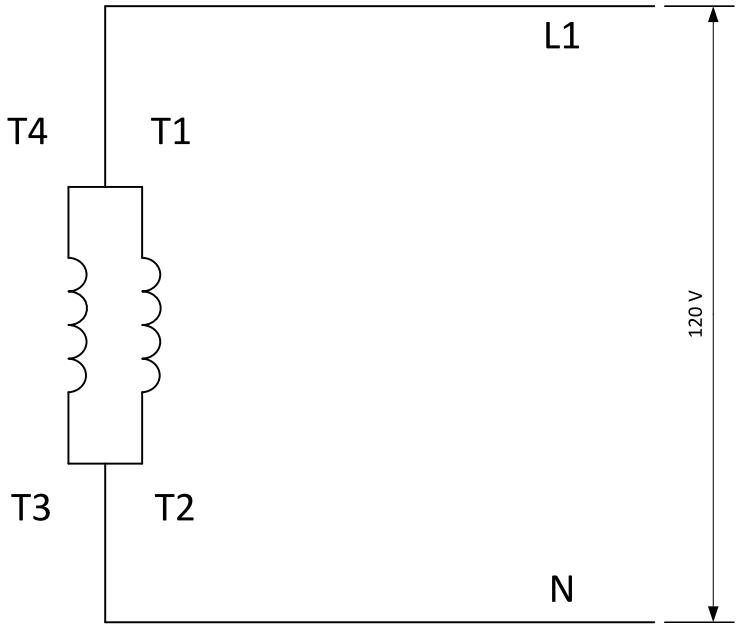


Image 4.23 Typical Mono Phase generator wiring

Voltage measurement MINT

There are 4 voltage measurement Connection Type (setpoint **Connection type (page 314)** [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 314)** setting:

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

ConnectionType: 3 Phase 4 Wires

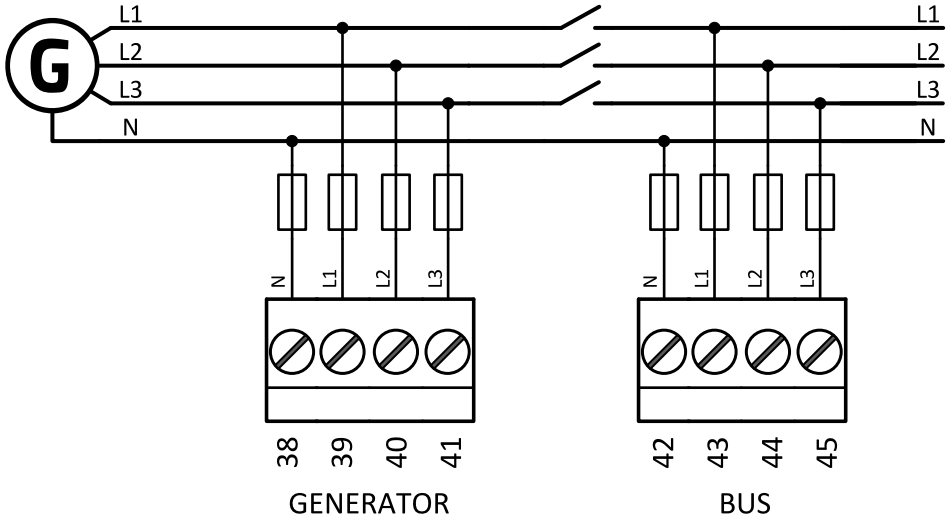


Image 4.24 3 phase application with neutral

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

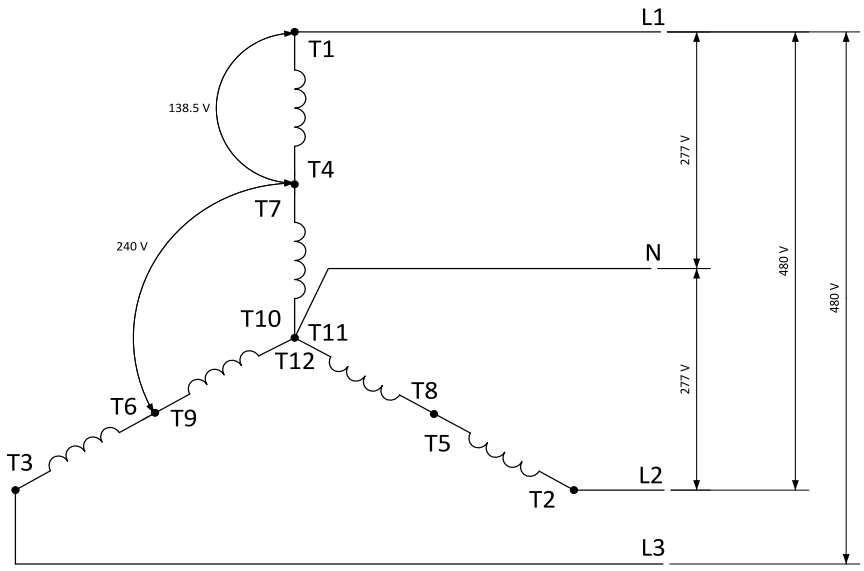


Image 4.25 Typical 3 Phase 4 Wires generator wiring, also known as 3ph High Y

Note: *Connection type 277/480V 3-PHASE,* ***Nominal Voltage 3Ph High Y (page 318)****.*

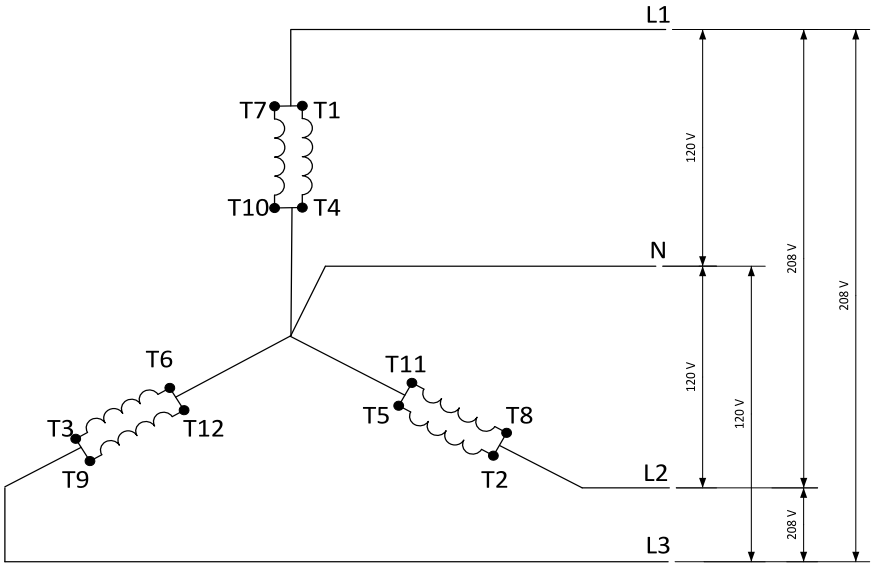


Image 4.26 3 Phase 4 Wires generator wiring, also known as 3ph Low Y

Note: *Connection type 120/208V 3-PHASE,* ***Nominal Voltage 3Ph Low Y (page 317)****.*

ConnectionType: High Leg D

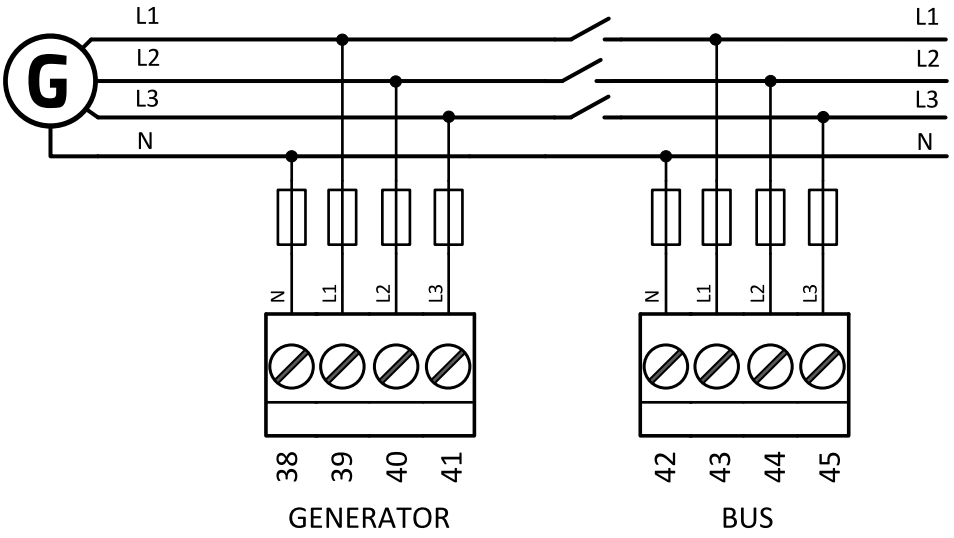


Image 4.27 High Leg Delta application

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

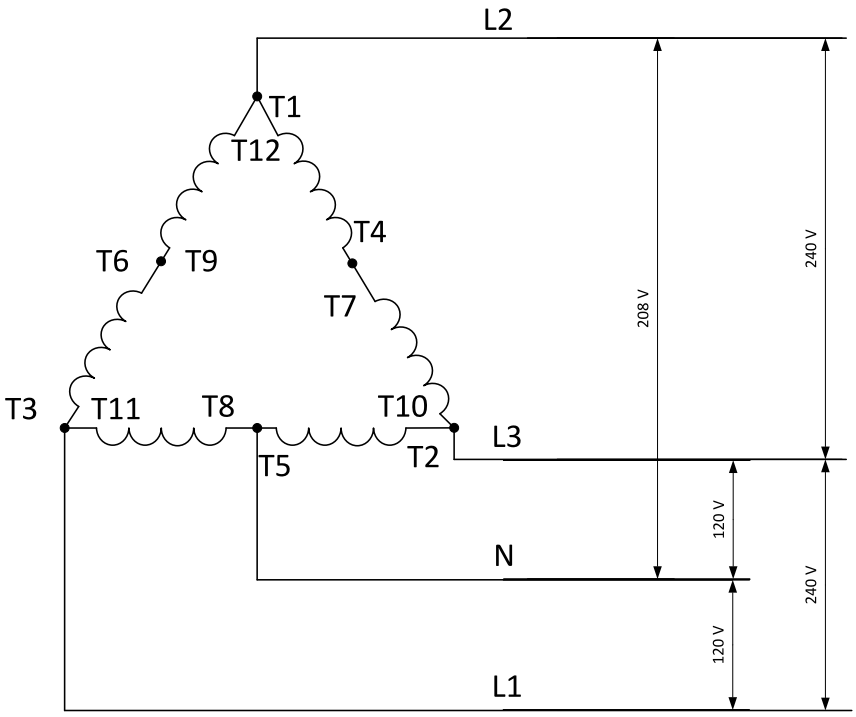


Image 4.28 Typical High Leg D generator wiring

ConnectionType: 3 Phase 3 Wires

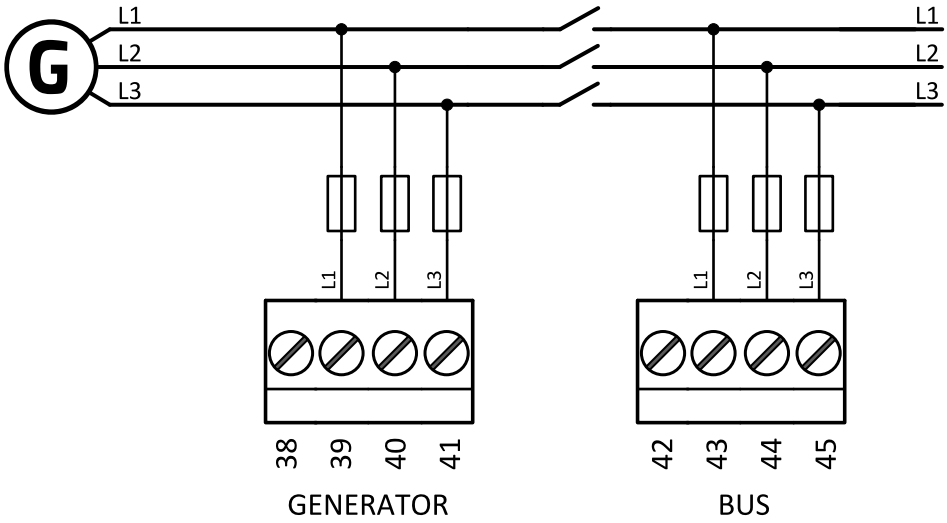


Image 4.29 3 phase application without neutral

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

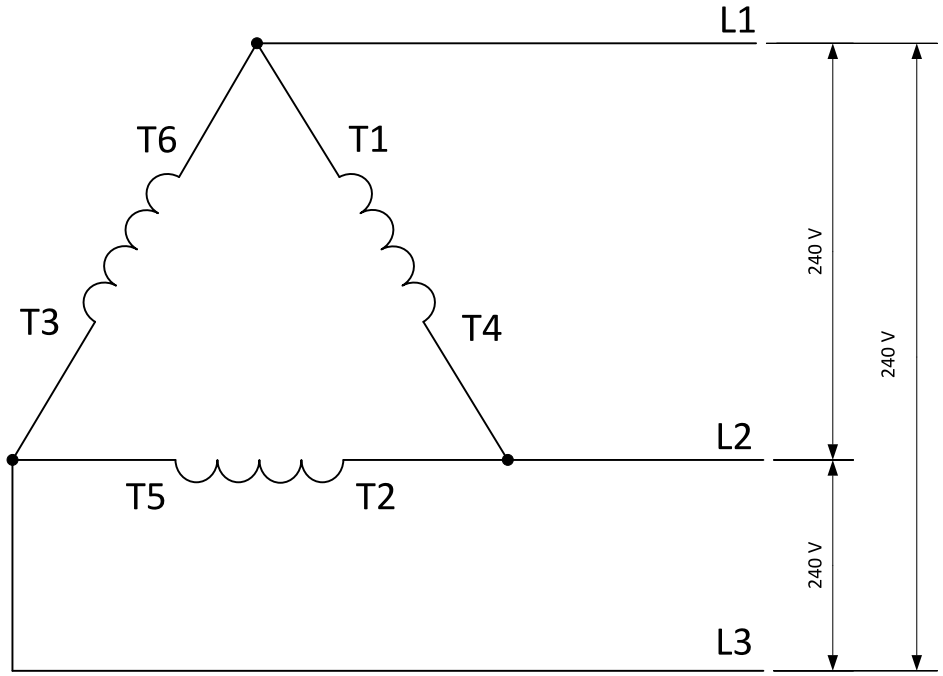


Image 4.30 Typical 3 Phase 3 Wires generator wiring

ConnectionType: Split PhaseSplPhL1L3

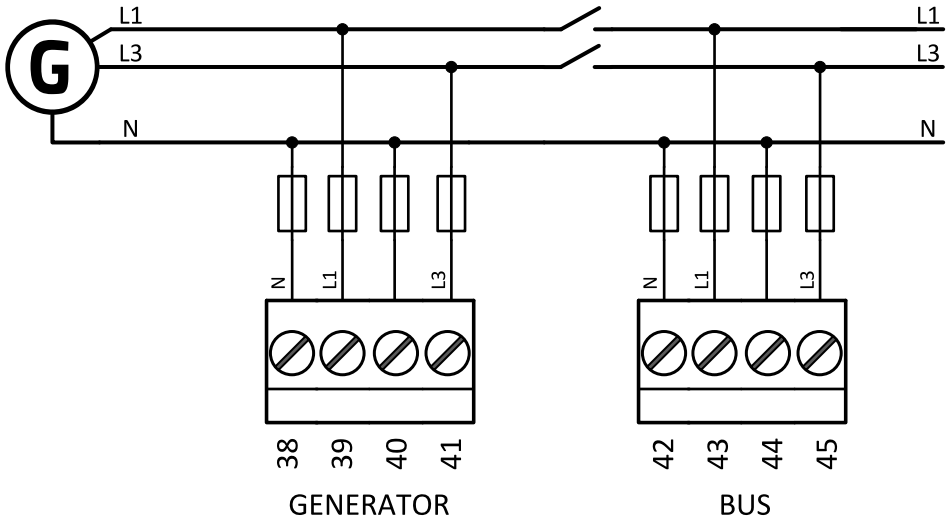


Image 4.31 Split phase application (SplPhL1L3)

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

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

ConnectionType: SplPhL1L2

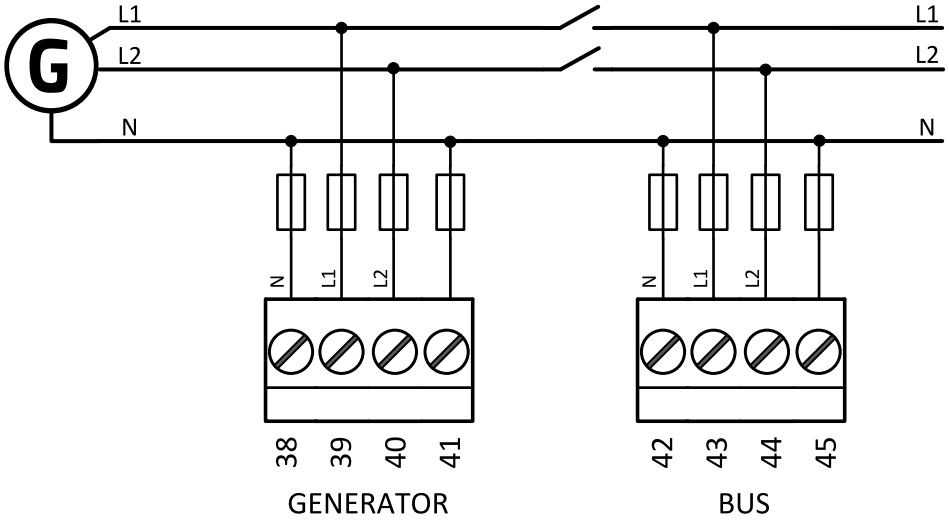


Image 4.32 Split phase application (SplPhL1L2)

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

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

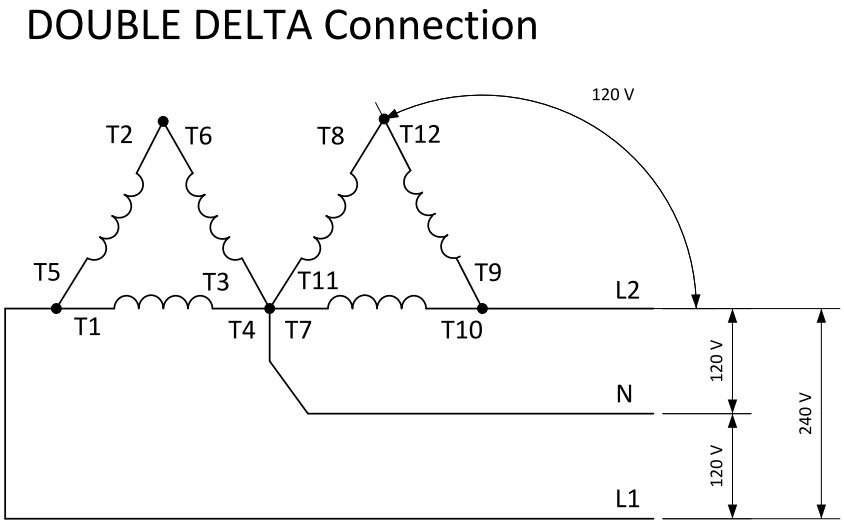


Image 4.33 Typical Split Phase generator wiring

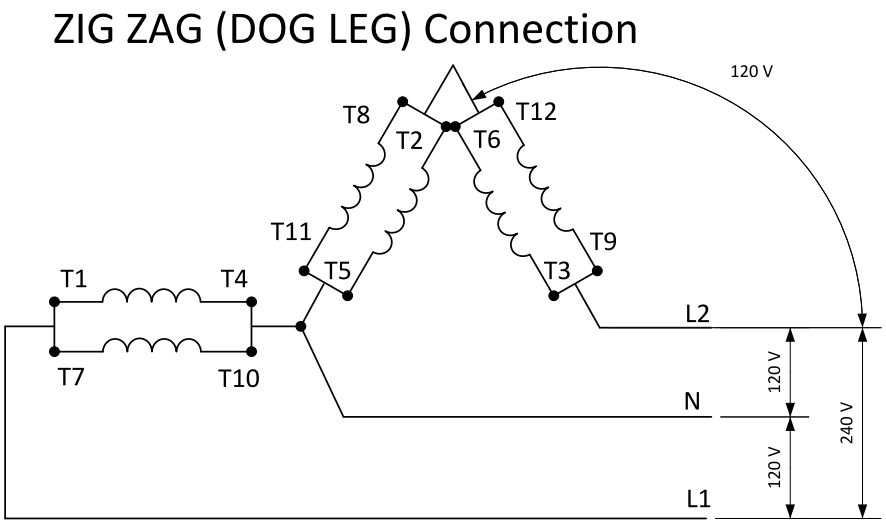


Image 4.34 Typical Split Phase generator wiring

Note: *Connection type 120/240V 1-PHASE,* ***Nominal Voltage SplitPhase (page 319)****.*

ConnectionType: Mono Phase

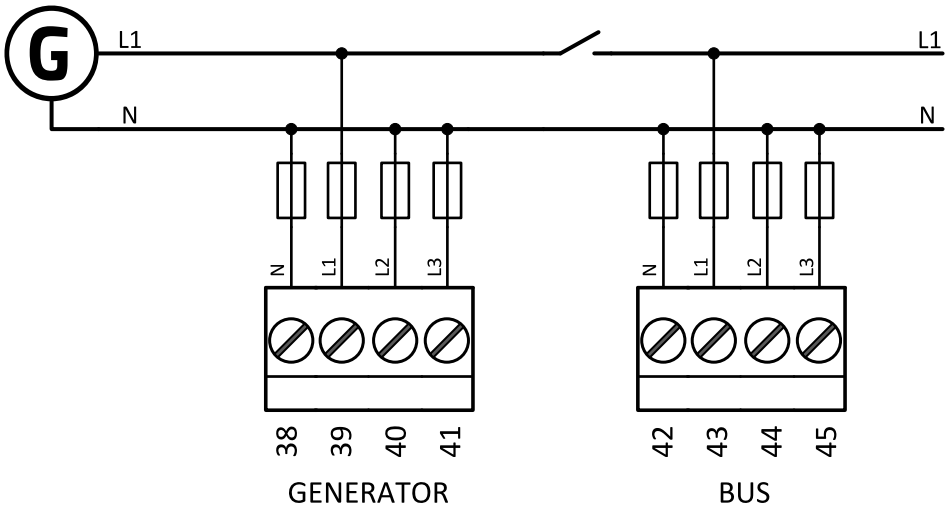


Image 4.35 Mono phase application

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

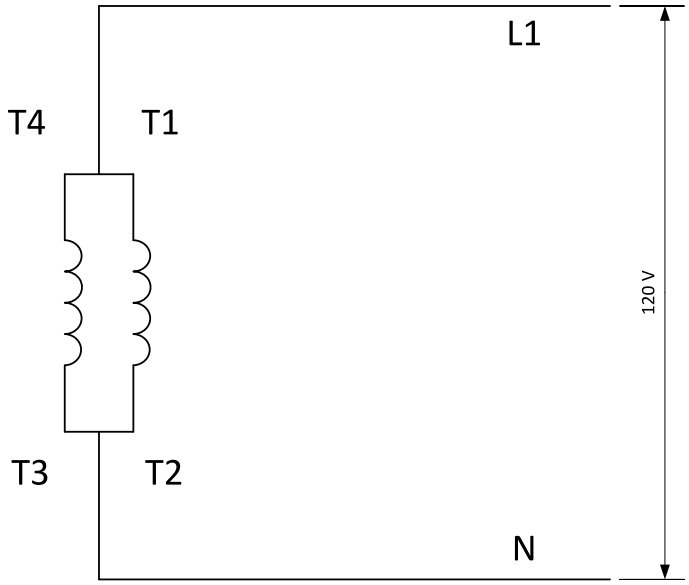


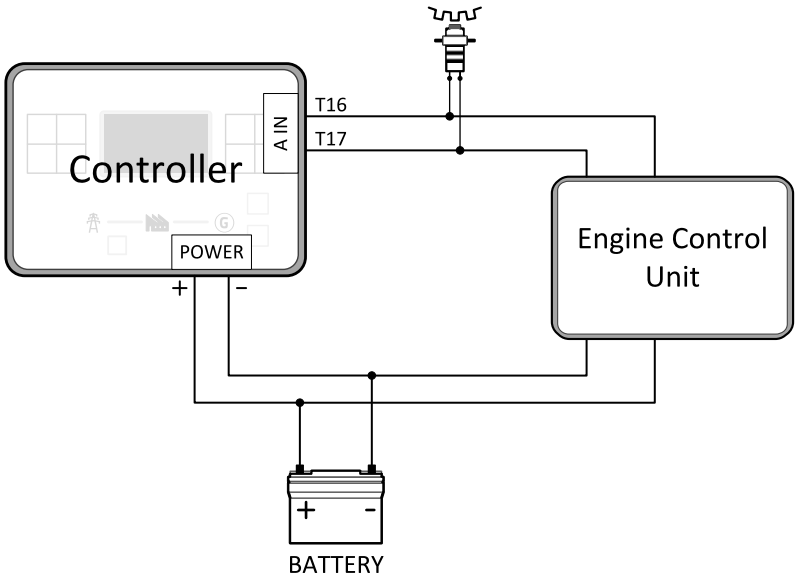
Image 4.36 Typical Mono Phase generator wiring

4.4.5 Magnetic pick-up

A magnetic speed sensor (pickup) is the most common method of engine speed measurement. To use this method, mount the pickup opposite the engine flywheel, connect the cable to the controller as shown on the picture below and adjust the setpoint **Gear Teeth (page 321)** according to the number of teeth on the flywheel.

For the details about the pick-up input parameters **see Technical data on page 281**.

IMPORTANT: To ensure proper function use a shielded cable.



If engine will not start:

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

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

4.4.6 Binary inputs

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

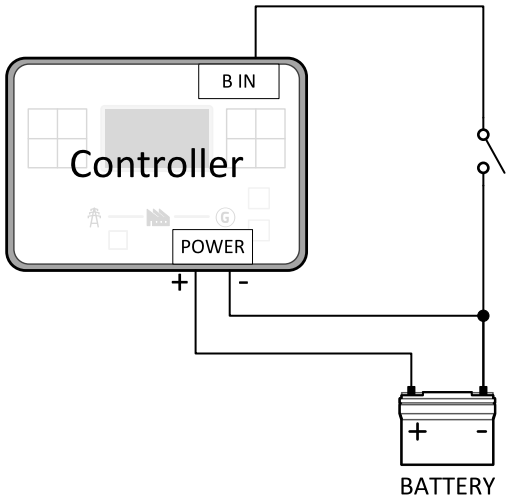


Image 4.37 Wiring binary inputs

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

4.4.7 Binary Outputs

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

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

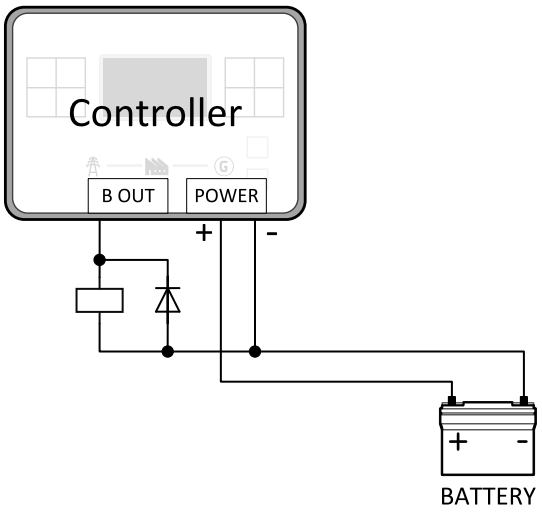


Image 4.38 Binary outputs wiring

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

IMPORTANT: Binary output 1 and 2 is power up by E-Stop terminal.

4.4.8 E-Stop

E-Stop has dedicated terminal T04. Power supply of binary output 1 and binary output 2 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 157**.

Note: *This function has the same behavior as binary input* ***EMERGENCY STOP (PAGE 725)****.*

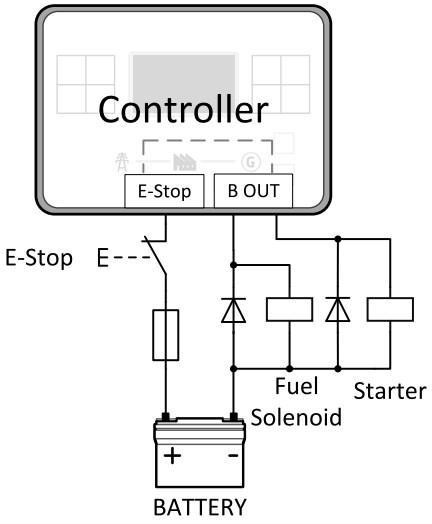


Image 4.39 E-Stop wiring

Note: *Recommended fusing is 2 A fuse.*

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

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

IMPORTANT: Suppression diodes are not indicated, but required.

4.4.9 Analog inputs

On each analog input, there is the possibility to connect a voltage, current or resistive sensor.

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

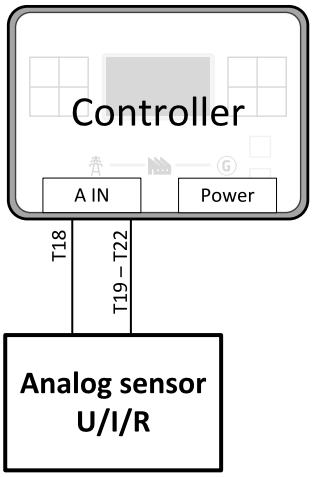


Image 4.40 Wiring of analog sensor

- 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.

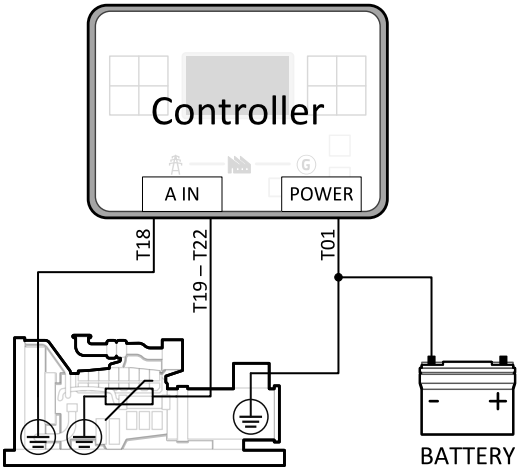


Image 4.41 Grounded sensors

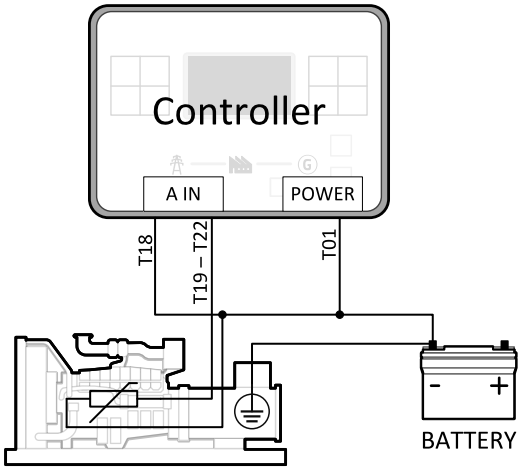


Image 4.42 Isolated sensors

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

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

Analog as binary or tristate inputs

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

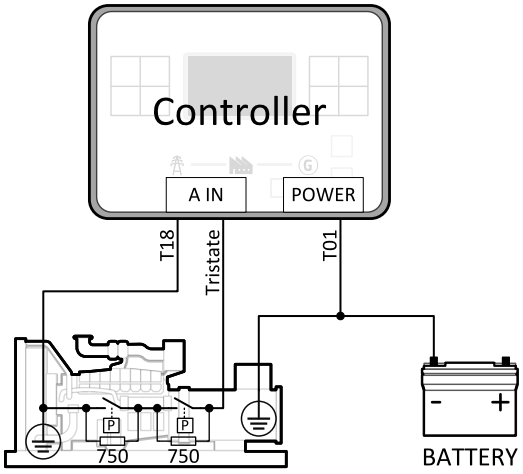


Image 4.43 Analog inputs as tristate

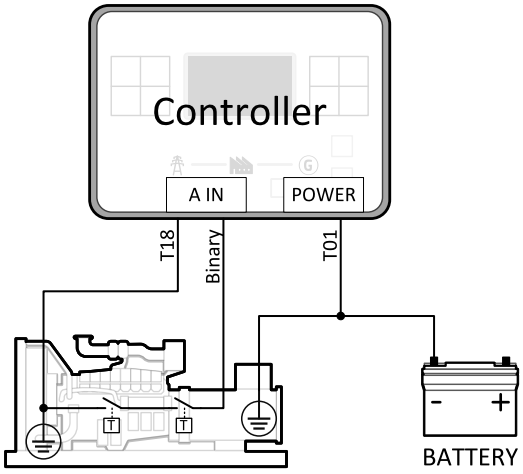


Image 4.44 Analog inputs as binary

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.*

Curve of tristate sensor is prepared for resistive analog inputs 0 .. 2500 Ω.

Tristate sensor has 3 states:

- Fls – fail of sensor
- 1 – value is in logical 1
- 0 – value is in logical 0

Curve of sensor:

- < 10 Ω – fail of sensor
- 10 .. 750 Ω – logical 1
- 750 .. 2500 Ω – logical 0
- > 2500 – fail of sensor

Analog Voltage sensor

Controller is equipped with +5 V terminal which can be used as power supply for a voltage analog sensor.

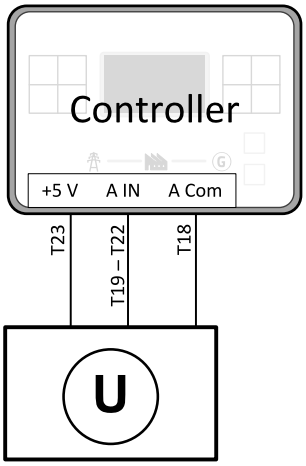


Image 4.45 Analog Voltage sensor

Note: *Maximal current of 5V output is 100 mA.*

4.4.10 Speed governor interface

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

- voltage mode -10 to 10 V (10k output resistance can be internally connected by jumper)
  - Maximum load current: 5 mA both sourcing and sinking.
  - Precision: 1% of set value ±100 mV.
  - Resolution / minimum step: 3 mV approx.
  - Step response: less than 10 ms, measured between 10 % and 90 %.
  - Output ripple: 30 mV max. at 50 % of pwm.
  - Galvanic insulation: NO
- 5 V PWM mode
  - PWM amplitude: 5 V.
  - PWM frequency: 500 to 2900 Hz defined by setpoint **Speed Governor PWM Rate (page 438)**
  - Maximum load current: 20 mA both sourcing and sinking.
  - PWM Resolution: 14 bit.
  - Galvanic insulation: NO

Please **see Speed control outputs on page 237** 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.**

4.4.11 AVR Interface

The output from the controller work in the following mode:

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

Please **see Voltage control outputs on page 243** 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.

4.4.12 CAN bus and RS485 wiring

CAN bus wiring

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

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

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

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

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

[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)

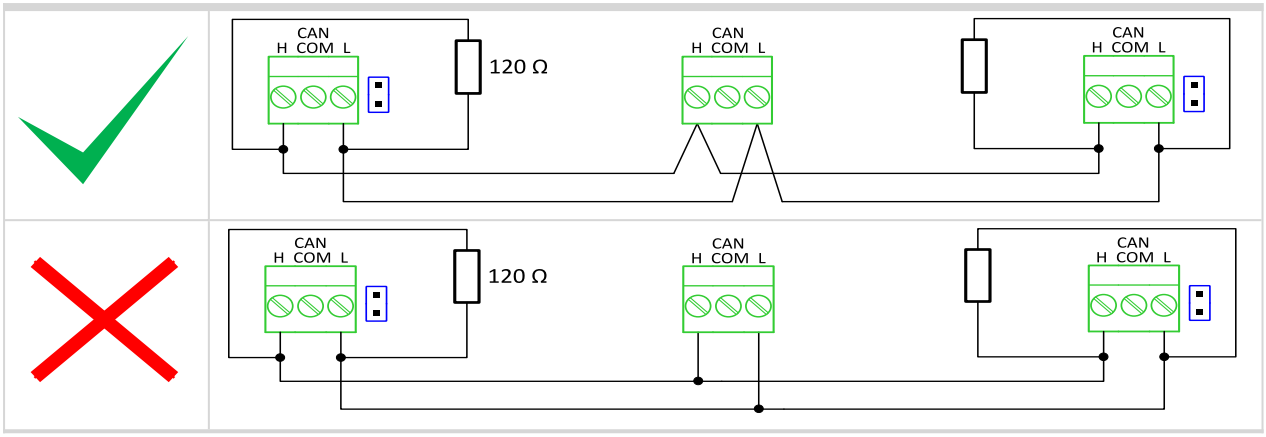


Image 4.46 CAN bus topology

› For shorter distances (connection within one building)

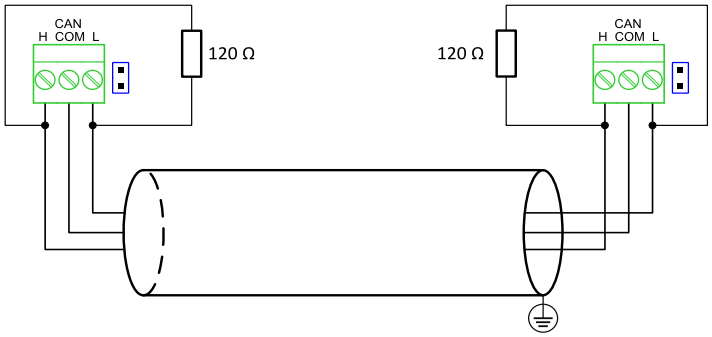


Image 4.47 CAN bus wiring for shorter distances

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.)

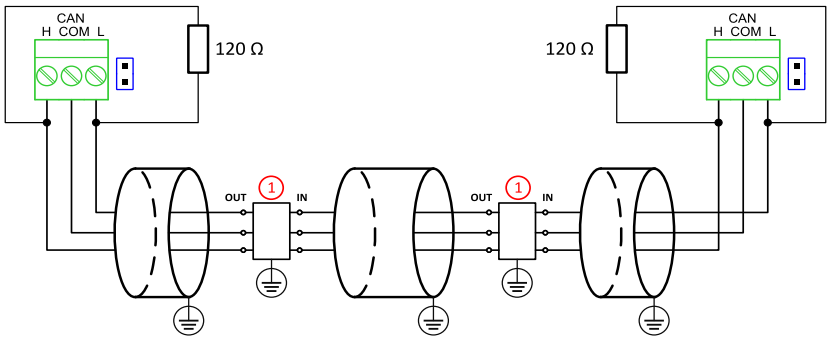


Image 4.48 CAN bus wiring for longer distances

① Recommended PT5-HF-12DC-ST[1]

[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

RS485 wiring

The wiring of the RS485 communication (available with plug-in module CM-RS232-485) should be provided in such a way that the following rules are observed:

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

- Standard maximum bus length is 1000 m.
- Shielded cable[1] must be used, and shielding must be connected to the terminal T01 (Grounding).
- External units can be connected on the RS485 line in any order, but keeping the line arrangement (no tails, no star) is necessary.
- The line must be terminated by 120Ω resistors at both ends.
- For shorter distances (connection within one building)

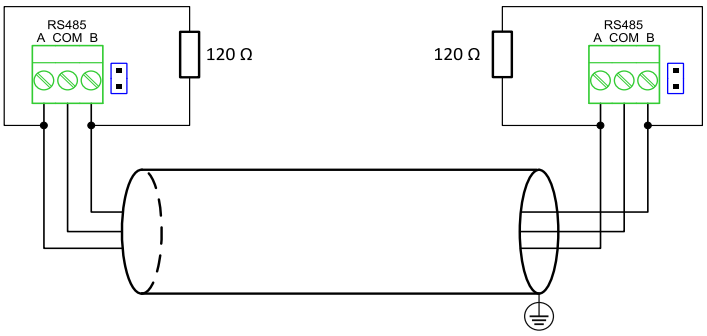


Image 4.49 RS485 wiring for shorter distances

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

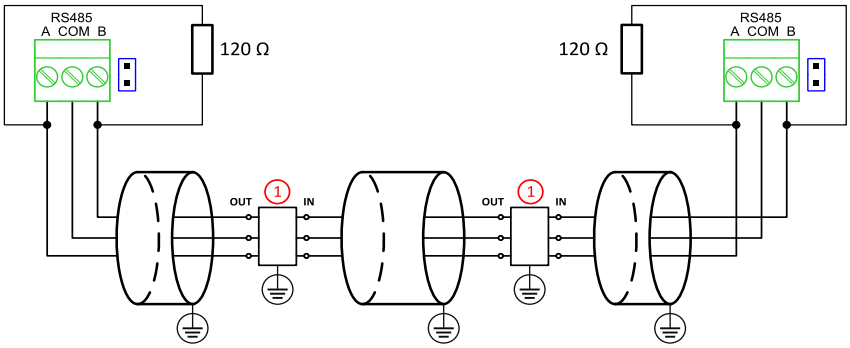


Image 4.50 RS485 wiring for longer distances

① Recommended PT5HF-5DC-ST[2]

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

[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)

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

On board RS485 description

Balancing resistors

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

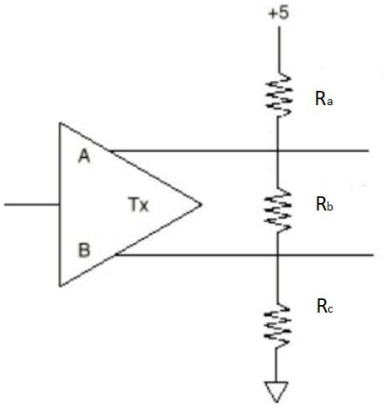


Image 4.51 Balancing resistors

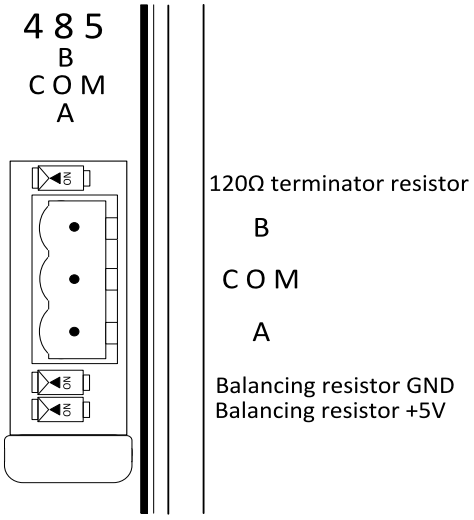


Image 4.52 RS485 on board

4.4.13 Ethernet

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

4.4.14 USB

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

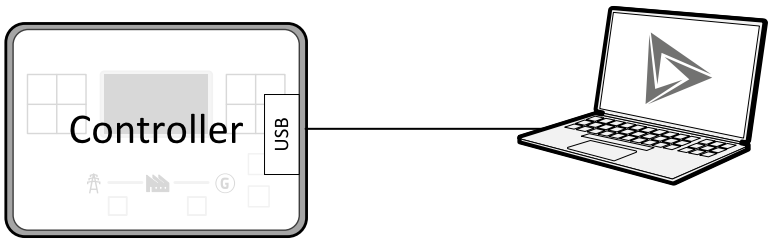


Image 4.53 USB connection

Controller can be also powered by USB (only for service purpose like an 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.**

4.4.15 USB HOST

USB Flash Drive can be connected into USB A connector.

back to Recommended wiring

4.5 Plug-in module installation

4.5.1 Installation

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

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

After removing the back cover insert the plug-in module. The plug-in module must be inserted under holders. Start with holders marked by arrows. After inserting plug-in module under holders press it down. This locks the module in place.

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

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

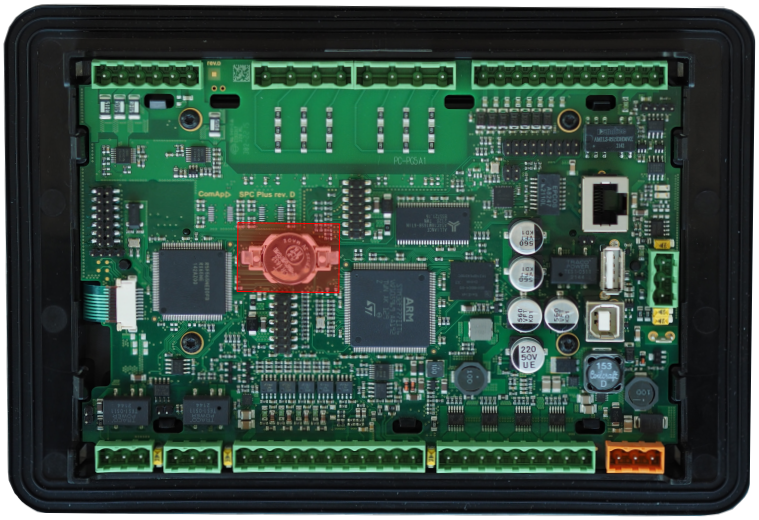
The internal backup battery lifetime is approx. 6 years. If replacement of backup battery is needed, follow these instructions:

- Connect the controller to a PC and save an archive for backup purposes (not necessary but recommended).
- Disconnect all terminals from the controller and remove the controller from the switchboard.

- Remove the back cover and all plug-in modules.
- Release the rear cover using a flat screwdriver or another suitable tool.



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



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

back to Installation and wiring

5 Controller setup

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5.2 Controller configuration and PC tools connection 69
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5.5 User management and data access control 246

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5.1 Default configuration

5.1.1 Binary inputs

Number	Description	Configured function
BIN1	Generator circuit breaker feedback	**GCB Feedback (page 735)**
BIN2	Mains circuit breaker feedback	**MCB Feedback (page 741)**
BIN3	Not Used	**Not Used**
BIN4	Access lock keyswitch	**Access Lock (page 714)**
BIN5	Switch controller to OFF mode	**Remote OFF (page 750)**
BIN6	Switch controller to TEST mode	**Remote TEST (page 752)**
BIN7	Suppression of alarms	**Sd Override (page 754)**
BIN8	Not Used	**Not Used**

5.1.2 Binary outputs

Number	Description	Function
BOUT1	Starter motor control	**Starter 1 (page 818)**
BOUT2	Fuel solenoid valve	**Fuel Solenoid (page 786)**
BOUT3	Indication of breaker state	**GCB Close/Open (page 788)**
BOUT4	Indication of breaker state	**MCB Close/Open (page 803)**
BOUT5	Activation of any devices before start	**Prestart (page 812)**
BOUT6	Gen-set can be connected to load	**Ready To Load (page 814)**
BOUT7	Indication of unconfirmed alarm	**Alarm (page 772)**
BOUT8	Not Used	**Not Used (page 811)**

5.1.3 Analog inputs

Number	Configured sensor	Function
AIN1	VDO 10 Bar	**Oil Pressure (page 834)**
AIN2	VDO40-120°C	**Coolant Temp (page 832)**
AIN3	VDOLevel %	**Fuel Level (page 832)**
AIN4	Not Used	Not Used

5.2 Controller configuration and PC tools connection

5.2.1 USB 69
5.2.2 RS232/RS485 70
5.2.3 Ethernet 71

back to Controller setup

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

5.2.1 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

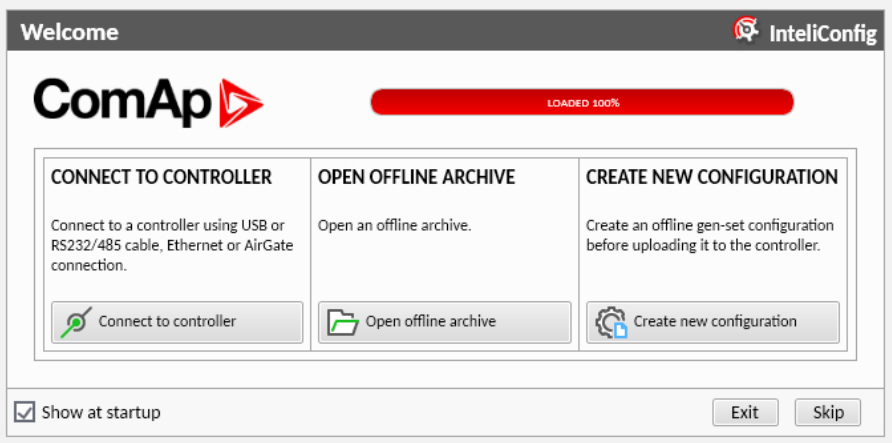


Image 5.1 First screen of InteliConfig – select connect to controller

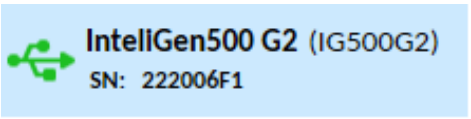


Image 5.2 Second screen of InteliConfig – select detected controllers

Connection using WinScope 1000

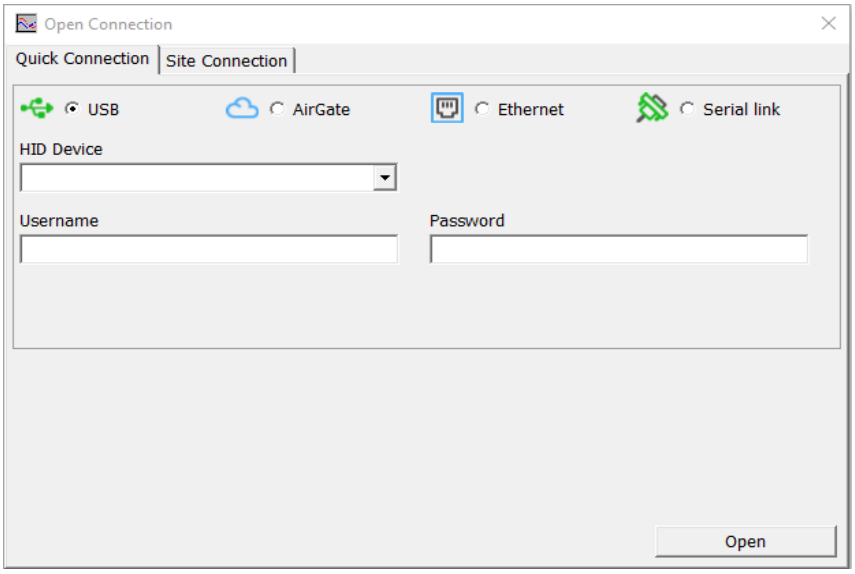


Image 5.3 WinScope 1000 screen – select USB connection

Select your controller from the HID Device drop-down list.

Note: *Username and password are not mandatory.*

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 should be checked in the controller:

- **COM1 Mode (page 559)** = Direct
- **Controller Address (page 327)** must be set

Connection using InteliConfig

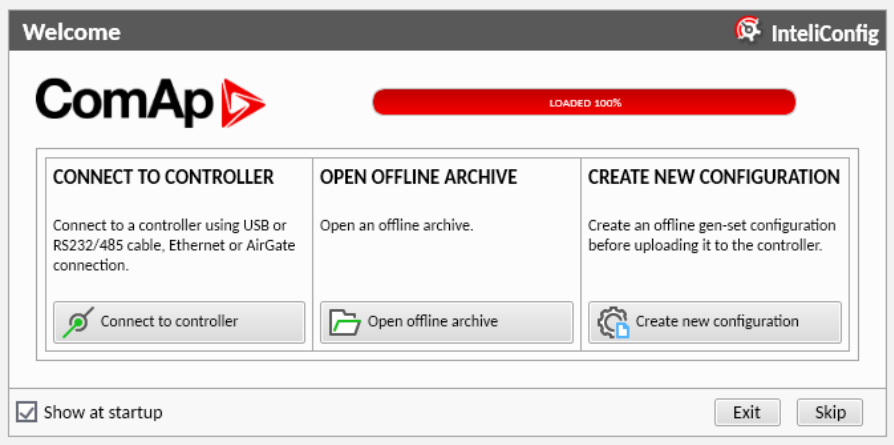


Image 5.4 First screen of InteliConfig – select connect to controller

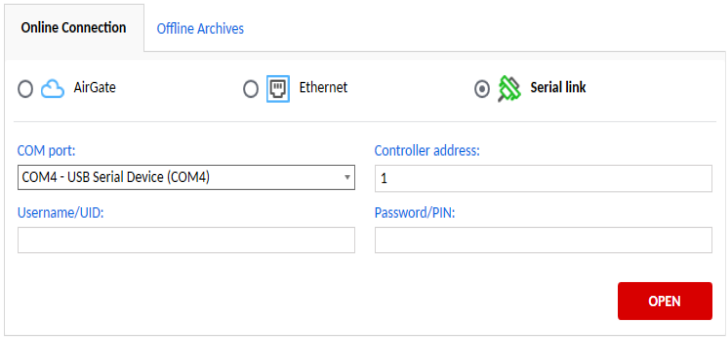


Image 5.5 Second screen of InteliConfig – select Serial link

Connection using WinScope 1000

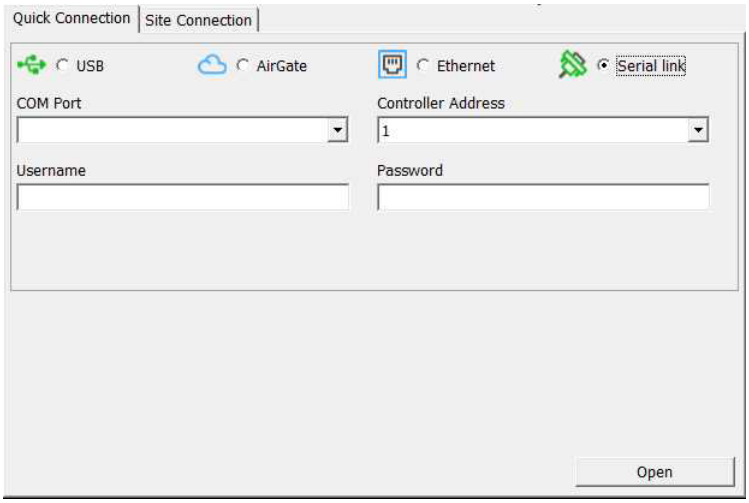


Image 5.6 WinScope 1000 screen – select serial link

Note: *Username and password are not mandatory.*

5.2.3 Ethernet

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

Note: *Internet connection can be acquired via Onboard Ethernet, CM3-Ethernet or CM2-4G-GPS plug-in modules.*

Direct connection

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

- **Controller Address (page 327)** must be set to the same value as in the PC tool
- **IP Address Mode (page 605)** can be set to AUTOMATIC when there is DHCP service available. Otherwise it should be set to FIXED
- **IP Address (page 606)** is either set automatically or it can be adjusted to a specific requested value
- **Subnet Mask (page 606)** is either set automatically or it can be adjusted to a specific requested value
- **Gateway IP (page 607)** can be set here when it is used

Connection using InteliConfig

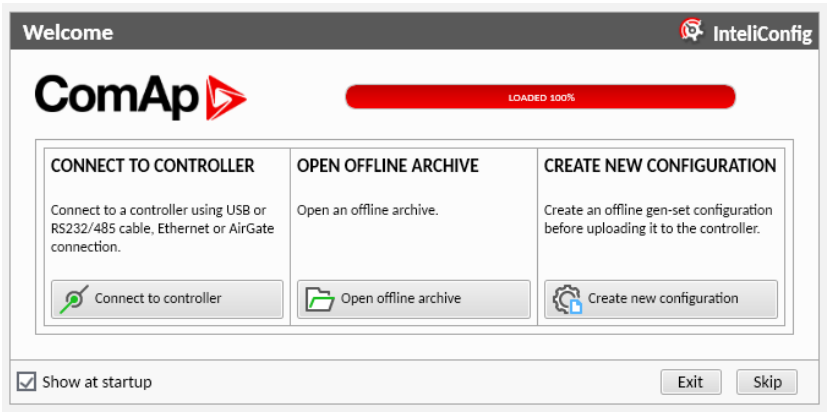


Image 5.7 First screen of InteliConfig – select connect to controller

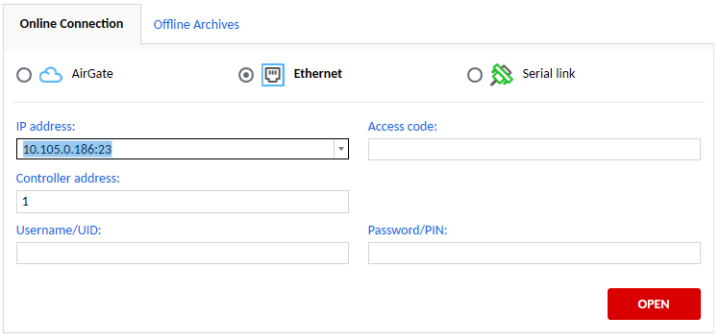


Image 5.8 Second screen of InteliConfig – select Internet / Ethernet

Connection using WinScope 1000

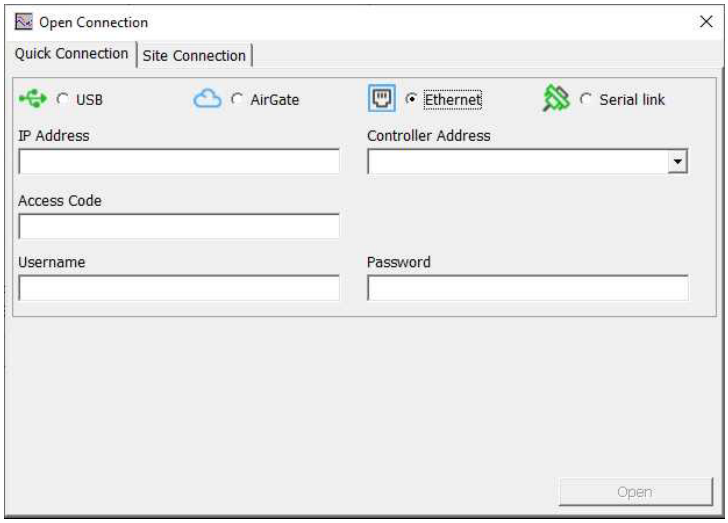


Image 5.9 WinScope 1000 screen – select Ethernet

Following information has to be filled to establish connection:

- IP address
- Controller address
- User name and Password
- Access code is required

AirGate connection

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

- **Controller Address (page 327)** must be set to the same value as in the PC tool
- **IP Address Mode (page 605)** can be set to AUTOMATIC when there is DHCP service available. Otherwise it should be set to FIXED
- **IP Address (page 606)** is either set automatically or it can be adjusted to a specific requested value
- **Subnet Mask (page 606)** is either set automatically or it can be adjusted to a specific requested value
- **Gateway IP (page 607)** can be set here when it is used
- **AirGate Address (page 610)** currently there is one AirGate server running at URL global.airgate.link (enter this URL into the setpoint)

IMPORTANT: AirGate Key has to be configured. User with administrator rights has a possibility to set up or change AirGate Key via InteliConfig using Tools -> Access Administration -> Change AirGate Key.

IMPORTANT: Controller has to be connected to the Internet.

Getting started with AirGate

1. Make sure controller has link to Internet
   a. CM3-Ethernet is connected to LAN infrastructure, has an IP address and access to Internet
   b. CM2-4G-GPS is connected to a mobile operator (preferably to 3G/4G network) and has an IP address
2. Connect with InteliConfig e.g. via USB and check setpoints as follows:
   a. *AirGate connection* = ENABLED
   b. *AirGate port* = 54440
   c. *AirGate address* = global.airgate.link
3. Adjust *AirGate key* in InteliConfig – this is your "secret key" that you have to provide always when you want to connect to the controller via AirGate.

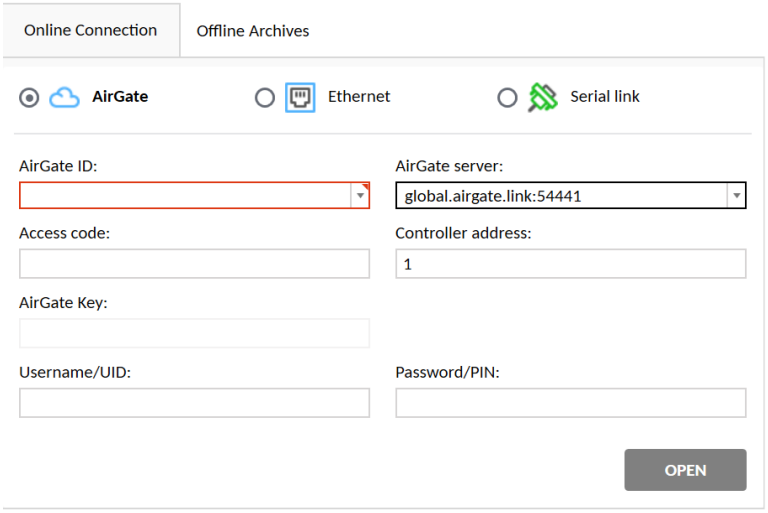


Image 5.10 Changing AirGate key

4. Wait for approx 2 – 4 minutes until the controller connects to AirGate. You can see the progress by observing the value *AirGate status* in InteliConfig
5. When the controller is connected to AirGate it will generate *AirGate ID* for the controller. This AirGate ID is the "phone number" of the controller.

Note: *If Onboard Ethernet, CM3-Ethernet and CM2-4G-GPS are used simultaneously the assigned AirGate ID will be different for each module, so the controller will be accessible via three different AirGate IDs.*

Connecting from InteliConfig via AirGate 2.0



AirGate ID	controller addressing ID (see above)
Access Code	leave empty
AirGate Key	AirGate Key adjusted in controller as per description above
AirGate Server	"global.airgate.link:54441"
Username, Password	use your credentials

AirGate operational and diagnostic information

Object	Description
Not defined	Indicated while the controller is actually not trying to connect to AirGate. This is initial value of the status.
Wait to connect	Indicated while the controller is waiting the "repetition period" before next attempt to connect to a node is performed.
Resolving	Indicated while the controller is resolving domain name of the node to which it is attempting to connect.
Connecting	Indicated while the controller is attempting to establish TCP link to the node.
Creat sec chan	Indicated while CCS encrypted channel is being negotiated.
Registering	Indicated when the CCS channel has been established until AirGate sends message "setRuntimeParams" (with any registration status).

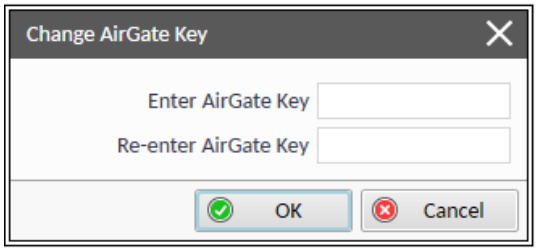
Object	Description
Conn inoperable	Indicated when AirGate sent registration status other than "Authorized" until the status changed to "Authorized".
Conn operable	Indicated when AirGate sent registration status "Authorized" until the status changed to any other one.
Susp AGkeyEmpty	Indicated when the service is enabled but suspended due to empty AirGate key. ***Note:*** *If you see this status message you have to adjust AirGate Key as per instructions above.*

Connection using InteliConfig

In order to connect to InteliConfig following information have to be filled out:

- AirGate Server → **AirGate Address (page 610)**
- **Controller Address (page 327)**
- User name and Password
- AirGate Key

IMPORTANT: AirGate Key has to be configured. User with administrator rights has a possibility to set up or change AirGate Key via InteliConfig using Tools -> Access Administration -> Change AirGate Key.



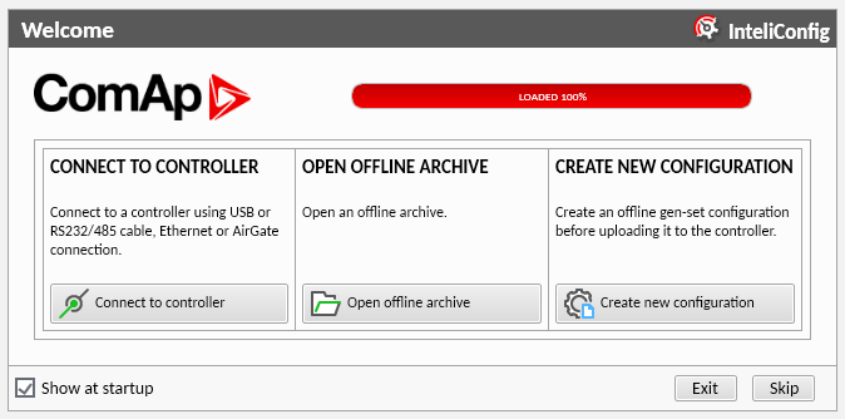


Image 5.11 First screen of InteliConfig – select connect to controller

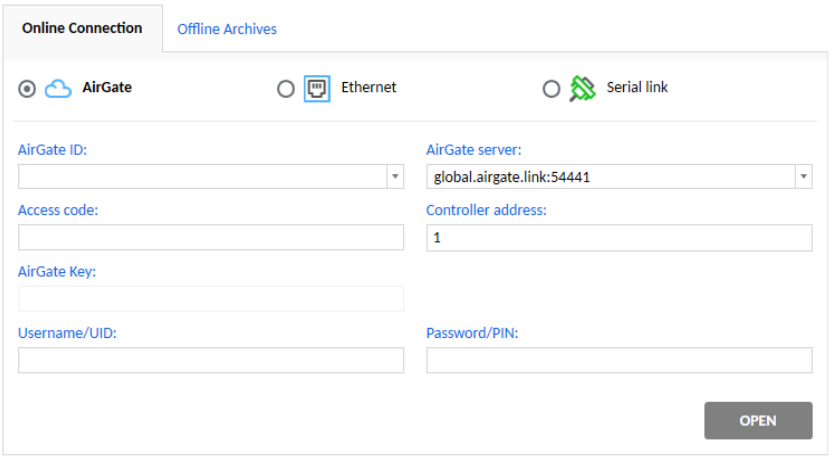


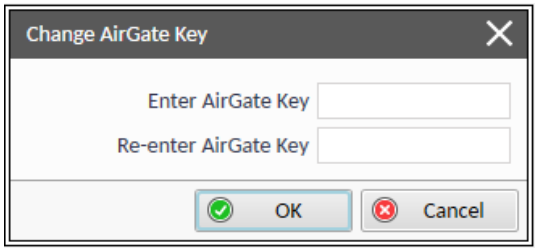
Image 5.12 Second screen of InteliConfig – AirGate

Connection using WinScope 1000

In order to connect to WinScope 1000 following information have to be filled out:

- AirGate Server → **AirGate Address (page 610)**
- **Controller Address (page 327)**
- User name and Password
- Device Access Key →AirGate Key
- Access code is required

> **IMPORTANT: AirGate Key has to be configured. User with administrator rights has a possibility to set up or change AirGate Key via InteliConfig using Tools -> Access Administration -> Change AirGate Key.**



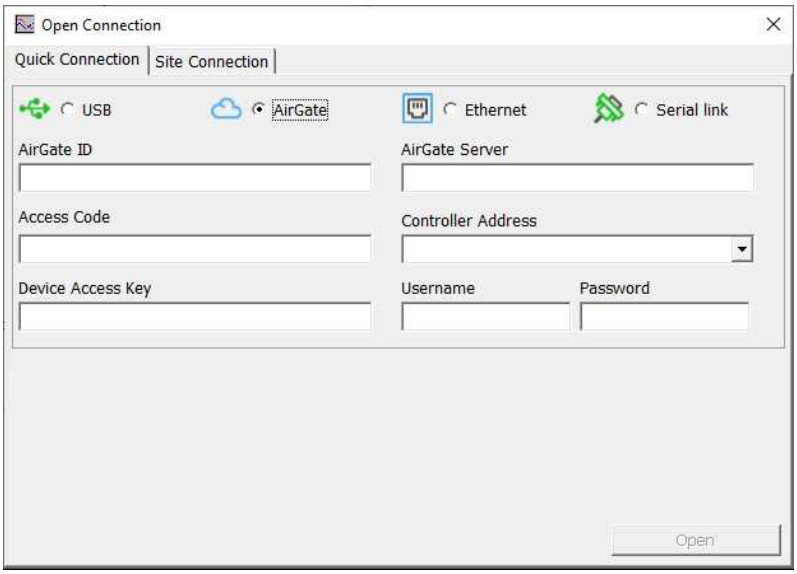


Image 5.13 WinScope 1000 screen – select AirGate

5.3 Operator Guide

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5.3.1 Front panel elements



Image 5.14 Operator interface of InteliGen 500 G2

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

		Note: *This button will not change the mode if the controller mode is forced by one of binary inputs listed in the Global 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		**MCB** button. Works in MAN mode only. Press this button to open or close the MCB. This button also start the synchronization process.
12		**GCB** button. Works in MAN mode only. Press this button to open or close the GCB. This button also start the synchronization process.
13	**ALARMLIST** button. Use this button to get to the alarmalist screen.	
14	**HISTORY** button. Use this button to get to the history screen.	
15	**HOME** button. Use this button to get to the main screen.	
16	**Multicolor (RGB) LED**. The specified color and flashing function describes the actual state of the unit.	

Status LED Indication

- LED intensity is directly connected with the actual setting of the backlight intensity in Administration menu "Settings" accessible by shortcut Enter + Menu
  - the intensity respects the value of the Manual or External brightness control

- The flashing of the status LED and indicative Alarm icon in the top statusbar have the same period
- Meaning of the status LED colors is described below

Color and flashing function meaning:

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

Color state priority:

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

Pages

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

The actual GUI consists of 6 different pages:

- Metering screen
- Alarmlist
- Setpoints
- History
- Trends

- Values (applicable only in supported controllers)
- Administration
  - Page administration is accessible only by pressing the combination of the Enter and Menu buttons from only Metering screen.

Screens

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

Note: *The metering screens are adjustable using the Screen Editor (in InteliConfig). The Screen Editor tool also has its own manual.*

Special screens

There are 2 special screens stored in the unit:

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

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

Dialogs

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

Note: *Function and User buttons work on background (e.g. if any dialog is displayed).*

IMPORTANT: Each dialog has its own structure corresponding to the value type.

IMPORTANT: QR Code is displayed on each dialog. Together with ComAp Smart Hint application the QR Code is dedicated for further help. Simply read the QR Code using Smart Hint application to get a help about actually edited setpoint.

Dialog Value

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

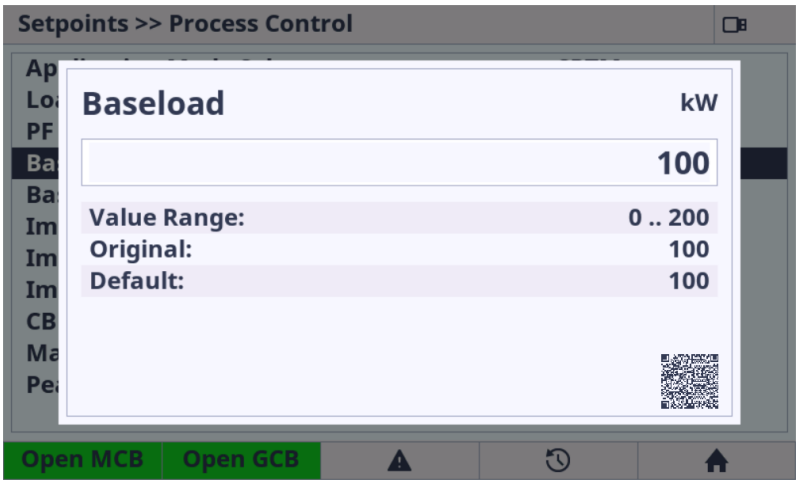


Image 5.15 : Dialog Value overview

Dialog Value Extended

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

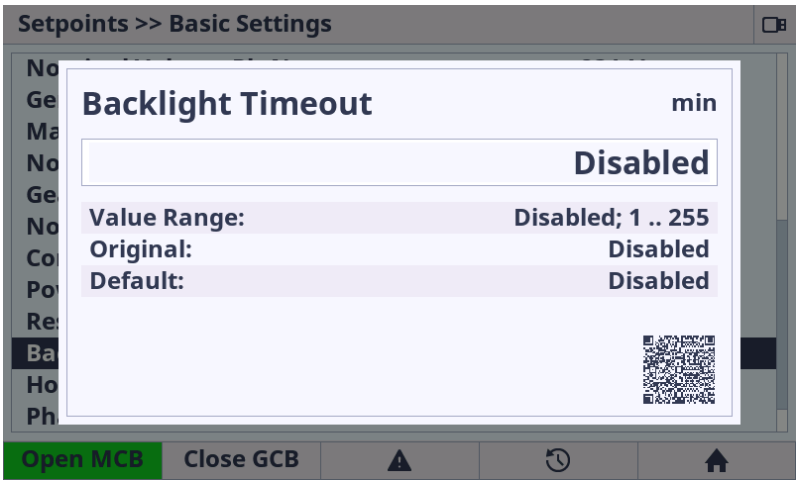


Image 5.16 : Dialog Value Extended overview

Dialog String List

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

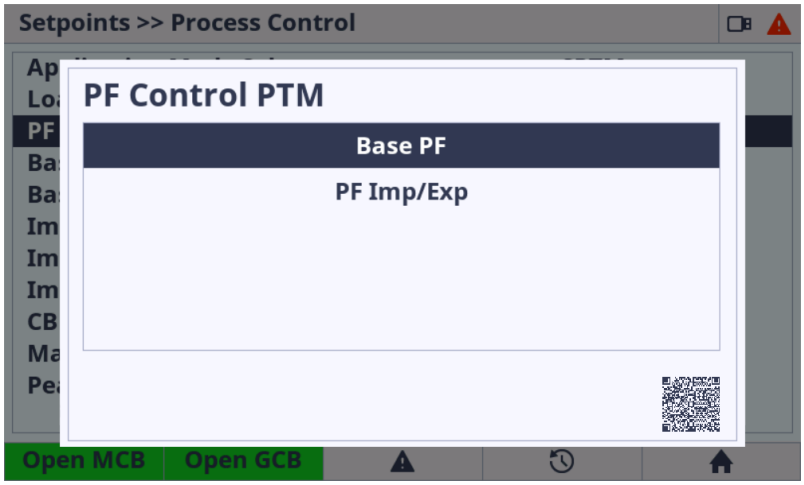


Image 5.17 : Dialog String List overview

Dialog Text

The dialog text is dedicated for text inserting or modification. When the dialog is active the buttons arrow up and down are used for letter selection. Arrow up means the selection in left direction, arrow down means the selection in right direction. Arrows right/left are used for moving between the letters to the next/previous letter position in the text field. If actual position is very right letter then the arrow right inserts new letter to the right. Letter DEL deletes actualy selected letter (using left or right arrow). Insert letter (empty letter - just behind the DEL letter) inserts the letter to the actual position (using left or right arrow) Enter button confirms the text modification. Menu button cancels the dialog without saving.

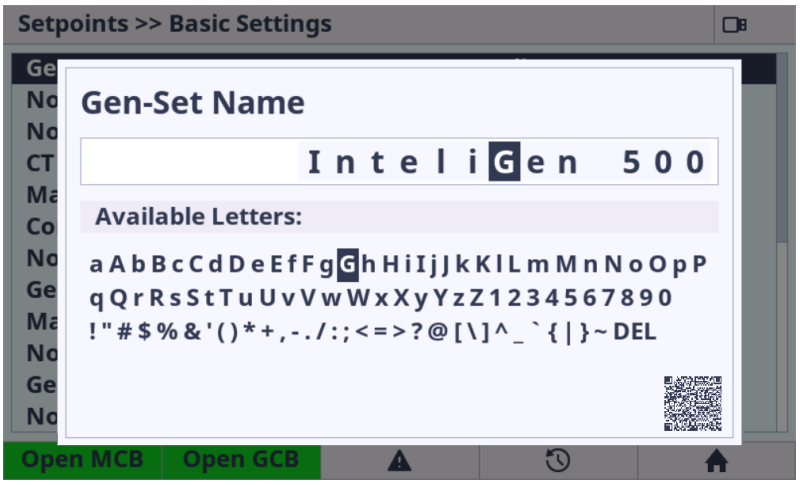


Image 5.18 : Dialog Text overview

Improved dialog for text inserting from version ICD 1.4.0 allows users better and user frinedly control. Arrows are used for movement in letter table. Enter is used for letter selection/confirmation. Function buttons is used for another functions. F1 button is used to delete letter. F2 button is used for changing the letter table to special characters and vise versa. F3 and F4 buttons are used for movement inside the text field between the letters. F5 button confirms the dialog and save changes. Menu button cancels the dialog without the saving changes.

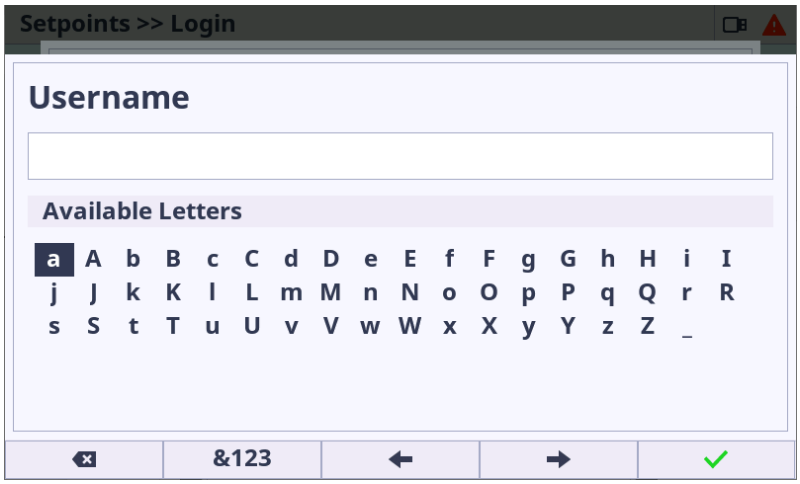


Image 5.19 : Dialog Text from ICD firmware version 1.4.0

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

Dialog IP address

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

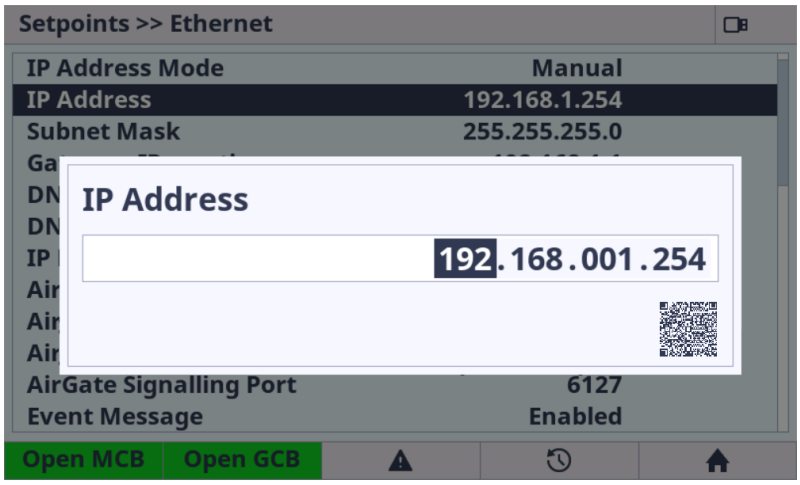


Image 5.20 : Dialog IP address overview

Dialog Message

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

- Stop - dedicated for error indication
- Information - dedicated for general message

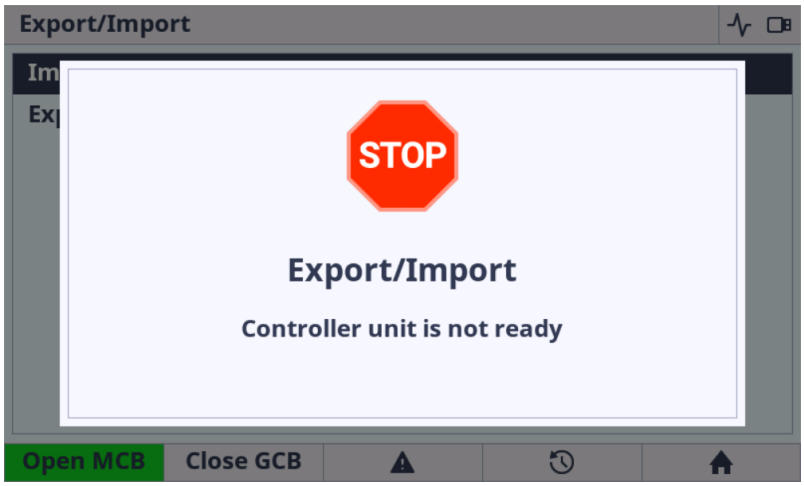


Image 5.21 : Dialog Message overview

Dialog Progress

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

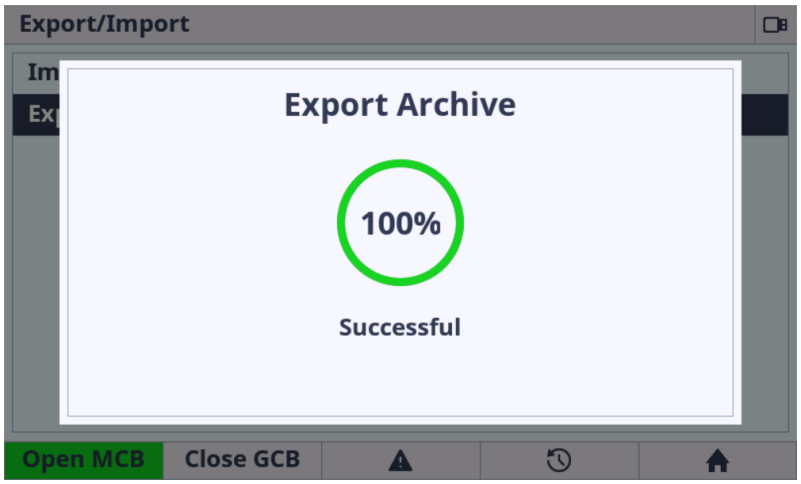


Image 5.22 : Dialog Progress overview

Dialog Date

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

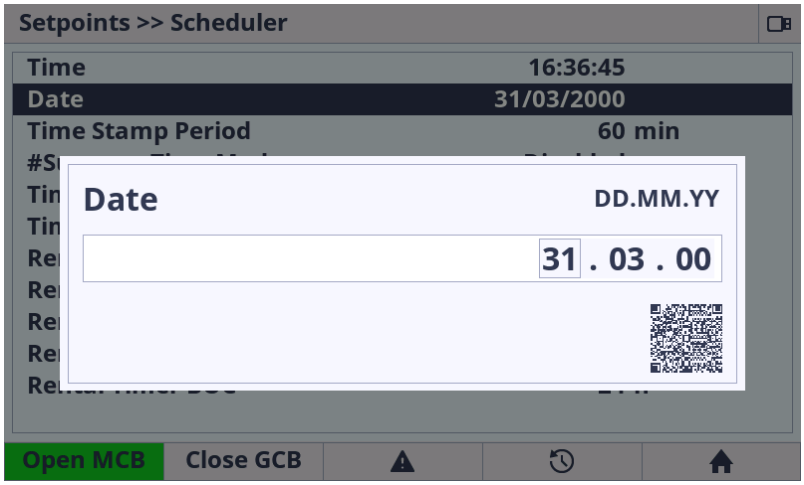


Image 5.23 : Dialog Date overview

Dialog Time

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

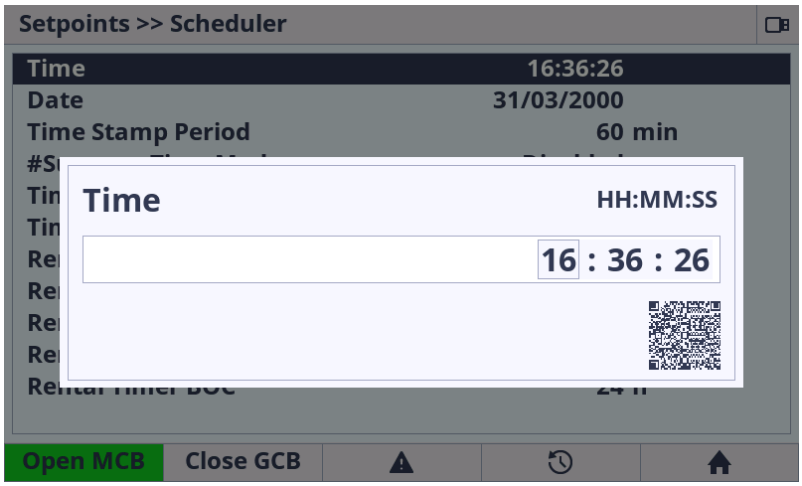


Image 5.24 : Dialog Time overview

Dialog Login

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

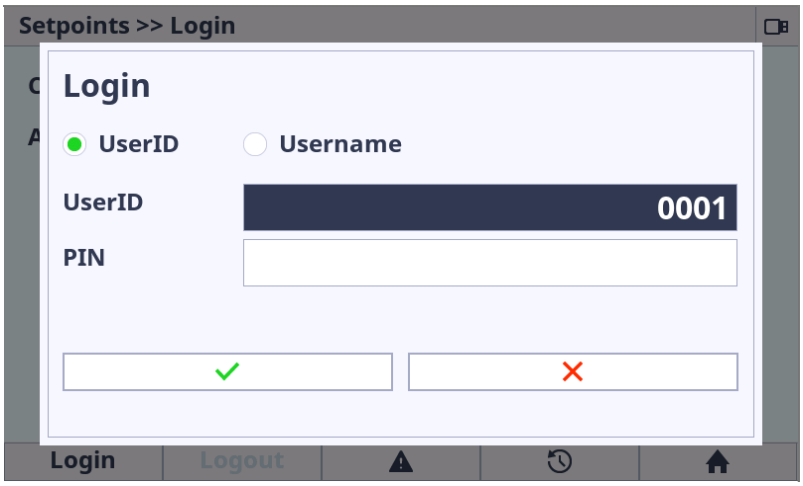


Image 5.25 : Dialog Login overview

Status bars

Bottom status bar

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

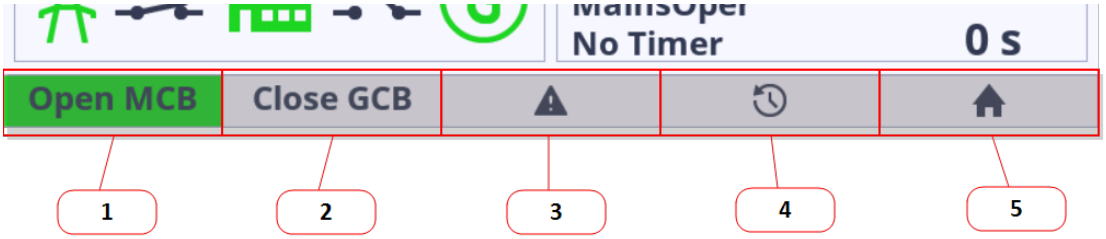


Image 5.26 : Example (bottom status bar on Home metering screen)

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

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

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

Top status bar

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

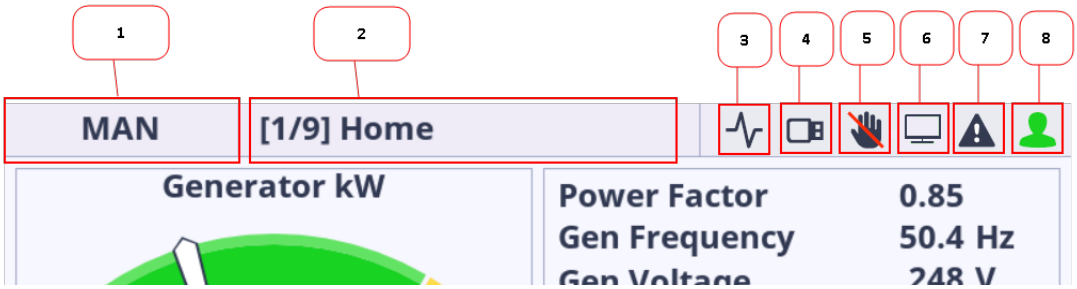


Image 5.27 Top Status Bar description



Image 5.28 : Top Status Bar – Mode selector dialog

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

5.3.2 Display screens and pages structure

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

The actual GUI consists of following pages:

- **Metering screens (page 89)**
- **Alarmlist (page 90)**
- **Trends (page 97)**
- **Values (page 99)**
- **Administration (page 99)**
  - Page administration is accessible only by pressing the combination of the Enter and Menu buttons from the only Metering screen.

Metering screens

Metering screens are dedicated for important controller values and setpoints.

InteliGen 500 G2 metering screens are predefined by ComAp and covers all the application types.

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

InteliGen 500 G2 metering screens by default

1. Home
2. Power
3. Generator
4. Mains
5. Bus
6. Synchro
7. Power Management
8. Analog inputs
9. Binary Inputs | Outputs
10. Statistics
11. Ethernet
12. After-treatment
13. CM-4G-GPS
14. EM-BIO8-EFCP-A

15. EM-BIO8-EFCP-B
16. CAN modules
17. ECU modules
18. Virtual modules

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



Image 5.29 : InteliGen 500 G2 metering screens overview

5.3.3 Alarmlist

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

There are 4 different types of controller alarms:

- **Warning *(often also known as 1st level alarm)*** – represented by the YELLOW color. These types of alarms inform the user that something is wrong and need to be checked and confirmed.

- **Shutdown** ***(often also known as 2nd level alarm)*** – represented by the RED color. These types of alarms protects the Gen-set or Engine during the wrong state.
- **ECU alarm** – represented by the BLUE color. This type of alarm comes from the connected external ECU units.
- **Sensor fail alarm** – represented by the WHITE color. A special kind of alarm that appears if any connected sensor emits the wrong state.

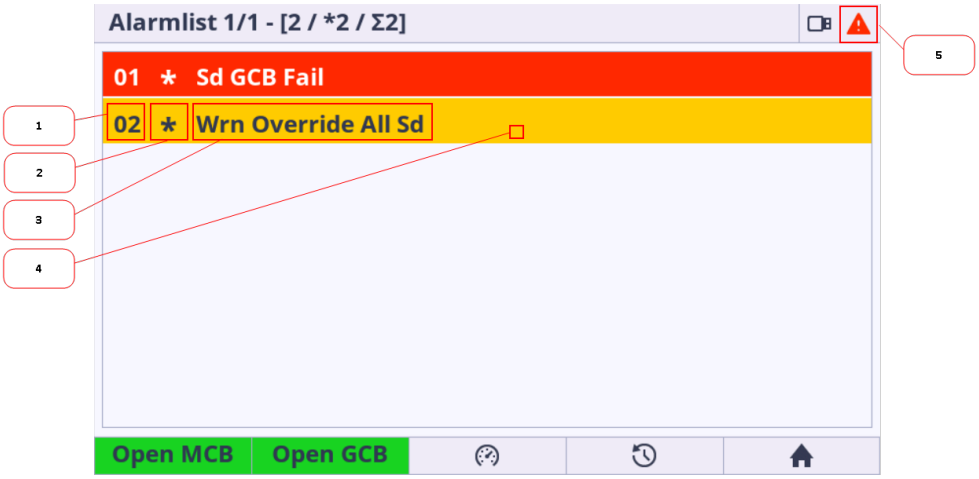


Image 5.30 : Alarmlist Page

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

- ECU alarm
  - Active/unconfirmed : * / blue background / white text (asterix active)
  - Active/confirmed : blue background / white text (asterix inactive)
  - Inactive/unconfirmed : * / dark background / blue text (asterix active)

5. **Topstatus bar Alarmlist icon** – The alarm icon is fashing red if there is at least one unconfirmed alarm (shutdown or warning) in the alarmlist. The icon lights red if there is at least one confirmed active alarm and no unconfirmed alarm in the alarmlist. The icon is inactive if the alarmlist is empty. This is information that something is wrong and need to be checked and resolved.

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

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

IMPORTANT: InteliGen 500 G2 controller displays maximum of 16 alarms.

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

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

User Access Management Alarm

By default the controller is preset with administrator password with no predefined email address for password reset procedure. Production mode is turned on. Due to security reasons the following access management alarms appear.

- **Wrn Production Mode** is present in the alarm list any time the production mode is turned on. To turn off the Production mode go to User management and uncheck the checkbox Production mode.
- **Wrn Default Credentials** appears in alarm list when the default administrator password is set. The purpose of alarm is to inform that the controller might be or is connected to an untrusted interface and cybersecurityrules are not fulfilled because there is default administrator password.
- **Wrn Password reset e-mail addr is not set** appears in alarm list when there is no email address set and the administrator password is not the default one. The purpose of alarm is to inform that there is possibility that the controller might not be accessible by administrator password due to a forgotten password. The password reset procedure cannot be performed without a filled email address. To fill out email address, the administrator password is required.

5.3.4 Setpoints

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

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

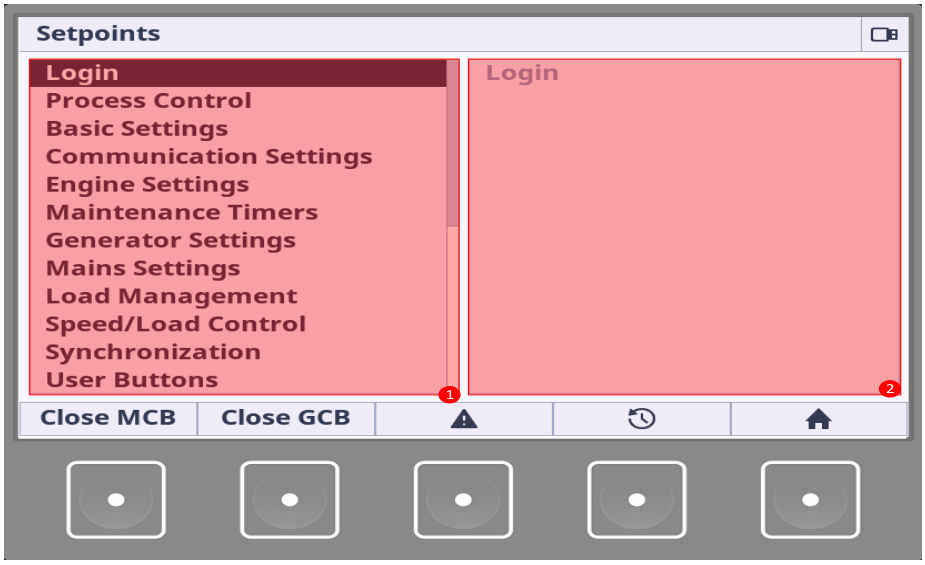


Image 5.31 : Setpoints Page overview

1. **Setpoints group** – the column setpoint group displays the available groups based on the controller, application type and configuration level settings. Respective setpoint group is selected using enter button.
2. **Available setpoints in actually selected group** – each setpoint group contains specific setpoints. The informative column Setpoint name displays the available set of setpoints to be set in each Setpoint group. This column is only informative and can NOT be set using the arrow left and right. The setpoint setting is done using the 2nd step – see below.

› 2nd step – Setpoint item is selected using the buttons arrow up and down and the dialog for value setting is called using the enter button. The dialogs are described in the chapter Dialogs.

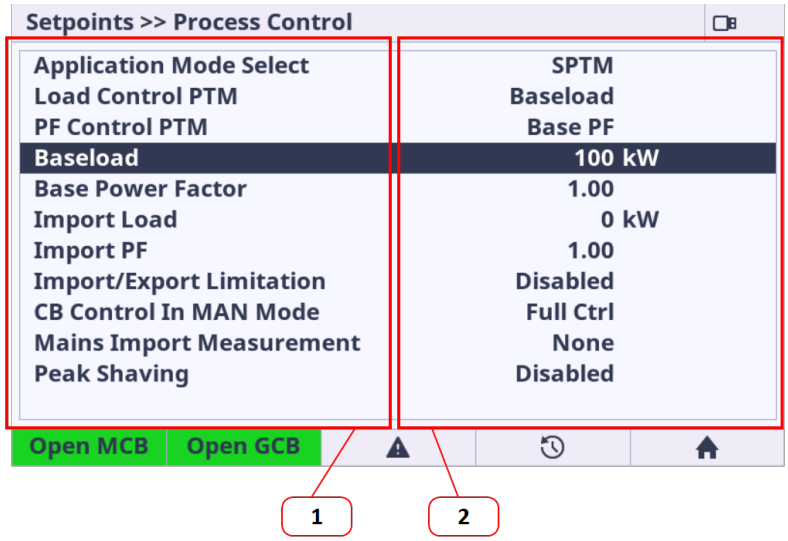


Image 5.32 : Group Setpoints Page

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

Protected Setpoint Indication

If the setpoint is protected by password then the icon (crossed hand) is displayed just behind the setpoint value. The setpoint protection is set using PC Tool InteliConfig.

Force Value Indication

If the setpoint is forced by another setpoint then the icon (double right arrow) is displayed just behind the setpoint value.

- Green Icon – Forcing is active
- Grey Icon – Force Value is set to the specific setpoint and forcing is inactive

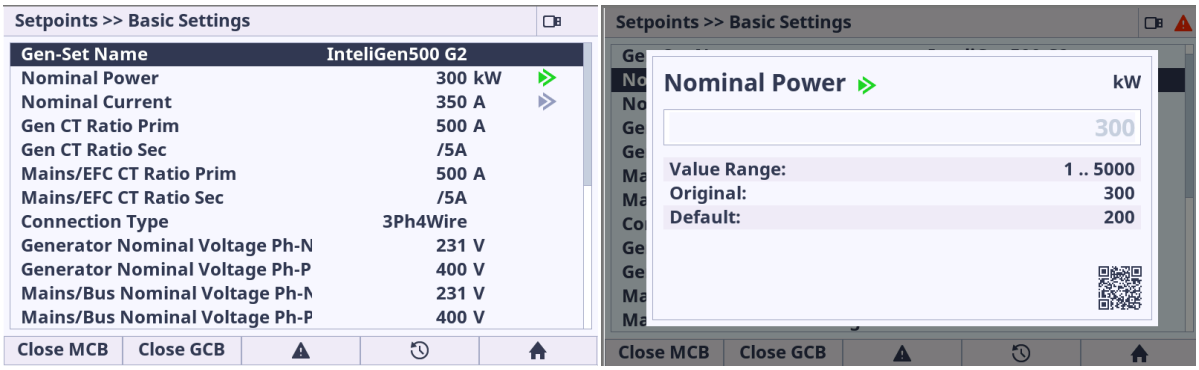


Image 5.33 : Force Value and Protected Setpoint Indication

IMPORTANT: If the controller is locked (Access Lock function is active) then the attempt for setpoint editation is denied and the information dialog is displayed (Controller is Locked). See chapter Administration and Access Lock.

Login screen

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

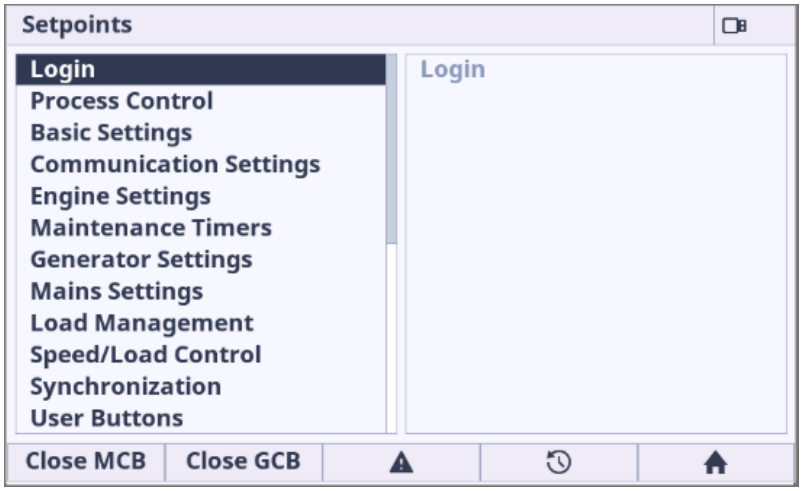


Image 5.34 : Main Setpoints Page

Password item – the item dedicated for the login and logout to the controller.

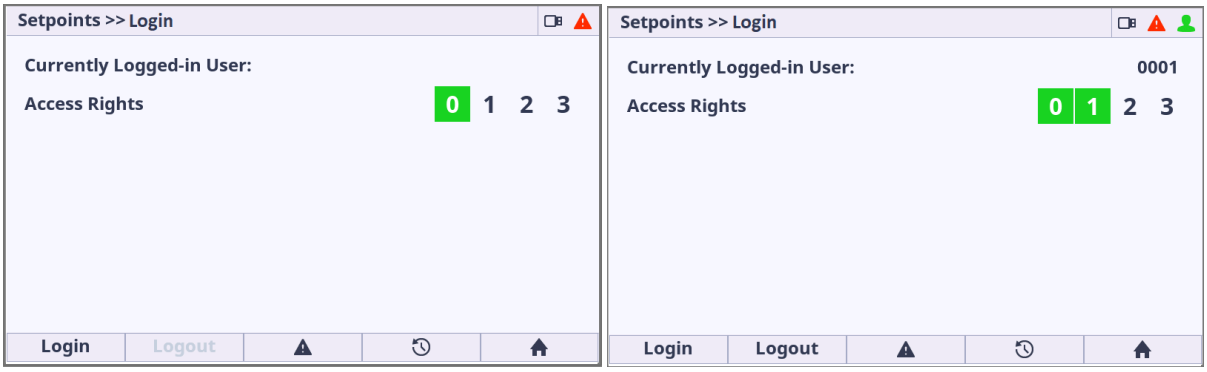


Image 5.35 : Setpoints Password Page

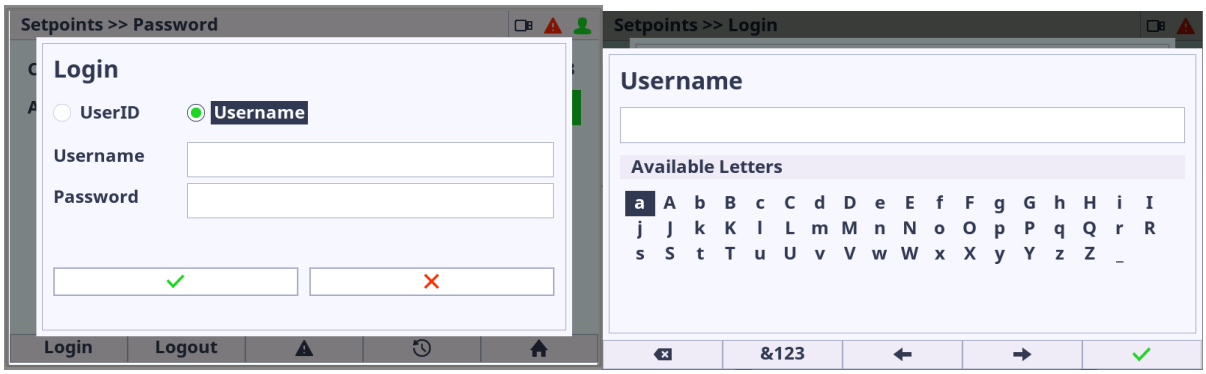


Image 5.36 : Login Dialog

Currently Logged-in User – the information about actually logged in user or his ID if loged using ID and PIN.

Access Rights – Access rights of the actually logged in user

- 0 – user has access rights 0, which means "logged-out" user
- 0,1 – user has access rights 0 + 1 access rights
- 0,1,2 – user has access rights 0 + 1 + 2 access rights
- 0,1,2,3 – user has access rights 0 + 1 + 2 + 3, which means administrator rights

Login and Logout buttons

- Login button calls the login dialog.
- Logout button performs the logout action.

5.3.5 History

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

There are 2 types of history records :

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

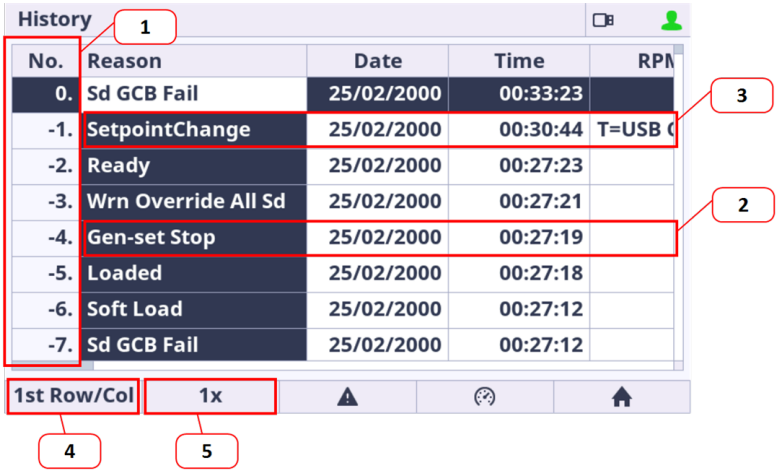


Image 5.37 : History page overview

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

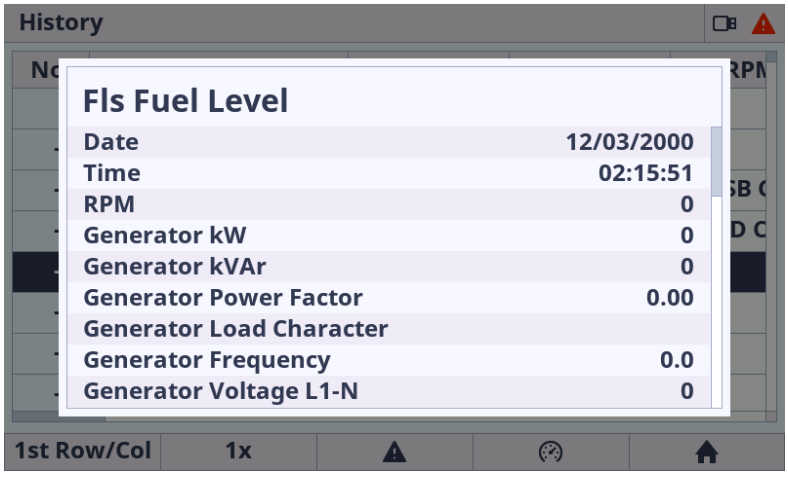


Image 5.38 : History page – Item detail dialog

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

IMPORTANT: Each controller unit supports the specific number of history records. E.g. controller InteliGen500 G2 supports 500 history records (750 in the Extended features version). Default configuration consists of 33 columns. Maximal column amount is approximately 100 columns based on the type of the observed value.

5.3.6 Trends

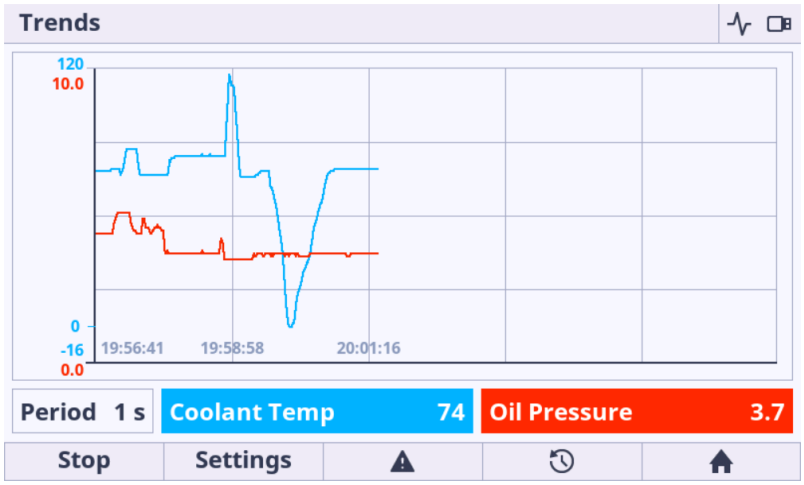


Image 5.39 : Trends page overview

The Trends page is divided on to 3 main blocks :

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

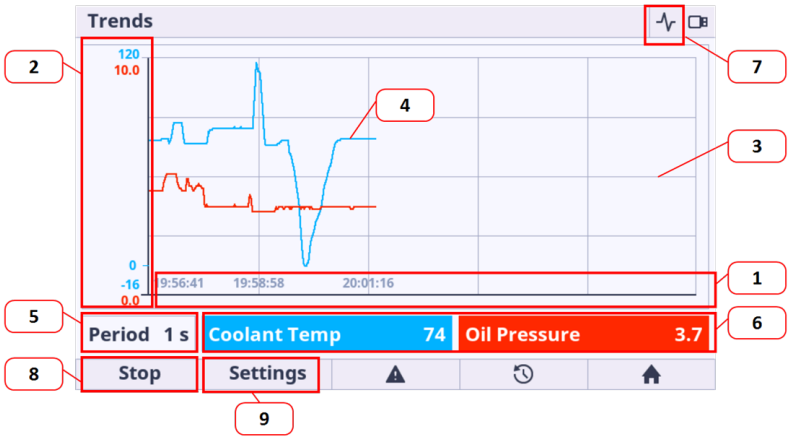


Image 5.40 : Trends page description

1. **X axis** – X axis displays the time stamps. The view of X axis is fully automatic.
2. **Y axis** – If the default range is not suitable for the displaying of the value it can be adjusted in settings option. See bellow for more information.
3. **Grid** – the grid is displayed behind the trends charts. The grid is fully automatic.
4. **Trend line** – each channel have different color for better value identification. The color of the trend line match to the Value color in channel panel.
5. **Actual period** – actual period settings. The period can be adjusted in settings option.

6. **Actual channel value panels** – display the values of the newest (actual) sample.
7. **Trend Icon** (Top Status bar) – if the trends are running the informative icon is shown in the top status bar
8. **Start / Stop button** – the button is dedicated for manual start and stop of the trends. It is possible to setup the automatic start of trending based on the trigger. There are 2 trigers : Return to Home metering screen and the specified bit of the available binary value.
9. **Channel settings button** – There are some settings available for the trends. See more information bellow.

Trends settings

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



Image 5.41 : Trends page settings overview

1. **Channel value** – the channel value menu appears if the enter button is pressed just on the position. Inside the channel value menu the requested channel value can be selected. The value availability depends on the type of configuration stored in the controller.
2. **Low limit value** – the low limit value is intended for changing the low border of the value range. For the best view of the displayed trends it is highly recommended to set this limit to the minimum expected value with some reserve.
3. **High limit value** – the high limit value is intended for changing the high border of the value range. For the best view of the displayed trends it is highly recommended to set this limit to the maximum expected value with some reserve.
4. **Quick channel removal** – pressing the enter button on the trash bin icon the actual channel is not configured.
5. **Period** – section is dedicated for setting of the sample time period.
6. **Run** – the section is intended for the selection of the run mode
    a. once – trending only until the trend chart window is full
    b. circular – cyclic mode (trending is repeated continuously) – be aware the samples are stored only in internal temporal memory, the trend chart starts moving when the trend chart window is full, the oldest samples are trashed out
7. **Start option** – The start of trends are triggered by the start option. There are 3 start options.
    a. Binary state - the trigger is the bit of the selected binary value. Manual start and stop is still active.
    b. Manual (by default) – the trigger is the start button called by user.
    c. Home – the trigger is the return to the Home metering screen from any GUI position. Manual start and stop is still active.

8. **Bit of binary value selection** – If the start option is set to Binary state then the field for the bit of the concrete binary value is activated.
9. **Acknowledgment button** – Pressing the user button 1 (Confirm) the settings are saved.
10. **Cancel button** – Pressing the user button 2 (Cancel) the settings are canceled and the main trends page is displayed without any change of the trends configuration.

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

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

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

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

5.3.7 Values

The values page is intended to monitor the controller values. Each type of controller has specific set of values. Values screen is visually similar to setpoins screen.

To list across the values the navigation, enter and menu buttons is used.

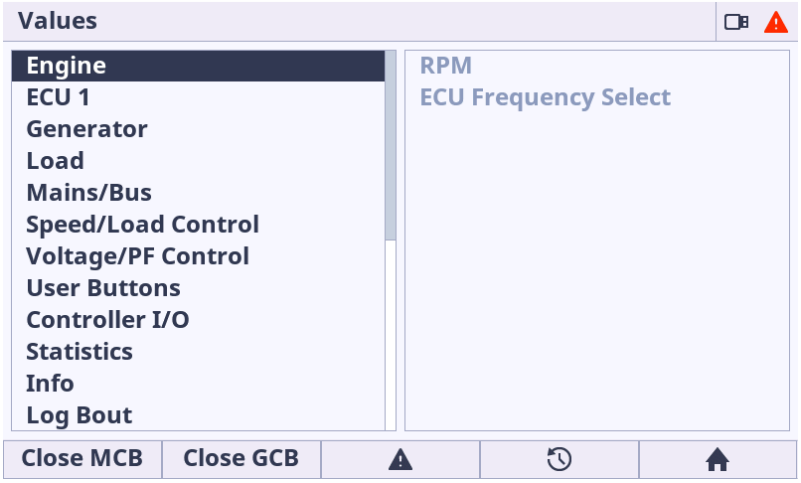


Image 5.42 : Values screen overview

5.3.8 Administration

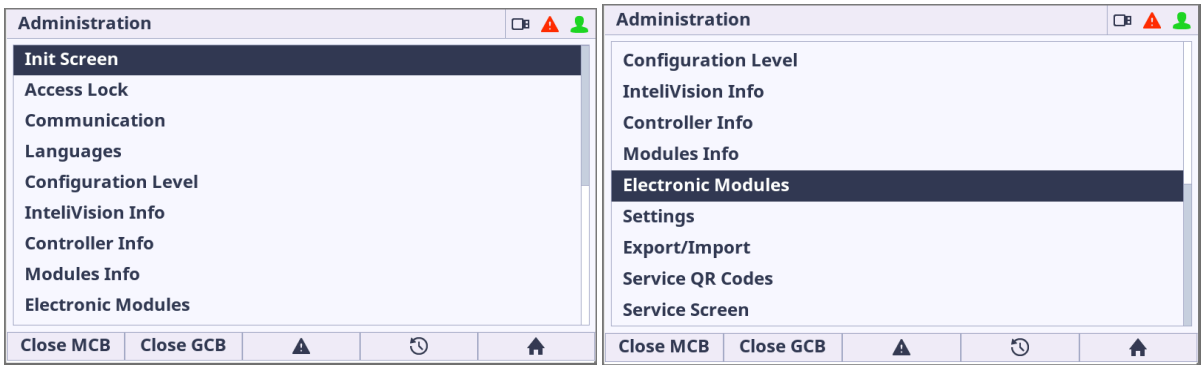


Image 5.43 : Administration Screen Overview

Init screen

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



Image 5.44 : Init screen overview

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

Controller Info

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

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

- Integrated Color Display unit
- Controller unit
- Configuration

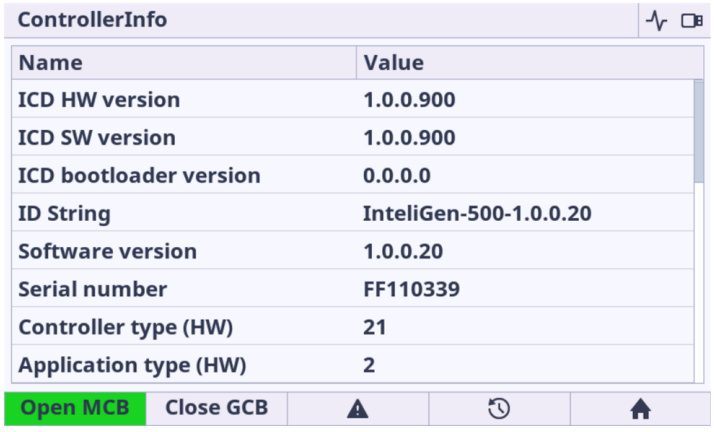


Image 5.45 : Administration Page – Controller Info

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

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

Modules Info

Modules Info screen is dedicated for important information about the connected CAN and Plug-In modules information. The page Modules Info displays the information from the following type of connected modules :

- Plug-In modules
- CAN peripheral extension modules



Image 5.46 : Administration Page - Modules Info

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

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

Electronic Devices

Electronic Devices screen is dedicated for important information about the connected ECU.

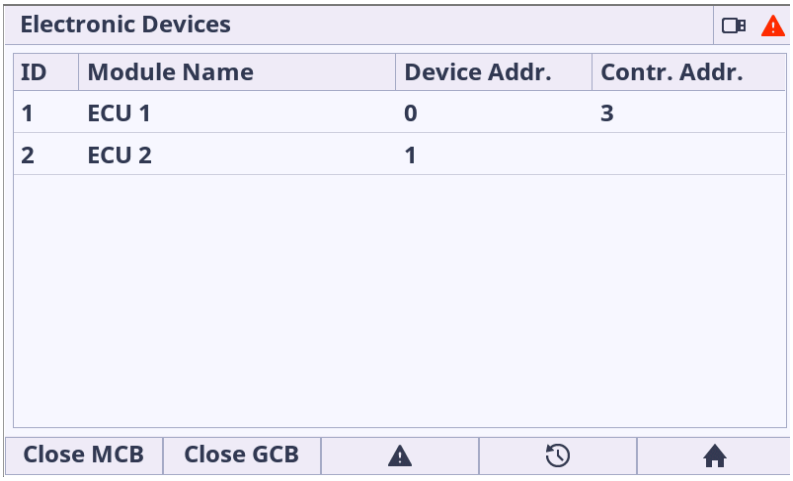


Image 5.47 : Administration Page – Electronic Devices

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

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

Settings

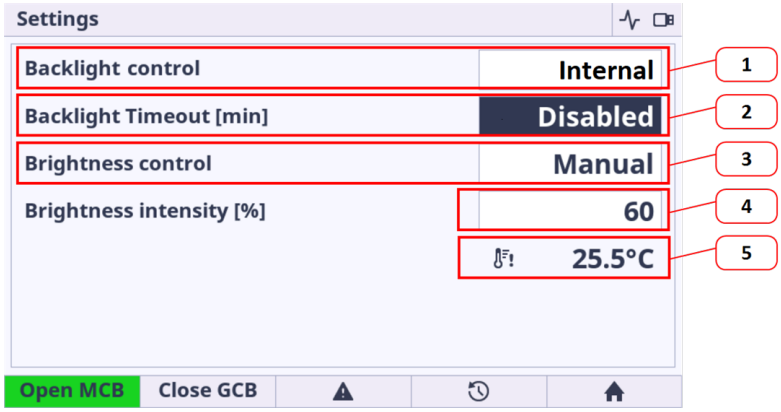


Image 5.48 : Administration Page – Settings

1. **Backlight Control** – can be controlled using Internal settings or external signal over LBI Dark Mode
   a. Internal – Backlight timeout and backlight intensity is respected from the manual settings
   b. LBI Dark Mode – if controller LBI Dark Mode is activated then the Status LED and LCD backlight is completely diabled. Be aware that the application and controller is still running. Keyboard is still in functional state. The Backlight Timeout is still respected in this option.
2. **Backlight Timeout** – if the cell area is pressed the dialog for time settings is displayed. The user is able to set the period from 1 up to 241 minutes. There is also the option to set NO Timeout which means the display unit is backlighted forever. Note that in remote displays like IntelIVision 5.2 the Backlight Timeout option is not mirrored with controller setpoint Backlight Timeout (it is mirrored in Integrated Color Display).
3. **Brightness Control**:
   a. Manual (by default) – the value of the backlight is set manually using the value dialog (point 3)
   b. External–- the value of the backlight is given by the Analog Input settings in InteliConfig and connected value of resistor, voltage or current (based on the type of the selected sensor).
4. **Brightness intensity** – the value is selected using the value dialog. Note the value is applied immediately during the change of the value.
5. **Internal Temperature information** – gives the actual inside temperature of the unit. There is implemented automatic mechanism for lowering the backlight intensity based the internal derating backlight curve. If the inside temperature exceeds 35 °C the area behind the temperature lights yellow. The yellow color indicates that the display backlight curve is applied and automatically starts derate the backlight intensity. The backlight intensity returns to normal when the temperature is decreased bellow 35 °C. This feature saves the lifetime of the internal components.

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

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

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

Languages



Image 5.49 : Administration Page – Languages

- **Language settings** – the list of languages stored in the controller configuration is displayed in the list of possible languages.
- The integrated color display unit supports the following languages
  - English
  - Chinese
  - Japanese
- The integrated color display unit **partially** supports the following languages
  - Bulgarian, Taiwan, Czech, German, Greek, Spanish, Finnish, French, Hungarian, Icelandic, Italian, Korean, Dutch – Netherlands, Norwegian, Polish, Roman, Russian, Croatian, Slovak, Swedish, Turkish, Ukrainian, Slovenian, Estonian, Latvian, Lithunian, Vietnamese, Italian, Portuguese, Bosnian
- The integrated color display unit supports the following Unicode standard character sets
  - Basic Latin, Latin-1 Supplement, Latin Extended-A, Latin Extended-B, Latin Extended Additional, Cyrillic, Greek, Greek Extended, Arabic, Arabic Supplement, General Punctuation, Superscripts and Subscripts, Currency Symbols, Arrows, CJK Unified Ideographs, Kanji, Hiragana, Katakana, Hangul Jamo, Thai

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

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

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

Configuration Level



Image 5.50 : Administration Page – Configuration Level

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

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

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

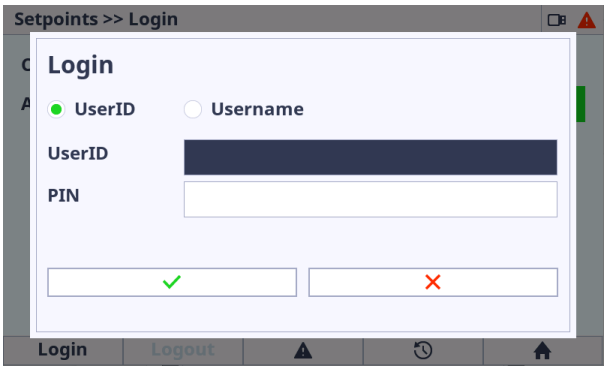
Export / Import



Image 5.51 : Administration Page – Export & Import

- **Import Package** – is dedicated for integrated color display unit firmware updated, controller firmware update, controller archive update. Extension modules firmware update is not supported.
  - If the USB stick is not connected the import function is not available and visually indicated as a greyed text.

- File packages used for firmware import can be prepared only in InteliConfig PC application **only**.
- The files (*.pcg3) prepared in InteliConfig (for import) must be stored in the root of USB stick folder – the only root folder is supported for import.
- Import function is always protected by Administrator password. Until the correct credentials are not inserted the import function is unavailable. Be aware that there is implemented algorithm to have password protected against the brute force attempts. It is possible to insert credentials using UserID and PIN or Username and Password.



- The message dialog (Controller unit is not ready) is displayed if the controller is not in state ready for programming (e.g. Gen-set running)

Export Archive – is dedicated for the entire archive export.

- If the USB stick is not connected the export function is not available and visually indicated as a greyed text.
- The archive files (*.aig4) is exported to the fixed directory in the USB stick (root:/IG500/Archive. The directory structure is automatically created if does not exist.
- Export function is not protected by password.
- The message dialog (Controller unit is not ready) is displayed if the controller is not in state ready for archive export (e.g. Gen-set running)
- Waiting dialog is displayed during the export proccess.
- The message dialog is displayed after archive proccess.
  - Archive Export Successful if successfully exported.
  - Archive Export Failed if any error occurs during the export proccess.
- Integrated color display unit is restarted after export proccess.

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

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

Imported File selection

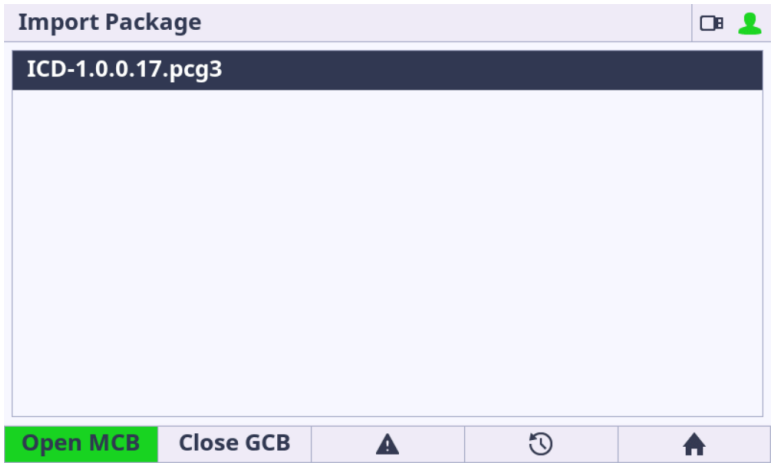


Image 5.52 : Administration Page – Export & Import - File selection

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

Import proccess

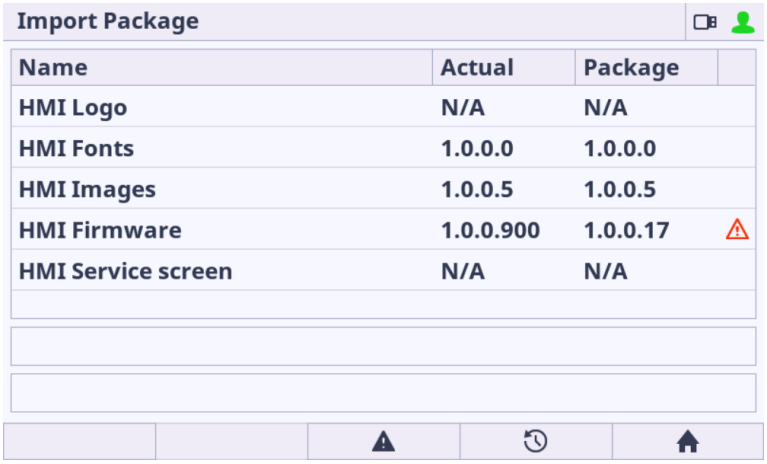


Image 5.53 : Administration Page – Export & Import – Import process

- **Import process** – is available if the correct and compatible file is selected conditions above (in section Import Package) is fulfilled
  - The import process is not allowed if at least one file in the package is not compatible with each other – the Import button is not displayed.
  - When the Import process is started it is not possible to interrupt it.
  - Bar Message is displayed
    - Package Import Successful (green colored) – if success
    - Package Import Failed (red colored) – if any error during the process

- the user is informed about the actual item progress
  - ✓ – the file has been imported correctly
  - ••• – the file import is under progress
  - ⚠ – the file is incompatible
- The device is rebooted after import process.

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

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

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

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

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

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

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

Service QR Codes

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

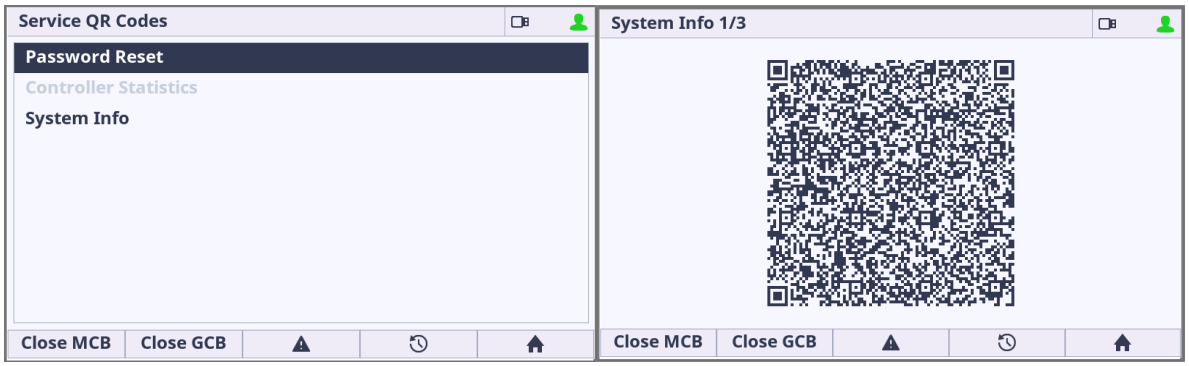


Image 5.54 : Administration Page – Service QR Codes

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

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

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

Service screen

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



Image 5.55 : Service screen overview

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

5.3.9 Quick help

Logging in/off to the Controller

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

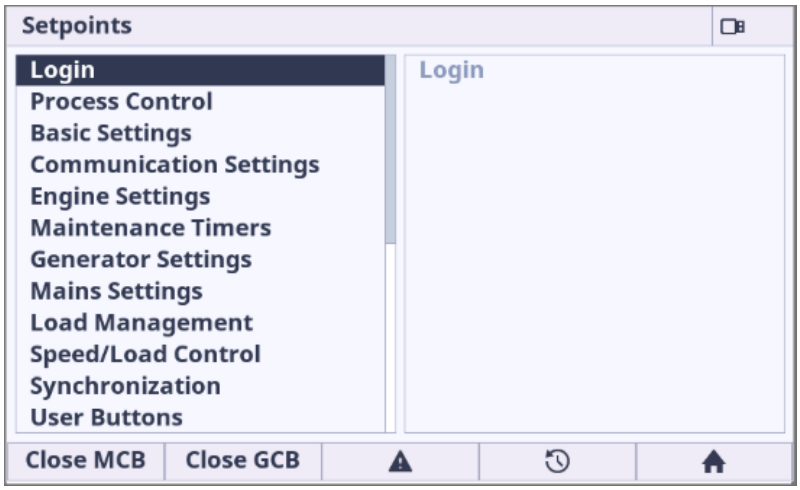


Image 5.56 : Main Setpoints Page

Password item – the item dedicated for the login and logout to the controller.

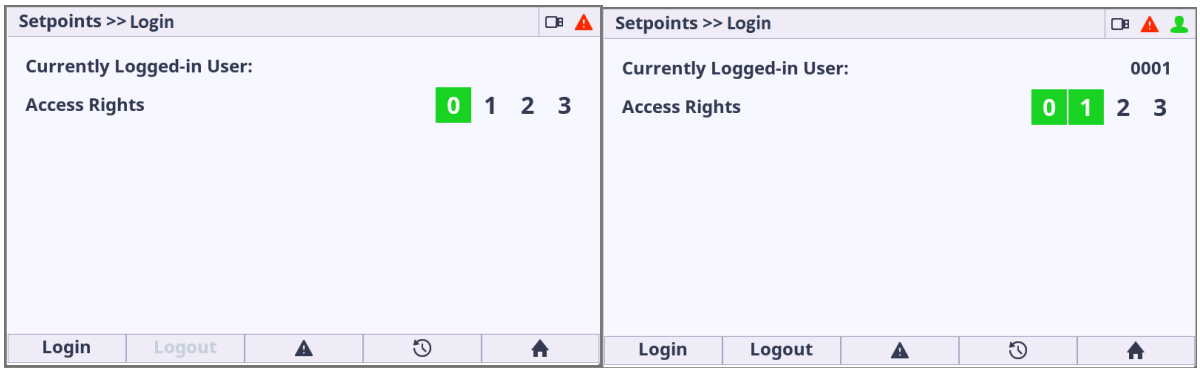


Image 5.57 : Setpoints Password Page

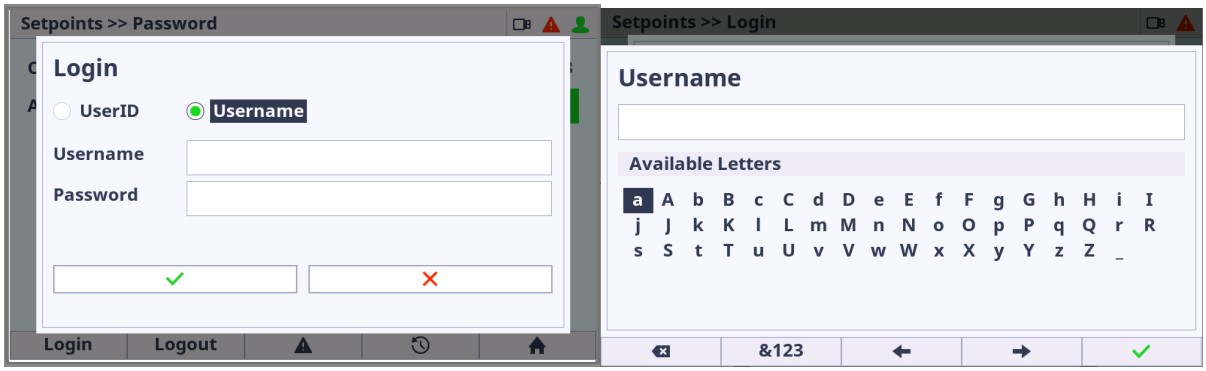


Image 5.58 : Login Dialog

Currently Logged-in User – the information about actually logged in user or his ID if loged using ID and PIN.

Access Rights – Access rights of the actually logged in user

- 0 – user has access rights 0, which means "logged-out" user
- 0,1 – user has access rights 0 + 1 access rights
- 0,1,2 – user has access rights 0 + 1 + 2 access rights
- 0,1,2,3 – user has access rights 0 + 1 + 2 + 3, which means administrator rights

Login and Logout buttons

- Login button calls the login dialog.
- Logout button performs the logout action.

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

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

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

Important values

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

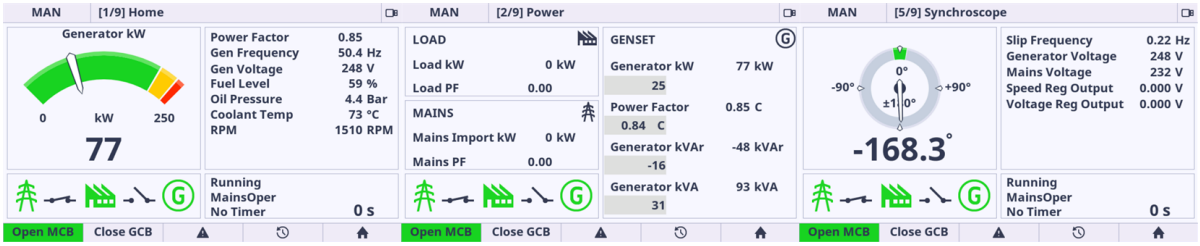


Image 5.59 : Important values

Note: *The adjustment of the important values can be made using powerfull tool Screen Editor (in InteliConfig).*

Gen-set mode change



Image 5.60 : Gen-set mode change

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

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

Password change

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

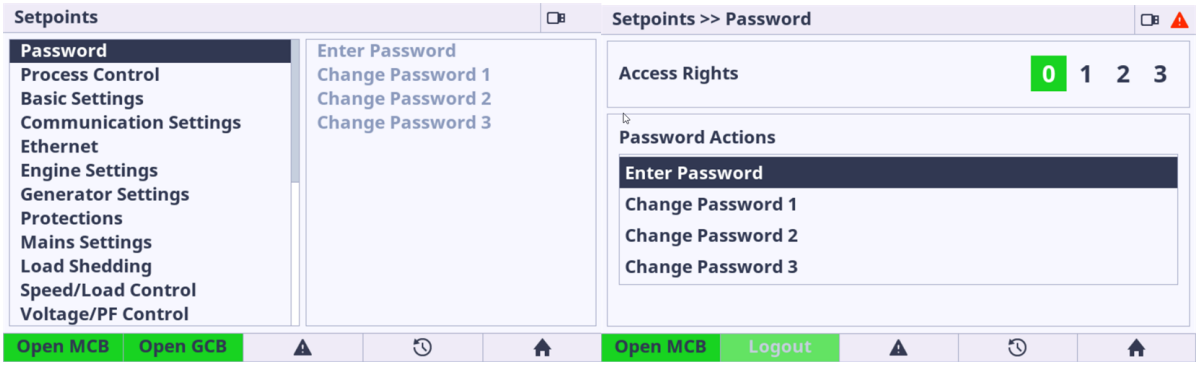


Image 5.61 : Password menu

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

Display brightness settings

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



Image 5.62 : Display brightness settings

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

Brightness control

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

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

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

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

State messages

State message	Description
Running	Indication of correctly running controller.
Initialize control unit	Controller unit initialization is under progress. The message is displayed during the booting procedure.
Control unit is programmed	The controller upgrade process is under progress.
Configuration Reading	Controller configuration reading is in progress. Text disappears when controller is detected.
Detecting main CU failed	Internal communication error.
Unsupported configuration format	Configuration version is not supported
Unsupported screen format	Screens template has unsupported screen format. Screens template is missing in configuration.
Control unit firmware is corrupted	Controller unit is not in valid state.
Wrong configuration content	Content of the configuration in controller unit does not match to configuration.

Hints

UI Position	Issue	Hint / Description
StartUp Screen	Detecting main CU failed	1. Download the latest FW from the ComAp webpage. 2. Import or reimport the newest ICD firmware.
StartUp Screen	Not compatible application branch in CU	1. Download the latest FW from the ComAp webpage. 2. Import or reimport the newest ICD firmware.
StartUp Screen	Firmware is corrupted	1. Import or reimport the newest ICD firmware.
StartUp Screen	Unsupported configuration format	1. Import the newest ICD firmware. 2. Upgrade the controller firmware to the newest version.
StartUp Screen	Unsupported screen format	1. Import the newest ICD firmware. 2. Upgrade the controller firmware to the newest version. 3. Check if there is at least one language in configuration using InteliConfig.
StartUp Screen	Wrong configuration content	1. Check the controller configuration using InteliConfig Tool. 2. Try to rewrite the controller configuration.
StartUp Screen	Controller unreachable	1. Check if the expected controller is online
StartUp Screen	Controller identification timeout	1. Double check the wiring. 2. Double check all the communication parameters. 3. Double check the missing or wrong Access Code in Communication settings screen.
StartUp Screen	Connecting / Connected (with InteliGen 500)	Connecting and connected state are marked red because at that moment the user is not logged in yet. Login procedure is automatic to InteliGen 500 controller on StartUp screen (user with access rights 0 is always loged in). Due to this fact the connecting and connected state are the transition states only on StartUp screen.
Metering Screens	Adjustment	The metering screens are adjustable using the Screen Editor (in InteliConfig). See chapter Screen Editor for more information. The Screen Editor tool also has its own manual.
Administration	Access to administration	Administration screens is accessible using the buttons combination Enter + Menu just only from the metering screens. Enter button has to be pressed first.
Init Screen Service Screen	Adjustment	Both screens are adjustable only in Integrated Color Display unit. The feature is not available in InteliVision 5.2 1.0.0.
Bottom Statusbar	Inactive Buttons	Inactive buttons are visually indicated as grayed button. It means that the button is not available for any reason (e.g. password protected button).
Alarmlist	Buttons Function	Alarm reset button confirms all the unconfirmed alarms stored in controller and resets the horn. Horn reset button resets only the horn.
Alarmlist	Automatic Jump	If the actual GUI position is Alarmlist page and there is at least one uncofirmed alarm in the Alarmlist the jump to the home metering screen and backlight timeout are ignored.

UI Position	Issue	Hint / Description
History	Number of Records in InteliGen 500	The number of records is different for each controller. E.g. InteliGen 500 supports 500 history records. Default configuration consists of 33 columns. Maximal column amount is approximately 100 columns based on the type of the observed value.
Trends	View	To get the best view of the displayed trends it is recommended to manually set the typical value range for each channel. If the channel is set the low and high limit values are automatically set based on the default value in configuration.
Trends	Communication Interruption	If the communication between display and controller is interrupted for any reason all the trends values are lost and the trending is automatically stopped. If the Trends settings option (Start option) is set to Home then the trending is automatically restarted in the moment the actual UI postiion becomes Home screen.
Export / Import Screen	Import proccess	If the import proccess fails try the import proccess again. Check if the import package is not corupted. Try to use another USB stick.

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back to Controller setup

5.4.1 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% **D+ Threshold (page 348)** of battery voltage. Connect this input to the D+ (L) terminal of the charging alternator and enable the D+ function by the setpoint **D+ Threshold (page 348)** D+ Treshold. If D+ terminal is not available, leave the input unconnected and disable the function.
- The pickup is not used and frequency is not detected on the pickup input. Connect the pickup input to the W terminal of the charging alternator if you do not use pickup and the W terminal is available. If not, leave the input unconnected.
- Oil pressure > **Starting Oil Pressure (page 335)** setpoint. The oil pressure is evaluated from the analog input or from the ECU if an ECU is configured.
- Binary input **OIL PRESSURE (PAGE 744)** is in logical 0.
- At least one phase of generator voltage is >25 % of nominal voltage.

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

5.4.2 After-treatment Support

Afer-treatment support generally provides monitoring and control of the after-treatment system installed on generators engine. The requirements are defined as:

- Providing After-Treatment status information by
  - Displaying universal lamps (icons)
  - Displaying analog and binary values
- Control of After-Treatment regeneration function by
  - Transmitting commands to the ECU

Providing After-treatment status information

After-Treatment screen

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



Image 5.63 Example of active After-treatment screen



Image 5.64 Example of inactive After-treatment screen

Universal lamps (icons)

Universal lamp icons are shown on the After-Treatment screen. Based on specific value read in specific frame with specific SPN, every lamp icon is either:

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

Lamp name	Active icon	Inactive icon	Alarm	LBO	LBI
ECU Yellow Lamp			Wrn ECU Yellow Lamp (page 874)	ECU Yellow Lamp (page 783)	ECU Yellow Lamp Blink (page 724) ECU Yellow Lamp Fast Blink (page 724) ECU Yellow Lamp Solid (page 724)
ECU Red Lamp			Wrn ECU Red Lamp (page 873)	ECU Red Lamp (page 782)	ECU Red Lamp Blink (page 722) ECU Red Lamp Fast Blink (page 723) ECU Red Lamp Solid (page 723)
ECU Wait To Start			Wrn ECU Wait To Start (page 874)	ECU Wait To Start (page 783)	ECU Wait To Start Blink (page 723) ECU Wait To Start Fast Blink (page 723) ECU Wait To Start Solid (page 723)
ATT DPF Lamp			Wrn ATT DPF Lamp (page 867)	ATT DPF Lamp (page 774)	ATT DPF Lamp Blink (page 715) ATT DPF Lamp Fast Blink (page 715) ATT DPF Lamp Solid (page 716)
ATT HEST Lamp			Wrn ATT HEST Lamp (page 868)	ATT HEST Lamp (page 774)	ATT HEST Lamp Blink (page 716) ATT HEST Lamp Fast Blink (page 716) ATT HEST Lamp Solid (page 716)

Lamp name	Active icon	Inactive icon	Alarm	LBO	LBI
ATT SCR Error Lamp			Wrn ATT SCR Error Lamp (page 869)	ATT SCR Error Lamp (page 775)	ATT SCR Error Lamp Blink (page 718) ATT SCR Error Lamp Fast Blink (page 718) ATT SCR Error Lamp Solid (page 718)
ATT DEF Level Lamp			Wrn ATT DEF Level Lamp (page 867)	ATT DEF Level Lamp (page 773)	ATT DEF Level Lamp Blink (page 715) ATT DEF Level Lamp Fast Blink (page 715) ATT DEF Level Lamp Solid (page 715)
ATT Inhibited Lamp			Wrn ATT Inhibited Lamp (page 868)	ATT Inhibited Lamp (page 774)	ATT Inhibited Lamp Blink (page 717) ATT Inhibited Lamp Fast Blink (page 717) ATT Inhibited Lamp Solid (page 717)

Note: *Lamps can by disabled during prestart phase. Checkbox: Ignore ECU lamps during prestart is located in InteliConfig -> Controller Configuration -> Modules -> ECU module -> Electronic control unit settings.*

Note: *Aftertreatment support can be disabled. Aftertreatment HMI Screen is hidden and alarms related to aftertreatment are not shown. Use the checkbox: Disable aftertreatment support located in InteliConfig -> Controller Configuration -> Modules -> ECU module -> Electronic control unit settings.*

Changing behavior of Aftertreatment lamps using PLC

The behavior of lamps can be changed using PLC logic. For this reason there is group of LBI introduced which directly controls each lamp state. These LBIs can be used for control of the lamps the way the user wants. PLC Decomposer block should be used in a case the signal from ECU is analog one.

Example:

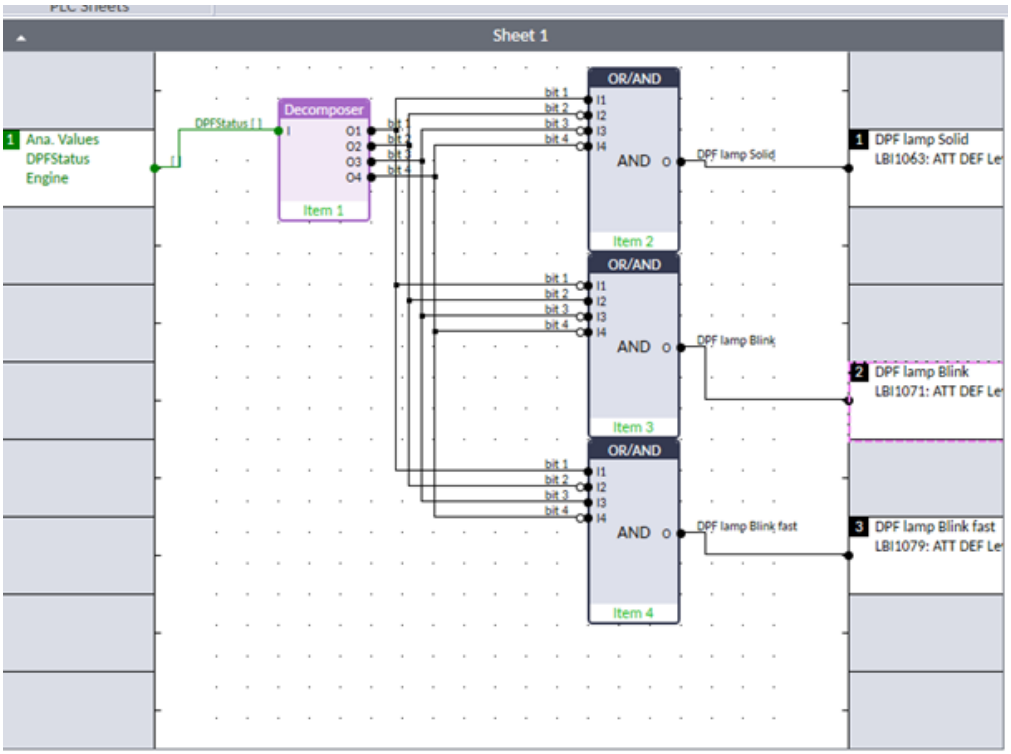


Image 5.65 The lamp state will be solid when signal is value 1, 2 = blink, 5 = blink fast

Control of After-Treatment regeneration function

Control of the non-mission regeneration is dependent on several conditions:

- Controller is in MAN mode
- State Running

When these conditions are met, user can either switch LBI **ATT INTERLOCK (PAGE 718)** which acts as acknowledgment for the ECU that everything is prepared for the DPF regeneration, after that user can start regeneration by closing LBI **ATT FORCE REGEN (PAGE 716)**. Some ECUs however do not include LBI **ATT INTERLOCK (PAGE 718)** and closing just LBI **ATT FORCE REGEN (PAGE 716)** is enough to start the regeneration process.

Some engines may require the regeneration to run on higher RPM than is normally expected. For this reason we recommend to adjust Overspeed Limit setpoint.

The exact process and conditions for each particular engine should be studied carefully from the engine documentation issued by the manufacturer.

User can also inhibit regeneration process by:

- **ATT INHIBIT REGEN (PAGE 717)**

By doing so, the process of regeneration will be postponed until user switches the LBI back to open position. The Regeneration Inhibit lamp should be usually on solid when the LBI is closed. If the LBI is closed during regeneration, the process stops and it will have to start over if the ECU allows it.

5.4.3 AMF operation

The "AMF function" represents the automatic start in the event that the mains have failed, and a stop after the mains have been restored. The automatic start can be enabled or disabled by binary inputs **AMF START BLOCK (PAGE 714)** or **MAINS FAIL BLOCK (PAGE 739)**.

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

Mains failure detection

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

- The mains voltage is out of the limits given by the setpoints **Mains Undervoltage (page 397)** and **Mains Overvoltage (page 394)** for a time period longer than **Mains Undervoltage Delay (page 397)** or **Mains Overvoltage Delay (page 395)**.
- The mains voltage unbalance is out of limit given by setpoint **Mains Voltage Unbalance (page 399)** for a time period longer than **Mains Voltage Unbalance Delay (page 399)**.
- The mains frequency is out of the limits given by the setpoints **Mains Underfrequency (page 401)** and **Mains Overfrequency (page 399)** for a time period longer than **Mains < > Frequency Delay (page 403)**.
- The MCB close command was not successful and the alarm **Wrn MCB Fail (page 888)** was not reset.
- Phase rotation is incorrect.

Healthy mains detection

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

- The mains voltage is within the limits given by the setpoints **Mains Undervoltage (page 397)** and **Mains Overvoltage (page 394)**.
- The mains voltage unbalance is within the limits given by the setpoint **Mains Voltage Unbalance (page 399)**.
- The mains frequency is within the limits given by the setpoints **Mains Underfrequency (page 401)** and **Mains Overfrequency (page 399)**.
- The alarm **Wrn MCB Fail (page 888)** is not active (if the **MCB FEEDBACK (PAGE 741)** matches the expected position given by the **MCB CLOSE/OPEN (PAGE 803)**). This condition is not required if MCB is open (**MCB FEEDBACK (PAGE 741)** 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 405)** is set to Mains Failure, the MCB is opened
- The timer for automatic start of the Gen-set **Emergency Start Delay (page 393)** 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 714)** or **MAINS FAIL BLOCK (PAGE 739)**.*

- If the setpoint **MCB Opens On (page 405)** is set to Gen Run, the MCB is opened once the generator voltage is within limits (after **Minimal Stabilization Time (page 339)** 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 443)** elapses, the GCB is closed and the Gen-set begins to supply the load.
- After the mains is restored to normal, the timer **Mains Return Delay (page 393)** begins to count down.

› Maximum time between closing of MCB and opening GCB is given by the setpoint **Open Transfer Min Break (page 443)**. After GCB is opened, the Gen-set cools down and stops.

IMPORTANT: Controller has this behavior only in AUTO mode!

5.4.4 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 829)	AIN Switch01 On (page 478) AIN Switch01 Off (page 479)	AIN SWITCH01 (PAGE 763)
AIN SWITCH 02 (PAGE 829)	AIN Switch02 On (page 480) AIN Switch02 Off (page 481)	AIN SWITCH02 (PAGE 763)
AIN SWITCH 03 (PAGE 829)	AIN Switch03 On (page 482) AIN Switch03 Off (page 483)	AIN SWITCH03 (PAGE 764)
AIN SWITCH 04 (PAGE 830)	AIN Switch04 On (page 484) AIN Switch04 Off (page 485)	AIN SWITCH04 (PAGE 764)
AIN SWITCH 05 (PAGE 830)	AIN Switch05 On (page 486) AIN Switch05 Off (page 487)	AIN SWITCH05 (PAGE 765)
AIN SWITCH 06 (PAGE 830)	AIN Switch06 On (page 488) AIN Switch06 Off (page 489)	AIN SWITCH06 (PAGE 765)
AIN SWITCH 07 (PAGE 831)	AIN Switch07 On (page 490) AIN Switch07 Off (page 491)	AIN SWITCH07 (PAGE 766)
AIN SWITCH 08 (PAGE 831)	AIN Switch08 On (page 492) AIN Switch08 Off (page 493)	AIN SWITCH08 (PAGE 766)
AIN SWITCH 09 (PAGE 831)	AIN Switch09 On (page 494) AIN Switch09 Off (page 495)	AIN SWITCH09 (PAGE 767)
AIN SWITCH 10 (PAGE 832)	AIN Switch10 On (page 496) AIN Switch10 Off (page 497)	AIN SWITCH10 (PAGE 767)

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

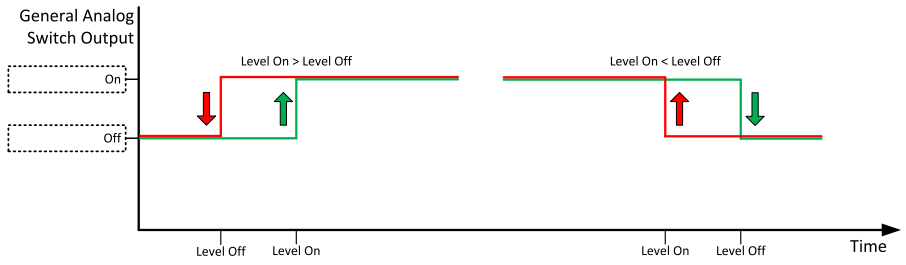


Image 5.66 Principle of analog switch

5.4.5 Breaker control

The following power switches are controlled by the controller:

- The generator circuit breaker or contactor – GCB
- The Mains circuit breaker or contactor – MCB

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

- The control outputs must be configured and wiring of the power switches must be provided in such a way, that the controller has full control over the breakers – i.e. the controller can open and close the breaker at any time.
- The breaker must respond within maximal delay adjusted by setpoint **Waiting For Breaker Feedback (page 309)** to a close and open command. Special attention should be paid to opening of motorized circuit breakers, as it could take more time on some types. In such cases it is necessary to use an undervoltage coil for fast opening.
- After opening the breaker, there is an internal delay before closing the breaker. Delay **Waiting For Breaker Feedback (page 309)** for activation of OFF coil and 1 second for UV coil. After this delay, breaker can be closed again. There is no delay when opening a breaker.
- Number of closing attempts of breaker is adjusted by setpoint **Attempts To Close Breaker (page 309)** and delay between these attempts is adjusted by setpoint **Delay Between Closing Attempts (page 309)**.

Breaker control outputs

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

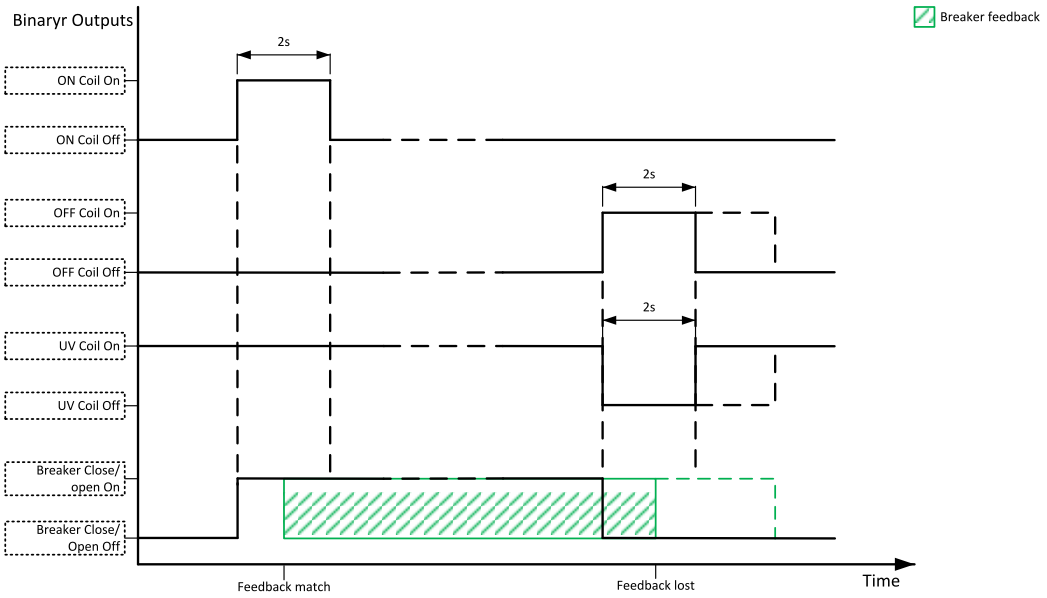


Image 5.67 Breaker control outputs

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 803)** is activated. This behavior is called "negative logic" and can be adjusted by the setpoint **MCB Logic (page 403)**. The negative logic will prevent accidental opening of the MCB when the controller is switched off.
- If a contactor is used on the MCB position, it will open itself immediately after the mains have failed, because it will lose power to the coil. That is why the following adjustment is necessary to prevent triggering the **Wrn MCB Fail (page 888)** alarm: **MCB Opens On (page 405)** = Mains Fail, **Mains Undervoltage Delay (page 397)** ≤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 405)** = Gen Run will prevent triggering the **Wrn MCB Fail (page 888)** alarm.

Breaker failure detection

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

> **IMPORTANT: Breaker feedback is required all the time.**

There are three different time delays for breaker failure detection – see following diagrams. Also there are 3 different types of alarm messages - alarm for fail to open, alarm for fail to close and common alarm breaker fail.

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

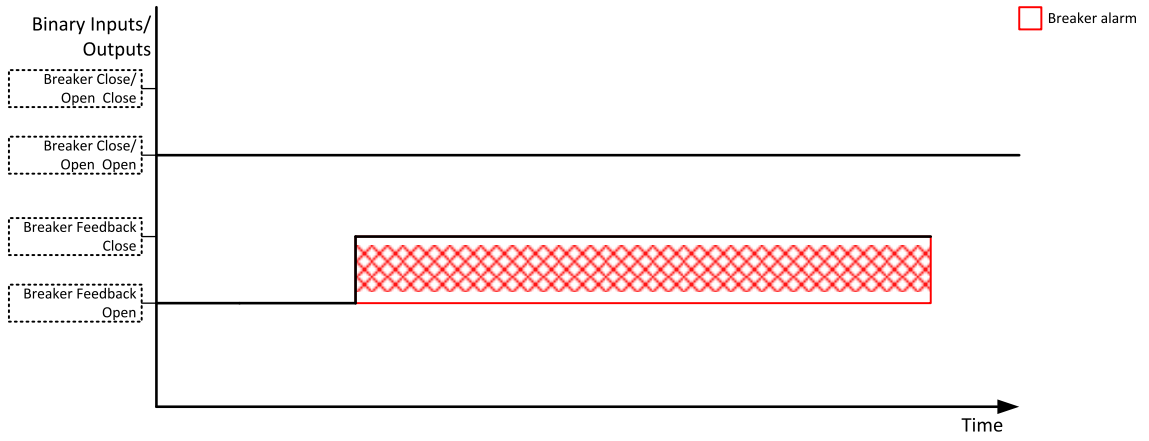


Image 5.68 Breaker failure – breaker close/open in steady position – open

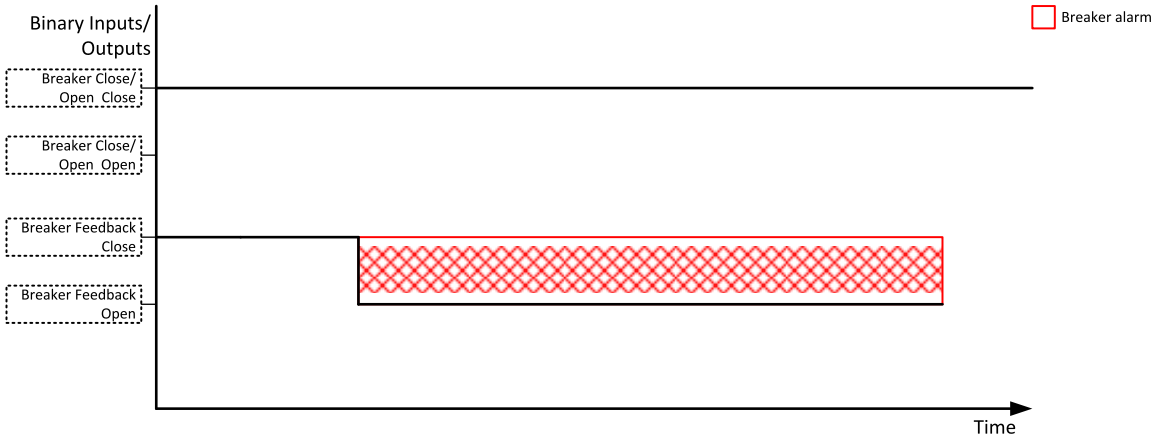


Image 5.69 Breaker failure – breaker close/open in steady position – close

When binary output breaker close/open opens there is **Waiting For Breaker Feedback (page 309)** delay for breaker failure detection.

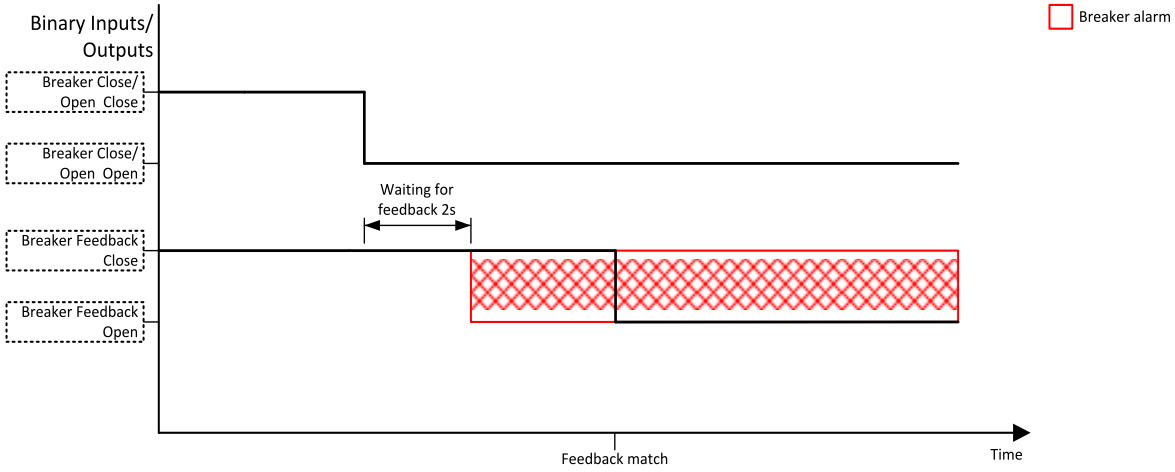


Image 5.70 Breaker failure – breaker close/open opens

When binary output breaker close/open closes there is **Waiting For Breaker Feedback (page 309)** delay for breaker failure detection.

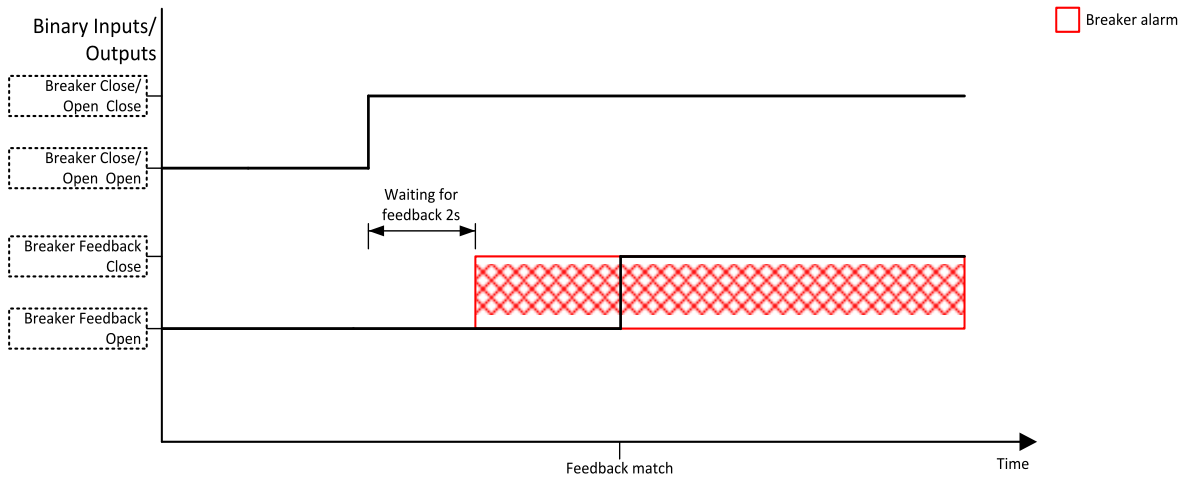


Image 5.71 Breaker failure – breaker close/open closes

5.4.6 Configuration Override

There may appear a situation, when controller reprogramming is not possible for some reason. The typical example is a situation, when the controller is configured to be always in Remote AUT mode. So, the controller cannot be switched to OFF mode to change the configuration. To enable controller configuration change in these cases, the InteliGen 500 G2 is offering a DIP switch located under the front cover of the controller. If the switch is enabled the controller configuration is forced to the invalid state so it is possible to upgrade the controller's FW or import new configuration. The older controllers are using the boot jumper to do the same thing and it is called "Boot Jumper Programming" or "Unsuccessful Controller Programming".

Process of configuration overriding

- Enable the DIP switch
- Restart the controller
- Connect to the controller via InteliConfig
- Log-in as administrator user
- Go to the Control and Import new configuration (button Configuration Import)
- Disable the DIP switch
- Restart the controller

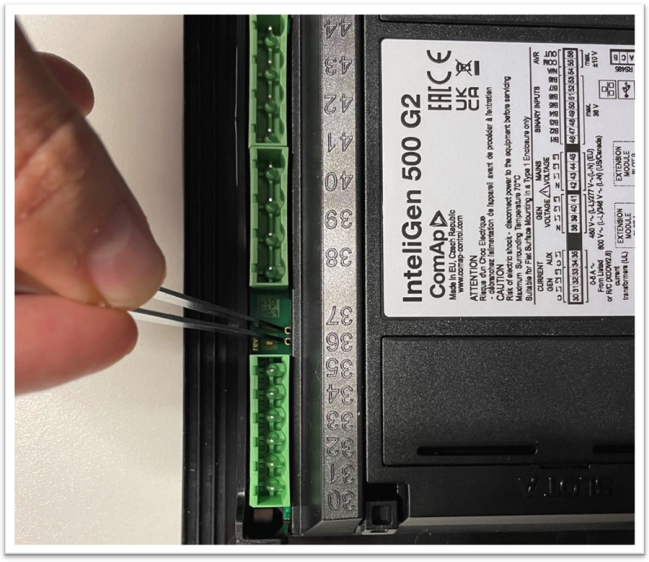


Image 5.72 Location of the DIP switch for Configuration override

5.4.7 Connecting to load

When the **Stabilization (page 227)** 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 339)** 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 448)*** *and* ***Speed Governor Bias (page 437)*** *setpoints.*

There are two ways to connect the gen-set to the load (bus bar). This depends on the state of **MCB FEEDBACK (PAGE 741)** and on the measured mains/bus voltage.

Connecting to dead bus

SPtM

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

MINT

The measured bus voltage is also taken in account – it must be below 2 % of the nominal bus voltage and with the open MCB (evaluated by **MCB FEEDBACK (PAGE 741)**) and also others GCB have to be open to close the GCB without synchronization.

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

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

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

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

Synchronization

Synchronization process

Behavior of synchronization process depends on, which breaker is used for synchronization and in which **Controller Mode (page 322)** is controller switched.

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

Synchronization via GCB in AUTO mode

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

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

IMPORTANT: GCB cannot be closed if Generator protections are DISABLED

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.

IMPORTANT: GCB cannot be closed if Generator protections are DISABLED

Synchronization via MCB in AUTO mode

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

- if the mains 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 393)**.
- 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 FailWrn Synchronisation Fail (page 896)** 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 453)**.

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 454)**. If the synchronization is not successful within this period of time, the **Stp Synchronisation Fail (page 942)** alarm will be issued.

Voltage matching

The Gen-set bus voltage is regulated to match the mains/bus voltage with tolerance given by the setpoint **Voltage Window (page 454)**. The regulation is adjusted by the setpoints **Voltage Gain (page 450)** and **Voltage Int (page 450)**.

Frequency / angle matching

The Gen-set bus frequency is regulated to match the mains/bus frequency first. The frequency regulation loop is active (setpoints **Frequency Gain (page 440)** and **Frequency Int (page 440)**). Once the frequency is matched, the regulation loop is switched to match the angle (setpoint **Angle Gain (page 441)**). When the angle is matched with tolerance ± **Phase Window (page 455)** for a time given by the setpoint **Dwell Time (page 455)** 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 735)** 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 454)**. 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 455)** value and the window is set by setpoint **Slip Frequency Window (page 456)**. 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 455)** the controller will allow GCB closing. The controller calculates periodically so called preclosing angle (based on the actual value **Slip Frequency (page 455)** 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).

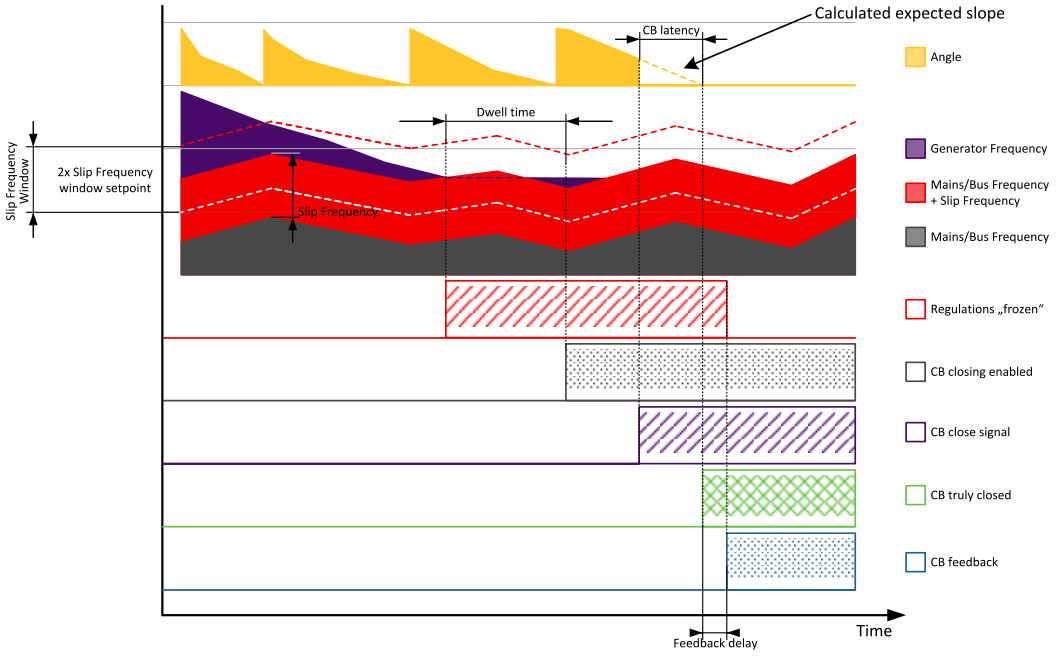


Image 5.73 Slip synchronization

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 456)** 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 455)** 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.

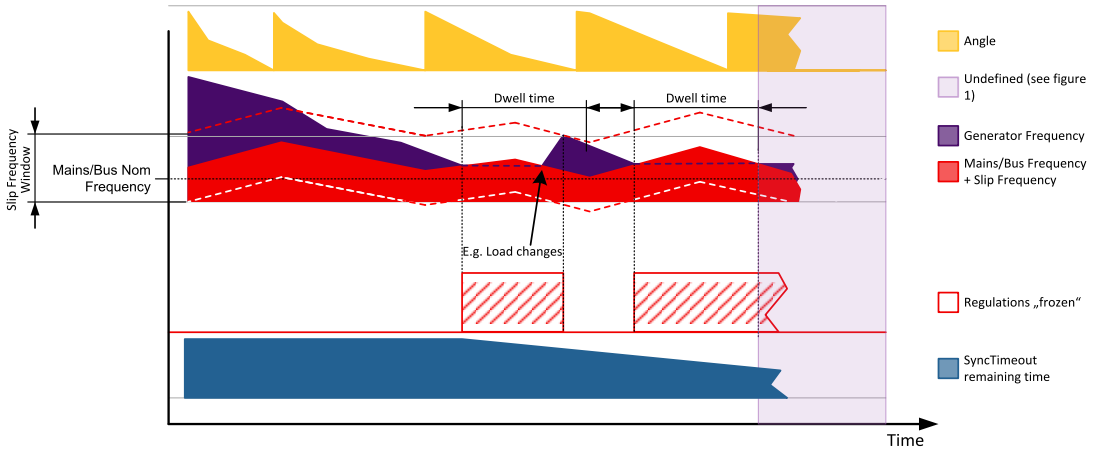


Image 5.74 Slip synchronization

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 455)** is set to 0.1 Hz and setpoint **Slip Frequency Window (page 456)** is set to 0.5 Hz).

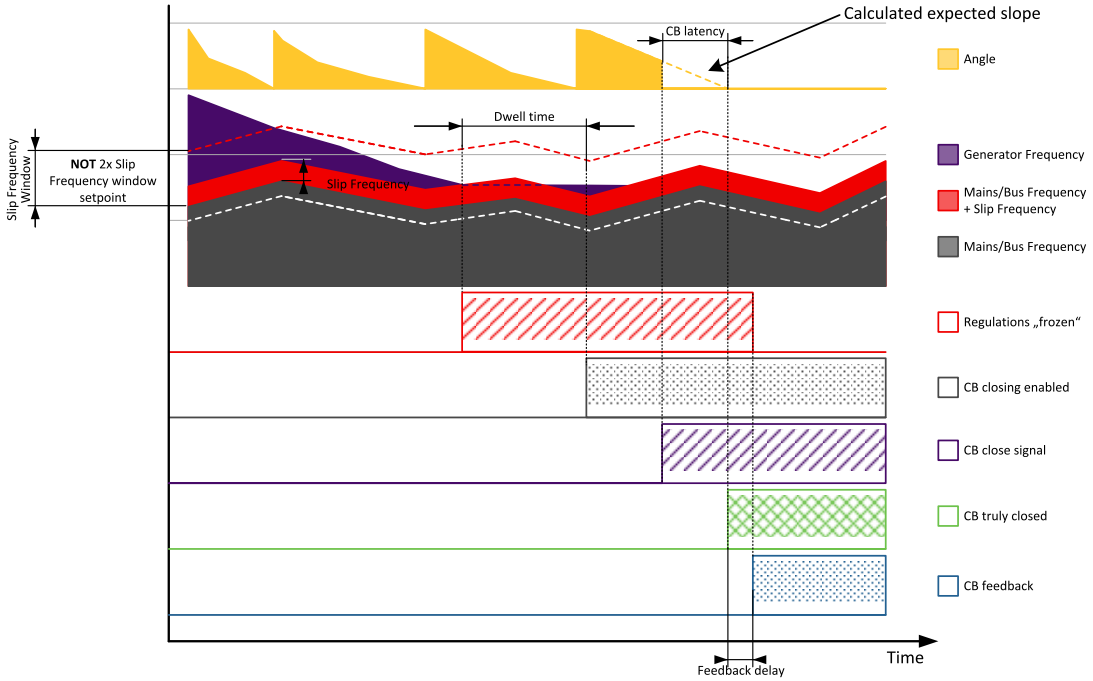


Image 5.75 Slip synchronization

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.

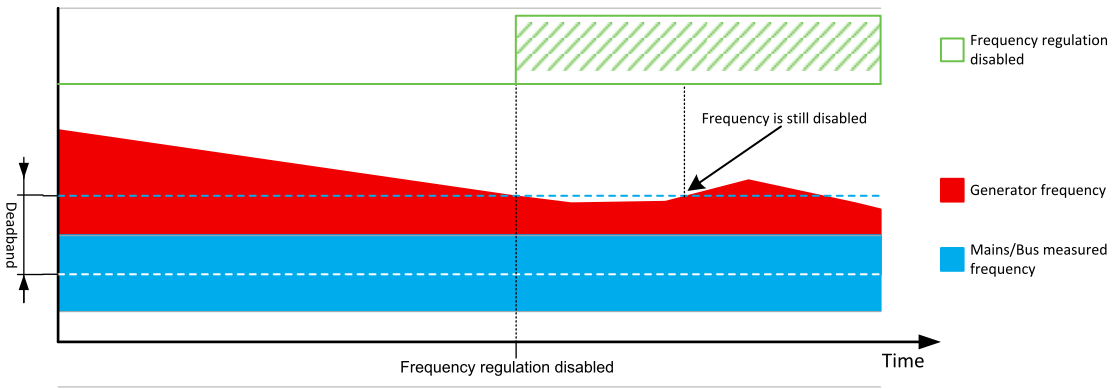
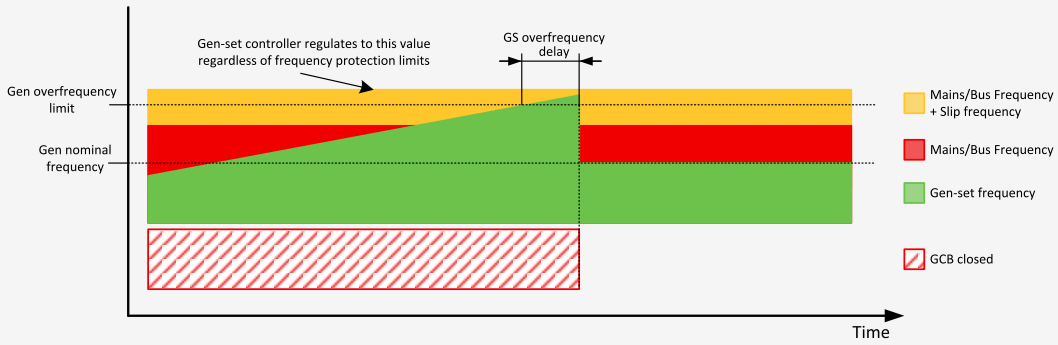


Image 5.76 Slip synchonization – deadband

Note: *Due to the nature of this function it is possible that in limit cases the Gen-set controller will regulate the generator frequency outside of protection limits. Example: Mains/Bus frequency is high but within its protection limits (e.g. 50.9 Hz, limit is 51 Hz).* ***Slip Frequency (page 455)*** *is set to 0.5 Hz. This will cause regulation loop of the gen-set controller to push the gen-set frequency to 51.4 Hz and eventually the controller will issue overfrequency delay. It is recommended to set the setpoint* ***Slip Frequency (page 455)*** *as low as possible that still enables successful synchronization. This minimizes the risk of this problem happening. Furthermore when slip synchronization is used it is recommended to set Mains/Bus Frequency protection limits to more rigid values than the generator frequency protection limits. In this case the setpoint* ***Slip Frequency (page 455)*** *can be set to 0.1 Hz and the Mains/Bus Frequency overfrequency protection limit is set to 50.9 Hz instead of 51 Hz. This will ensure that problematic state cannot be reached.*



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

- The two groups which are connected together by the BTB, are defined with parameters **Group Link L (page 435)** and **Group Link R (page 436)**.
- Controller sends via CAN2 bus information that controllers from groups *Group Link L* and *Group Link R* are linked together, if the *Group link* function (signal associated with the function) is active. It sends information that the groups are separated, if the *Group link* function is not active.

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

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

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

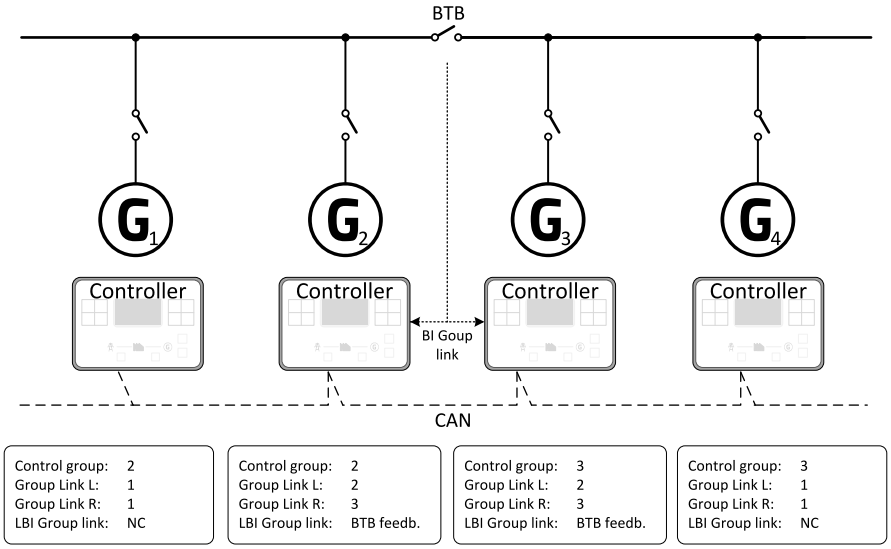


Image 5.77 Example of control groups

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

5.4.9 Controller Redundancy*

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

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

Redundant systems using CAN bus*

This system uses the CAN bus for detection whether the main controller is operational or not. If the redundant controller has not received two consequent messages from the main one (~100 ms) it will take over the system control – it activates the LBO **CONTROLLER HEARTBEAT FAIL DETECT* (PAGE 778)**, which has to be wired in such a way, that it disconnects the dead main controller from the control, connects the redundancy controller instead and activates it by deactivation of the LBI **EMERGENCY MAN (PAGE 724)**.

As there can be up to 16 pairs of controllers at the CAN2 bus it is necessary to select which main controller (address) belongs to which redundant one. The setpoint **Watched Controller* (page 310)** is used for this purpose. It must be adjusted to address of the respective main controller in each redundant controller and it must be adjusted to 0 in each main controller.

> **IMPORTANT: Correct wiring of all inputs and outputs that should be used both by the main and the redundant controller needs to be done. Please refer to the corresponding chapter for wiring of binary inputs and outputs (Binary inputs (page 56) and Binary Outputs (page 57)).**

> **IMPORTANT: Do not use Shared Binary Inputs/Outputs for LBO CONTROLLER HEARTBEAT FAIL DETECT* (PAGE 778) -> LBI EMERGENCY MAN (PAGE 724) connection since the failed controller may not interpret it correctly.**

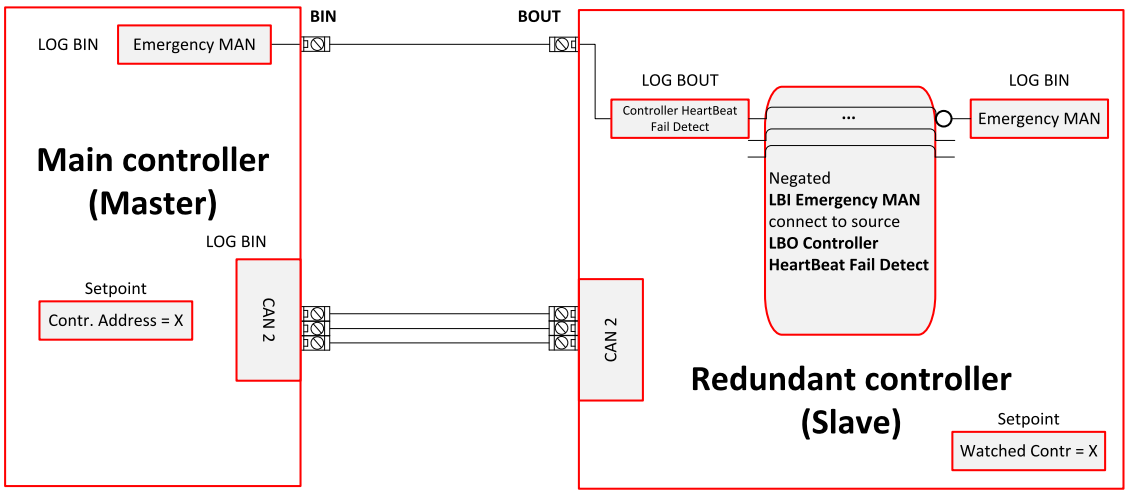


Image 5.78 Controller Redundancy using CAN bus

In the picture above the signal of LBO **CONTROLLER HEARTBEAT FAIL DETECT* (PAGE 778)** is used to disable the main controller if it is lost from can CAN2 bus or CAN2 communication from that controller becomes

erratic. It is used also to disable the redundant controller when the communication on CAN bus is alright (it is negated).

> **IMPORTANT: Use pulse signals for control of circuit breakers. LBO MCB ON COIL (PAGE 805) and LBO MCB OFF COIL (PAGE 804) should be used to prevent sudden opening for a short period of time when the controller fails and to ensure proper function of redundancy.**

5.4.10 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:

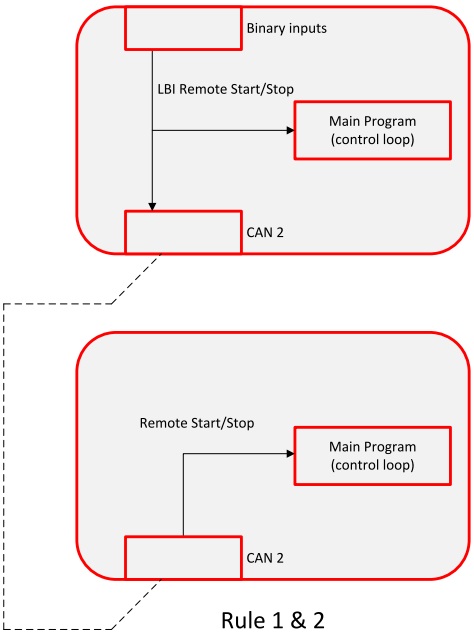
Standard version	Only in Extended features version
› Remote Start/Stop › Min Run Power Act › Load Res 2 Active › MCB Feedback	› Remote Start/Stop › Min Run Power Act 1, Min run Power Act 2, Min Run Power Act 3 › Load Res 2 Active, Load Res 3 Active, Load Res 4 Active › MCB Feedback

Distributed signal	Description (Mains controller)	Description (Gen-set controller)
System Start/Stop	› LBI **REMOTE START/STOP (PAGE 751)** is the request for start of the group of the Gen-sets. It is shared to LBO **SYS START/STOP (PAGE 823)** and distributed trough CAN2 to Gen-set controllers.	› Accepted only in Gen-set controllers belonging to the same logical group. › Accepted only in Gen-set controllers where the Distributed signal is not configured. › If the Distributed signal is configured to any binary input (physical or virtual), the signal is automatically shared to other controllers via CAN2 as CAN Distributed signal. › If distributed signal is shared on CAN2 by more sources, it is accepted from any of them.
Min Run Power 1, 2, 3		
Load Reserve 1, 2, 3, 4		
MCB Feedback	› The mains controller set this signal on whenever there is a closed path between the Mains and the Load side. › The signal is shared only inside the logical group (or interconnected logical groups).	› Accepted only in Gen-set controllers belonging to the same logical group as the source Mains Controller only. › Accepted only in Gen-set controllers where the Distributed signal is not configured.

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.

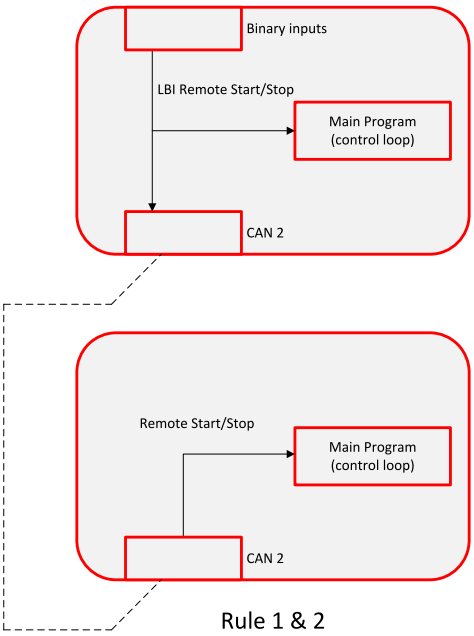
   Example: Logical input Remote Start/Stop is configured with a controller. State of the signal is automatically transmitted to other controllers via CAN2 bus as Remote Start/Stop.



Rule 1 & 2

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

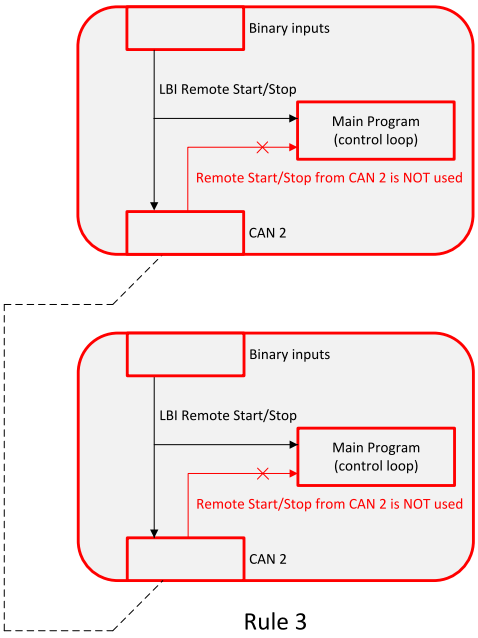
   Example: LBI Remote Start/Stop is not configured with a controller, but automatically shared Remote Start/Stop is received from CAN2 bus. Controller follows state of the shared LBI signal then.



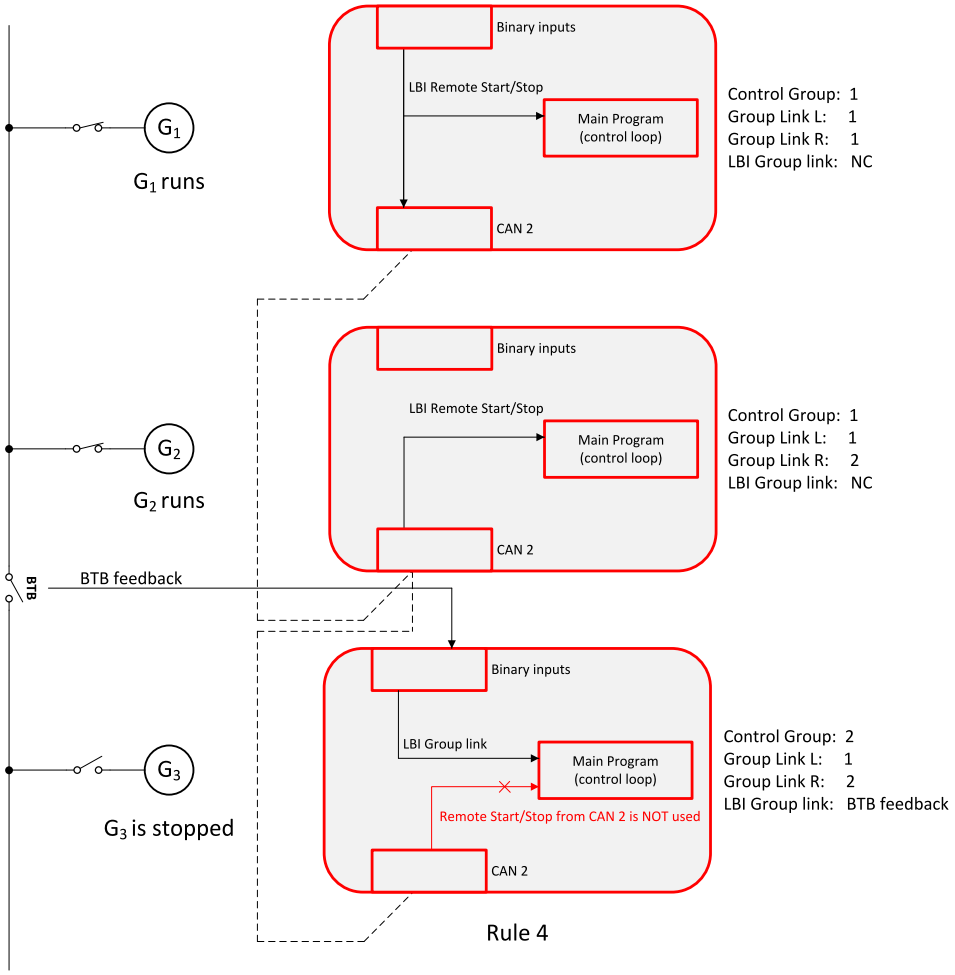
Rule 1 & 2

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 Remote Start/Stop signal.



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



5. LBI function can be configured with multiple controllers, which transmit through CAN2 bus state of the function. OR function applies to the function evaluation in controllers, in which the function is not

configured. It means that function is activated by shared signal coming from any controller (rule 4. applies).

5.4.11 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 457)**. There are two droop modes – emergency droop and droop.

Frequency droop

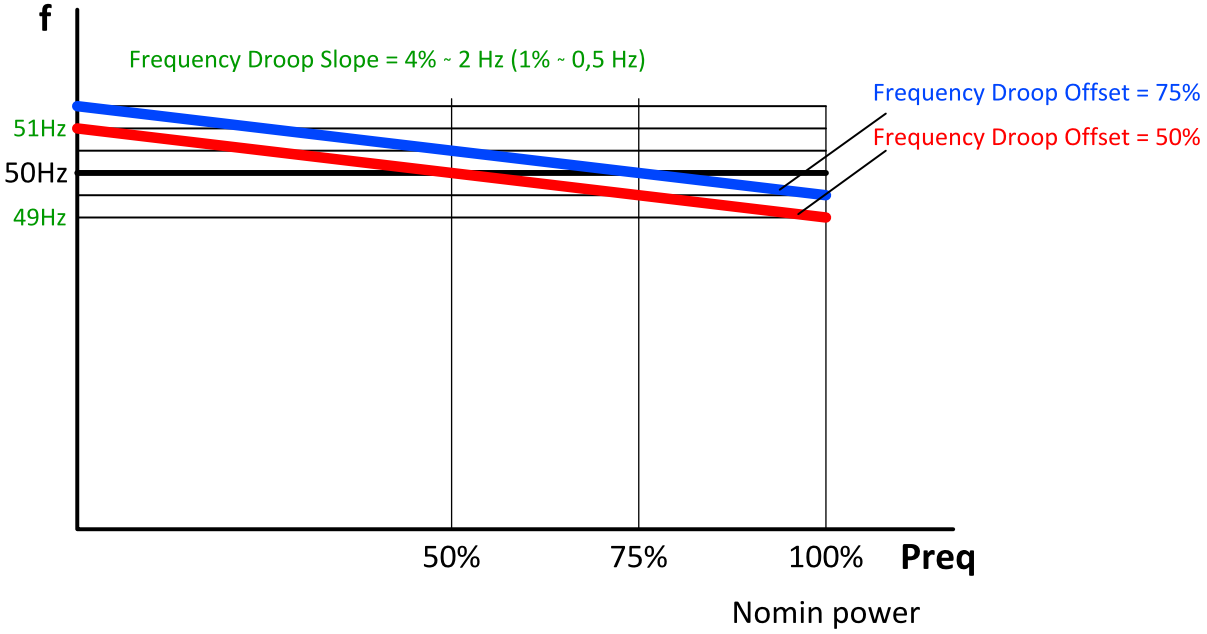


Image 5.79 Frequency droop

Equation:

Required frequency = Nominal frequency – [(Nominal frequency * **Frequency Droop Slope (page 458)** / 100) * (Active power / Nominal power – **Frequency Droop Offset (page 459)** / 100)).

Voltage droop

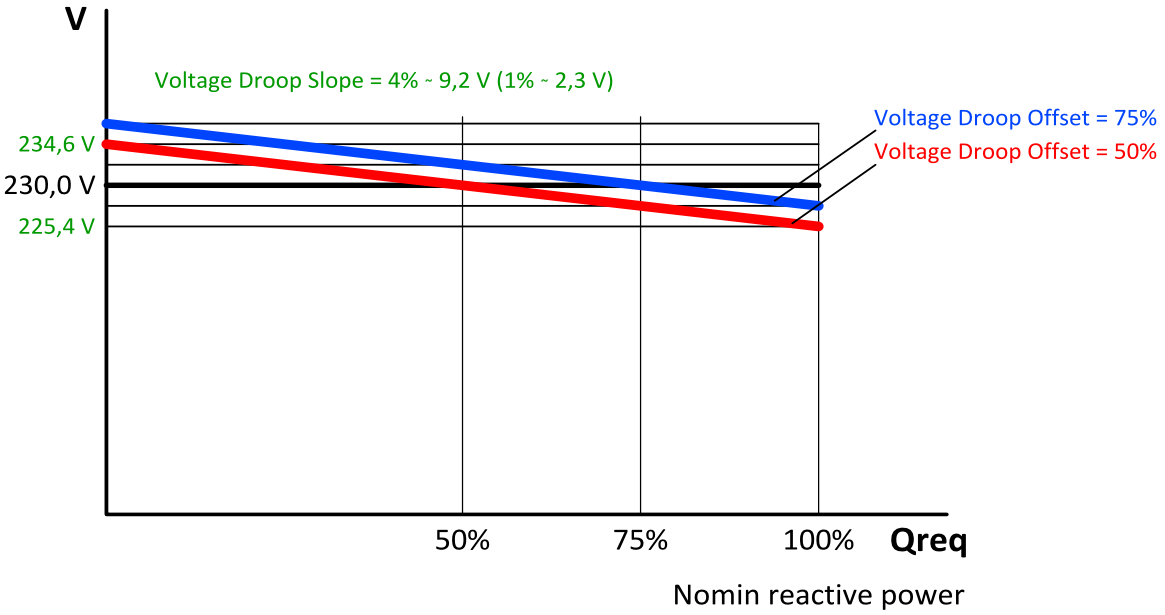


Image 5.80 Voltage droop

Equation

Required voltage = Nominal voltage – [(Nominal voltage * **Voltage Droop Slope (page 459)** / 100) * (Reactive power / Nominal reactive power – **Voltage Droop Offset (page 460)** / 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 751)** in AUTO mode gets active
  - The gen-set operating in droop is not calculated in the load reserve.
  - LBI **REMOTE START/STOP (PAGE 751)** 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 448)** and **Speed Governor Bias (page 437)** (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 458)** = 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 751)** in AUTO mode gets inactive.
- Controller starts soft unload of loaded Gen-set
  - Soft unload can be disabled via LBI **SOFT UNLOAD ENABLE (PAGE 754)** 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 446)**, latest when timer **Load Ramp (page 447)** 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 447)**.

Forcing of the regulation to droop

- Droop regulation can be forced by LBI **FORCE DROOP OPER (PAGE 726)**.

Principle of emergency droop

When **Load/Var Sharing Regulation Type (page 457)** = 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 Controllers On CAN (page 460)**.
- **#Emergency Droop On Delay (page 461)** 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 Controllers On CAN (page 460)**.
- **#Emergency Droop Off Delay (page 461)** has count down.

5.4.12 Dummy Load

This function is meant to prevent engine from running without load, which can in some cases shorten engine lifespan. It is a way user can set when to load external power bank and when to unload it.

This function can only be active if the setpoint **Dummy Load Active (page 410)** is set to correct value (Gen Only) and Engine State is loaded. Dummy Load function is triggered when the conditions mentioned before are met and Generator power is bellow **Dummy Load On (page 410)** setpoint level, or above **Dummy Load Off (page 411)** level.

Controller supports up to 5 Dummy Load stages. When the function is enabled, controller will always use all the dummy load stages up to the highest one configured. User can configure any number of these either in PLC or as LBO, but if just Dummy Load Stage 1 and Dummy Load Stage 5 are configured, **Dummy Load On Delay (page 411)** will trigger five times anyway when going from Dummy Load Stage 1 to Dummy Load

Stage 5. Whenever controller checks conditions and Dummy Load function is triggered, it will do the following (depending on the power level):

- Power is bellow level set by **Dummy Load On (page 410)** – in this case controller will wait for a period of time specified in **Dummy Load On Delay (page 411)** before activating **DUMMY LOAD STAGE 1 (PAGE 778)** LBO if no Dummy Load was active before. Otherwise the original outputs will stay on and controller will activate next stage of Dummy Load LBO (if **DUMMY LOAD STAGE 2 (PAGE 778)** was active before, **DUMMY LOAD STAGE 3 (PAGE 778)** will be activated and all 5 LBOs **DUMMY LOAD STAGE 1 (PAGE 778)**, **DUMMY LOAD STAGE 2 (PAGE 778)**, **DUMMY LOAD STAGE 3 (PAGE 778)** will be active).

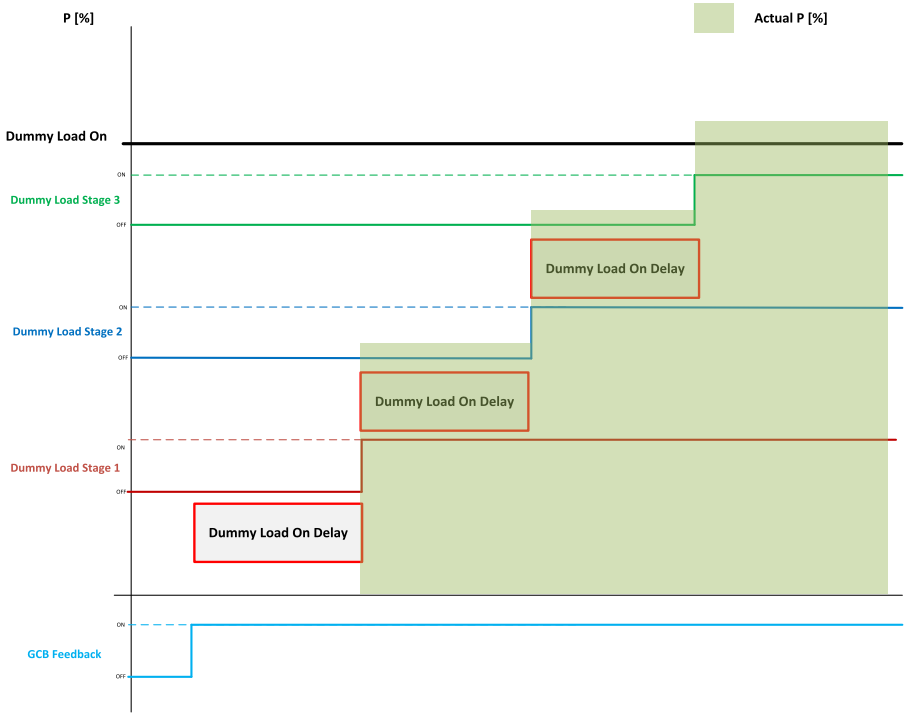


Image 5.81 Dummy load is on

- Power is above level set by **Dummy Load Off (page 411)** – in this case controller will wait for time set by setpoint **Dummy Load Off Delay (page 411)** before deactivating the highest active stage of Dummy Load (If **DUMMY LOAD STAGE 1 (PAGE 778)**, **DUMMY LOAD STAGE 2 (PAGE 778)** are active, controller will deactivate **DUMMY LOAD STAGE 2 (PAGE 778)**). If no Dummy Load outputs are active, nothing will happen.

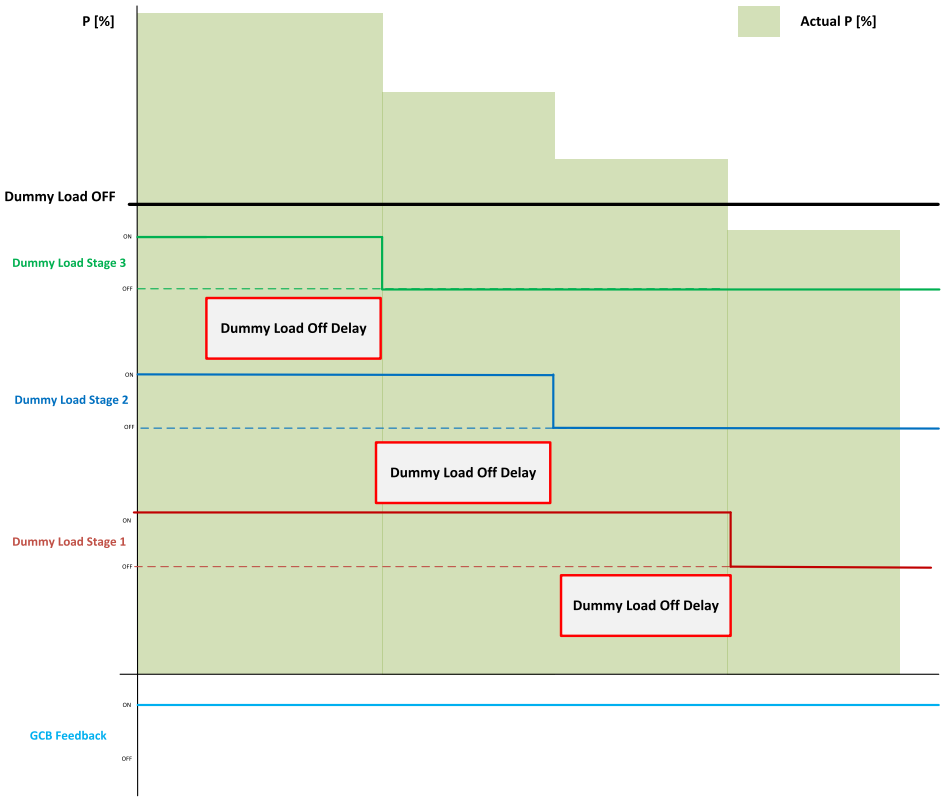


Image 5.82 Dummy load is off

- Controller will always work only with Dummy Load Stages up to highest one configured (if you only configure **DUMMY LOAD STAGE 1 (PAGE 778)** and **DUMMY LOAD STAGE 2 (PAGE 778)**, there will effectively only be two stages and if **DUMMY LOAD STAGE 1 (PAGE 778)** is already active and **Dummy Load On Delay (page 411)** timer collapses, **DUMMY LOAD STAGE 2 (PAGE 778)** will be activated but there will be no timer for **DUMMY LOAD STAGE 3 (PAGE 778)**.

IMPORTANT: Check how big your load bank is and set the Dummy Load On (page 410) and Dummy Load Off (page 411) setpoints to correct levels, so that when dummy load is activated , power will not immediately go over the Dummy Load Off (page 411).

5.4.13 ECU Frequency selection

Value Ecu freq select is calculated from **Nominal Frequency (page 320)** setpoint. The sequence for frequency change is executed automatically (engine must be in still condition) in the following steps:

1. Starting of the engine is blocked (state: Not Ready)
2. LBO: *ECU Power relay* is activated
3. Wait 5 s
4. LBO: *Stop Pulse* is set for 1 s (standard Stop Pulse duration)
5. Wait 3 s
6. Frequency selection is changed to a new value
7. Wait 2 s
8. LBO: *Stop Pulse* is set for 1 s (standard Stop Pulse duration)
9. Wait 2 s

10. LBO: *ECU Power relay* is deactivated
11. Return from start blocking state

5.4.14 Engine cool down and stop

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

- Duration of the cool down phase is determined by the setpoint **Cooling Time (page 345)**.
- 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 344)**.
- The cool down can be finished manually in MAN mode by pressing the STOP button.
- If a new start request comes, the cool down will be interrupted and the Gen-set will go back to the stabilization phase. If the cooling was at nominal speed, the stabilization timers will not count down again so the GCB is ready to be closed (after 2s delay).

When the cool down is finished, the output **FUEL SOLENOID (PAGE 786)** is de-energized and **STOP SOLENOID (PAGE 821)** is energized. The engine will stop within the time period determined by the setpoint **Stop Time (page 345)**. If the engine does not stop within this time, the alarm **Wrn Stop Fail (page 901)** will be issued.

The output **STOP SOLENOID (PAGE 821)** is energized until the engine is stopped, but at least for the duration of **Stop Time (page 345)**. If the **Stop Time (page 345)** has elapsed and the engine has still not stopped, the **STOP SOLENOID (PAGE 821)** is de-energized for 5 s and then energized again for **Stop Time (page 345)**.This is repeated until the engine is stopped.

The output **Ignition (page 798)** is continuously energized until the engine is stopped.

Stopped Gen-set evaluation

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

- The engine speed is lower than 2 RPM.
- The generator voltage in all phases is lower than 10 V.
- None of the **Additional running engine indications (page 116)** signals is active.

5.4.15 Engine start

Diesel engine

The setpoint **Fuel Solenoid (page 331)** must be switched to the Diesel position.

- After the command for start is issued (pressing the Start button in MAN mode, auto start condition is fulfilled in AUTO mode or controller is switched to TEST mode), **PRESTART (PAGE 812)** and **GLOW PLUGS (PAGE 794)** outputs are energized for a time period established by the setpoints **Prestart Time (page 334)** and **Glow Plugs Time (page 335)**.
- After **Prestart Time (page 334)** and **Glow Plugs Time (page 335)**, the output **FUEL SOLENOID (PAGE 786)** is energized after **Fuel Solenoid Lead (page 336)** the motor starter is activated by energizing the output **STARTER 1 (PAGE 818)**.
- When one or more of following conditions is met, the starter output is de-energized:
  - The engine speed exceeds the value of **Starting RPM (page 334)**, or
  - One of the **Additional running engine indications (page 116)** signals is active.

- The controller remains in the Starting phase until the engine speed exceeds the value of **Starting RPM (page 334)**, after which it is considered started and the Idle period will follow.
- The maximum duration that the output **STARTER 1 (PAGE 818)** is energized is determined by the setpoint **Maximum Cranking Time (page 333)**. If the engine does not start within this period, the output **STARTER 1 (PAGE 818)** is de-energized and a pause with a length determined by **Cranking Fail Pause (page 333)** will follow. **PRESTART (PAGE 812)** and **GLOW PLUGS (PAGE 794)** 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 332)**.
- Once the engine is started, the Idle period follows. The binary output **IDLE/NOMINAL (PAGE 798)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 337)**.
- After the idle period has finished, the output **IDLE/NOMINAL (PAGE 798)** is activated and the start-up sequence is finished. The **Stabilization (page 227)** phase follows.

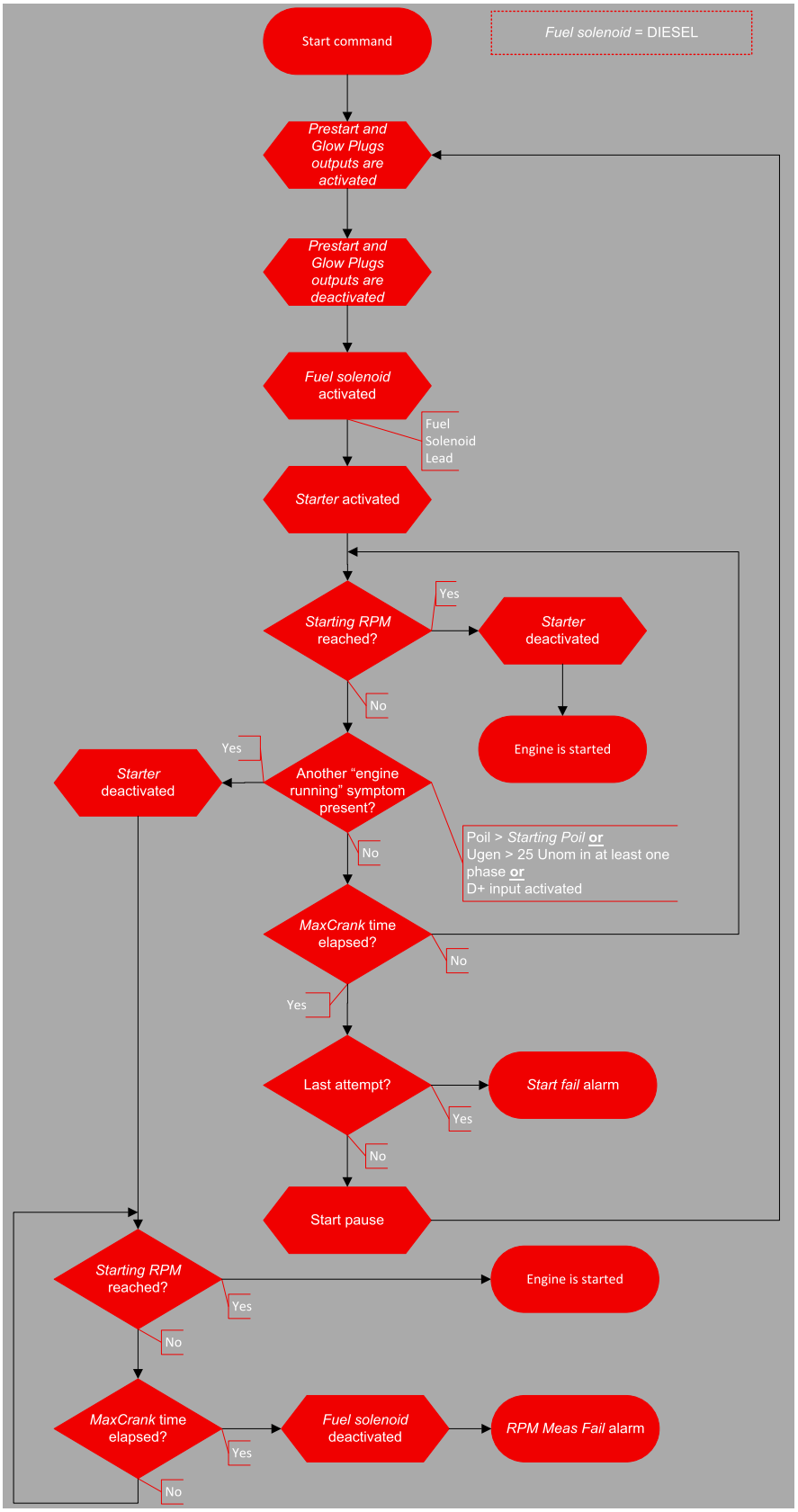


Image 5.83 Flowchart of start of diesel engine

GAS engine

The setpoint **Fuel Solenoid (page 331)** must be switched to the Gas position.

- After the command for start is issued (pressing the Start button in MAN mode, auto start condition is fulfilled in AUTO mode or controller is switched to TEST mode), **PRESTART (PAGE 812)** and **GLOW PLUGS (PAGE 794)** outputs are energized for a time period established by the setpoints **Prestart Time (page 334)** and **Glow Plugs Time (page 335)** begins.
- After **Prestart Time (page 334)** and **Glow Plugs Time (page 335)**, the countdown of **Sd Ventilation Time (page 342)**
- After **Sd Ventilation Time (page 342)**, the engine starter is activated by energizing the output **STARTER 1 (PAGE 818)**.
- When the engine speed exceeds 30 RPM, the outputs **FUEL SOLENOID (PAGE 786)** and **IGNITION (PAGE 798)** are energized.
- When the engine speed exceeds value of **Starting RPM (page 334)**, the engine starter is de-energized. The engine is considered as started and the Idle period will follow.

IMPORTANT: Additional running engine indications (page 116) 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 1 (PAGE 818)** is energized is determined by the setpoint **Maximum Cranking Time (page 333)**. If the engine does not start within this period, outputs **STARTER 1 (PAGE 818)** and **FUEL SOLENOID (PAGE 786)** are de-energized and a pause with length determined by **Cranking Fail Pause (page 333)** will follow. **PRESTART (PAGE 812)**, **GLOW PLUGS (PAGE 794)** and **IGNITION (PAGE 798)** 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 332)**.
- Once the engine is started, the Idle period follows. The binary output **IDLE/NOMINAL (PAGE 798)** remains inactive (as it was during the start). The idle period duration is adjusted by the setpoint **Idle Time (page 337)**.
- After the idle period has finished, the output **DESCRIPTION (PAGE 798)** is activated and the start-up sequence is finished. The **Stabilization (page 227)** phase follows.

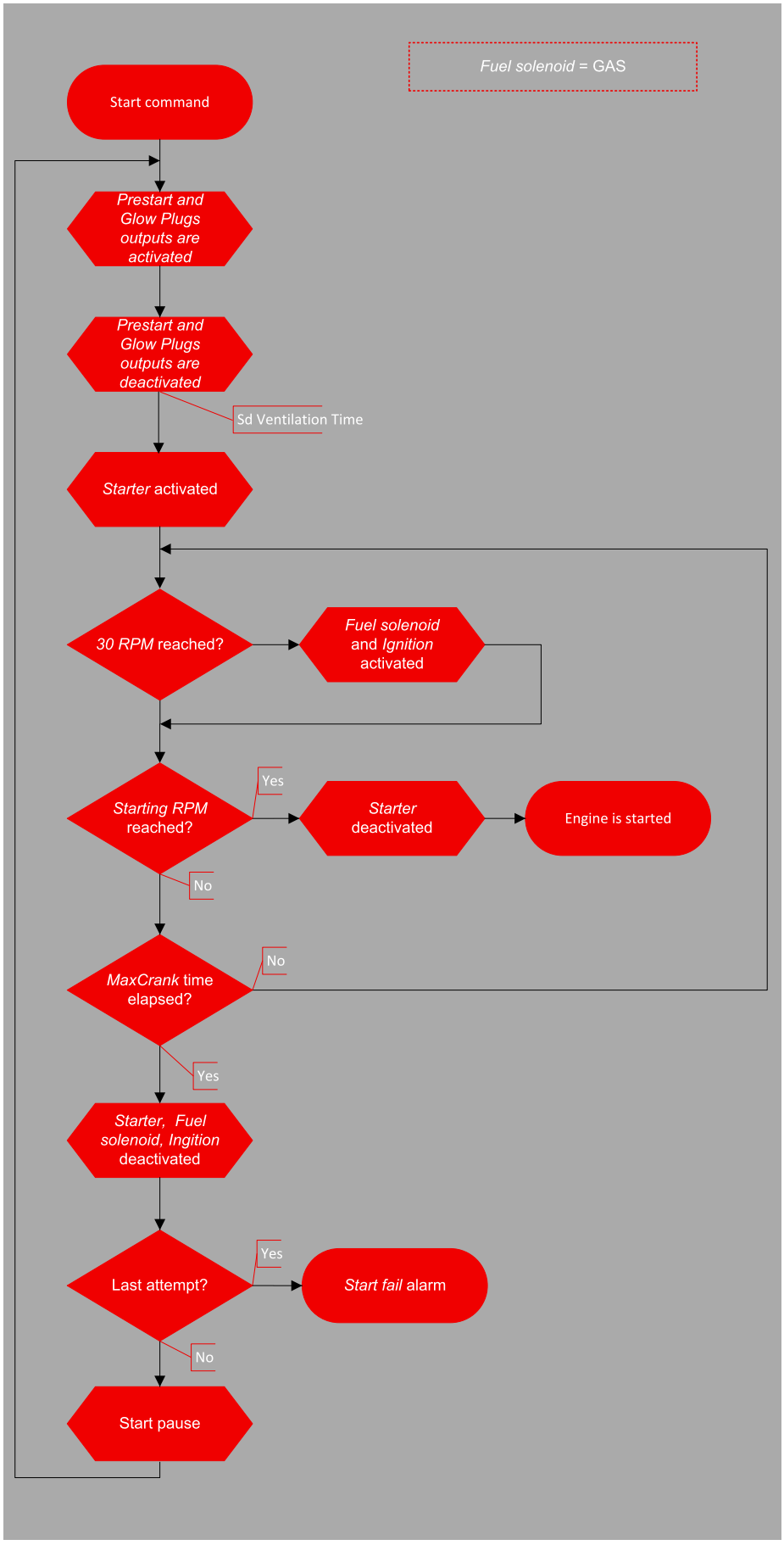


Image 5.84 Flowchart of start of gas engine

Dual Starter

Dual Starter function is enabled if LBO **STARTER 2 (PAGE 819)** is configured and Setpoint **Dual Starter Sequence (page 332)** is set to any of sequence options: 1-2 or 11-22 or 111-222.

Dual Starter Sequence options:

- Disabled (Default)
- 1-2: (Controller in cranking phase will activate **STARTER 1 (PAGE 818)** then **STARTER 2 (PAGE 819)** according to the order of option pattern 1-2.
- 11-22: (Controller in cranking phase will activate **STARTER 1 (PAGE 818)** then **STARTER 1 (PAGE 818)** then **STARTER 2 (PAGE 819)** then **STARTER 2 (PAGE 819)** according to the order of option pattern 11-22.
- 111-222: (Controller in cranking phase will activate **STARTER 1 (PAGE 818)** then **STARTER 1 (PAGE 818)** then **STARTER 1 (PAGE 818)** then **STARTER 2 (PAGE 819)** then **STARTER 2 (PAGE 819)** then **STARTER 2 (PAGE 819)** according to the order of option pattern 111-222.

The total number of attempts is defined by the Setpoint **Cranking Attempts (page 332)**.

Example:

- Cranking Attempts=5, Dual Starter Sequence =1-2
  - Gen-set will activate Starter 1 (if failed) then Starter 2 (if failed) then Starter 1 (if failed) then Starter 2 (if failed) then Starter 1
- Cranking Attempts=5, Dual Starter Sequence =11-22
  - Gen-set will activate Starter 1 (if failed) then Starter 1 (if failed) then Starter 2 (if failed) then Starter 2 (if failed) then Starter 1

The order of sequence is affected by the actual status of LBI **STARTER PRIORITY (PAGE 755)** (0-Starter 1, 1-Starter 2). Can be used for disabling a particular starter.

LBIs **STARTER 1 DISABLED (PAGE 755)**, **STARTER 2 DISABLED (PAGE 755)**. If the LBI Starter 1,2 Disabled state is 1 then the Starter 1 ,2 will be skipped in the sequence. Skipped starter is not counted as cranking attempt.

In case both starters are disabled, controller is in the state not ready.

Value **Num Starts (page 673)** stores the total successful starts of both starters.

5.4.16 Exercise timers

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

Related setpoints for timer 1 are:

- **Timer 1 Function (page 501)**
- **Timer 1 Repetition (page 503)**
- **Timer 1 First Occur. Date (page 502)**
- **Timer 1 First Occur. Time (page 503)**
- **Timer 1 Duration (page 503)**
- **Timer 1 Repeated (page 504)**
- **Timer 1 Repeat Day (page 504)**
- **Timer 1 Day (page 505)**
- **Timer 1 Repeated Day In Week (page 505)**
- **Timer 1 Repeat Day In Month (page 505)**
- **Timer 1 Repeat Week In Month (page 506)**
- **Timer 1 Refresh Period (page 507)**
- **Timer 1 Weekends (page 508)**
- **Timer 1 Setup (page 502)**

Related setpoints for timer 2 are:

- **Timer 2 Function (page 509)**
- **Timer 2 Repetition (page 511)**
- **Timer 2 First Occur. Date (page 510)**
- **Timer 2 Setup (page 510)**
- **Timer 2 Duration (page 511)**
- **Timer 2 Repeated (page 512)**
- **Timer 2 Repeat Day (page 512)**
- **Timer 2 Day (page 513)**
- **Timer 2 Repeated Day In Week (page 513)**
- **Timer 2 Repeat Day In Month (page 513)**
- **Timer 2 Repeat Week In Month (page 514)**
- **Timer 2 Refresh Period (page 515)**
- **Timer 2 Weekends (page 516)**
- **Timer 2 Setup (page 510)**

Related setpoints for timer 3 are:

- **Timer 3 Function (page 517)**
- **Timer 3 Repetition (page 519)**
- **Timer 3 First Occur. Date (page 518)**
- **Timer 3 Setup (page 518)**
- **Timer 3 Duration (page 519)**
- **Timer 3 Repeated (page 520)**
- **Timer 3 Repeat Day (page 520)**
- **Timer 3 Day (page 521)**
- **Timer 3 Repeated Day In Week (page 521)**
- **Timer 3 Repeat Day In Month (page 521)**
- **Timer 3 Repeat Week In Month (page 522)**
- **Timer 3 Refresh Period (page 523)**
- **Timer 3 Weekends (page 524)**
- **Timer 3 Setup (page 518)**

Related setpoints for timer 4 are:

- **Timer 4 Function (page 525)**
- **Timer 4 Repetition (page 527)**
- **Timer 4 First Occur. Date (page 526)**
- **Timer 4 Setup (page 526)**
- **Timer 4 Duration (page 527)**
- **Timer 4 Repeated (page 528)**
- **Timer 4 Repeat Day (page 528)**
- **Timer 4 Day (page 529)**
- **Timer 4 Repeated Day In Week (page 529)**
- **Timer 4 Repeat Day In Month (page 529)**
- **Timer 4 Repeat Week In Month (page 530)**
- **Timer 4 Refresh Period (page 531)**
- **Timer 4 Weekends (page 532)**
- **Timer 4 Setup (page 526)**

Related setpoints for timer 5 are:

- **Timer 5 Function (page 533)**
- **Timer 5 Repetition (page 535)**
- **Timer 5 First Occur. Date (page 534)**
- **Timer 5 Setup (page 534)**
- **Timer 5 Duration (page 535)**
- **Timer 5 Repeated (page 536)**
- **Timer 5 Repeat Day (page 536)**
- **Timer 5 Day (page 537)**
- **Timer 5 Repeated Day In Week (page 537)**
- **Timer 5 Repeat Day In Month (page 537)**
- **Timer 5 Repeat Week In Month (page 538)**
- **Timer 5 Refresh Period (page 539)**
- **Timer 5 Weekends (page 540)**
- **Timer 5 Setup (page 534)**

Related setpoints for timer 6 are:

- **Timer 6 Function (page 541)**
- **Timer 6 Repetition (page 543)**
- **Timer 6 First Occur. Date (page 542)**
- **Timer 6 Setup (page 542)**
- **Timer 6 Duration (page 543)**
- **Timer 6 Repeated (page 544)**
- **Timer 6 Repeat Day (page 544)**
- **Timer 6 Day (page 545)**
- **Timer 6 Repeated Day In Week (page 545)**
- **Timer 6 Repeat Day In Month (page 545)**
- **Timer 6 Repeat Week In Month (page 546)**
- **Timer 6 Refresh Period (page 547)**
- **Timer 6 Weekends (page 548)**
- **Timer 6 Setup (page 542)**

Available modes of each timer:

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

Once mode

Set-up via InteliConfig

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

Note: *First, the timer functions must be adjusted via setpoint* ***Timer 1 Function (page 501)****.*

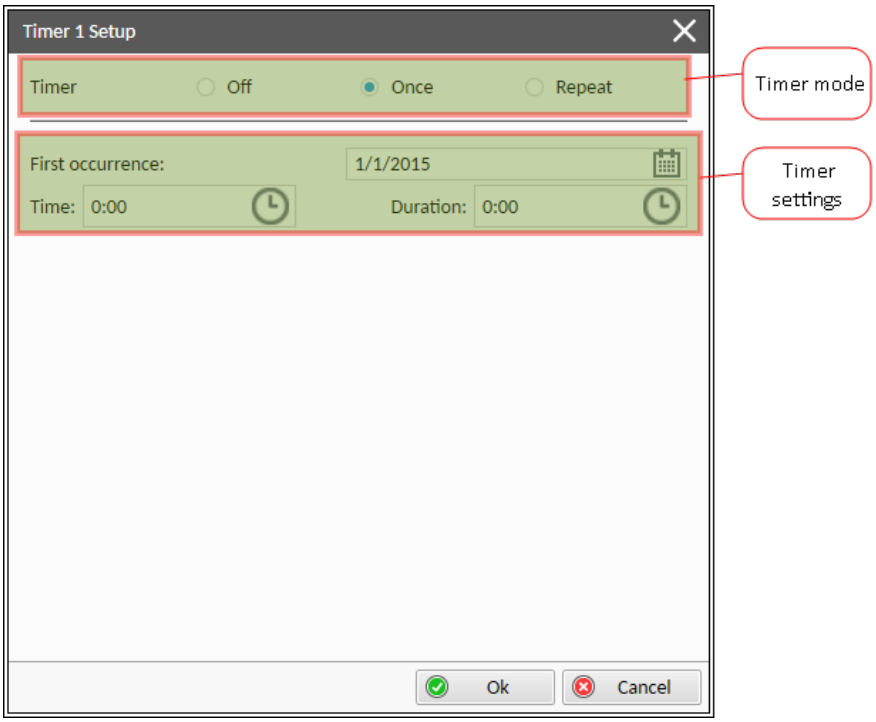


Image 5.85 Once mode – InteliConfig

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 501)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 503)** setpoint select Once mode. Then adjust **Timer 1 First Occur. Date (page 502)**, **Timer 1 First Occur. Time (page 503)** and **Timer 1 Duration (page 503)**.

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

Daily mode

Set-up via InteliConfig

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

Note: *First, the timer functions must be adjusted via setpoint **Timer 1 Function (page 501)**.*

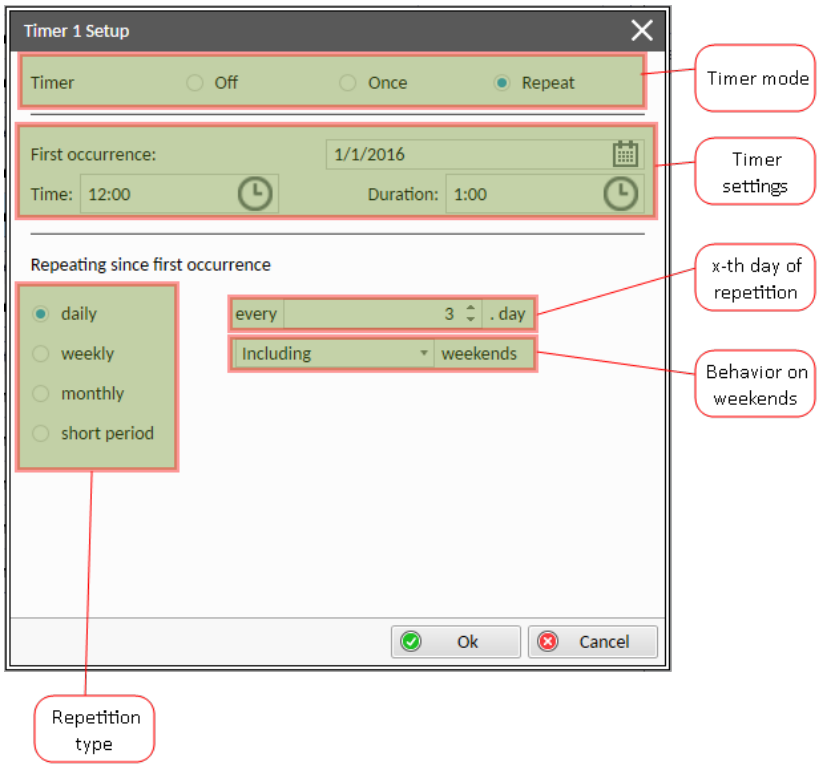


Image 5.86 Daily mode – InteliConfig

In timer mode select Repeat. In repetition type select Daily. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the xth day of repetition (**Timer 1 Refresh Period (page 507)**) and behavior of timer on weekends (**Timer 1 Weekends (page 508)**).

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

Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 501)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 503)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 502)**, **Timer 1 First Occur. Time (page 503)** and **Timer 1 Duration (page 503)**. In setpoint **Timer 1 Repeated (page 504)** select Daily and adjust **Timer 1 Refresh Period (page 507)** (xth day of repetition) and **Timer 1 Weekends (page 508)** (behavior of timer on weekends).

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

Weekly mode

Set-up via InteliConfig

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

Note: *First, the timer functions must be adjusted via setpoint **Timer 1 Function (page 501)**.*

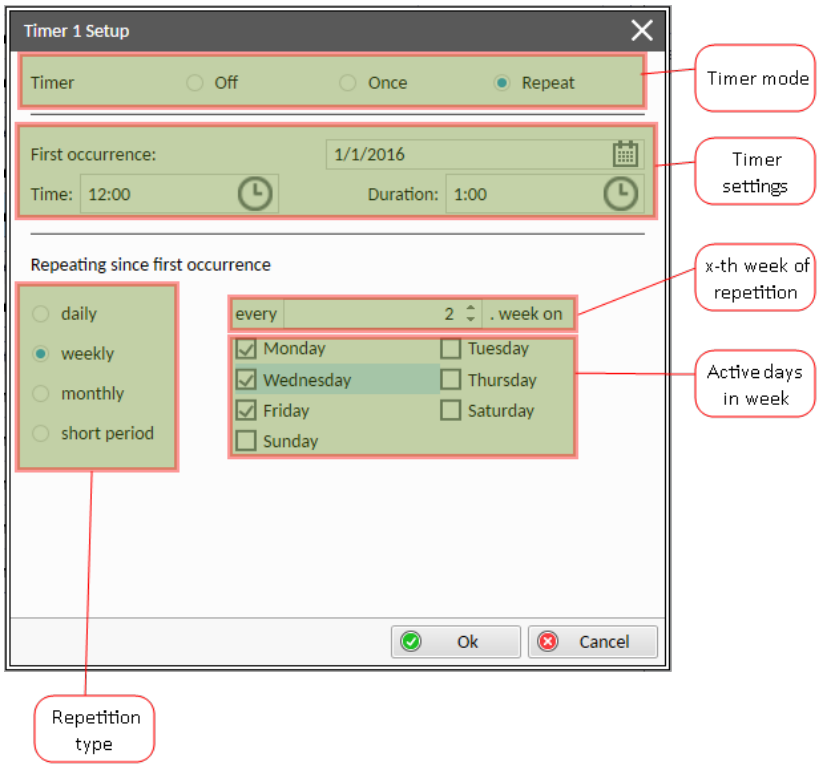


Image 5.87 Weekly mode – InteliConfig

In timer mode select Repeat. In repetition type select Weekly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the xth week of repetition (**Timer 1 Refresh Period (page 507)**) and days when timer should be active (**Timer 1 Day (page 505)**).

> **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 501)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 503)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 502)**, **Timer 1 First Occur. Time (page 503)** and **Timer 1 Duration (page 503)**. In setpoint **Timer 1 Repeated (page 504)** select Weekly and adjust **Timer 1 Day (page 505)** (days when timer should be active) and **Timer 1 Refresh Period (page 507)** (xth week of repetition).

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

Monthly mode

Set-up via InteliConfig

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

Note: *First, the timer functions must be adjusted via setpoint **Timer 1 Function (page 501)**.*

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

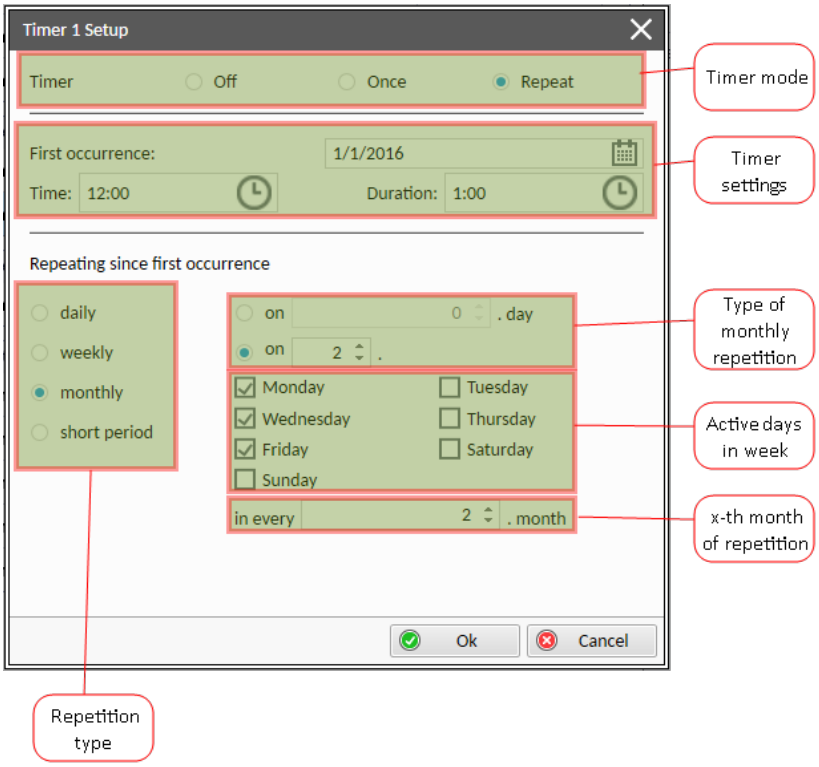


Image 5.88 Monthly mode – InteliConfig

In timer mode select Repeat. In repetition type select Monthly. In timer settings adjust date and time of first occurrence of timer. Also adjust the duration of each occurrence of timer. Then select the type of monthly repetition and the xth day of repetition (**Timer 1 Repeat Day In Month (page 505)**). Than select the xth month of repetition.

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

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

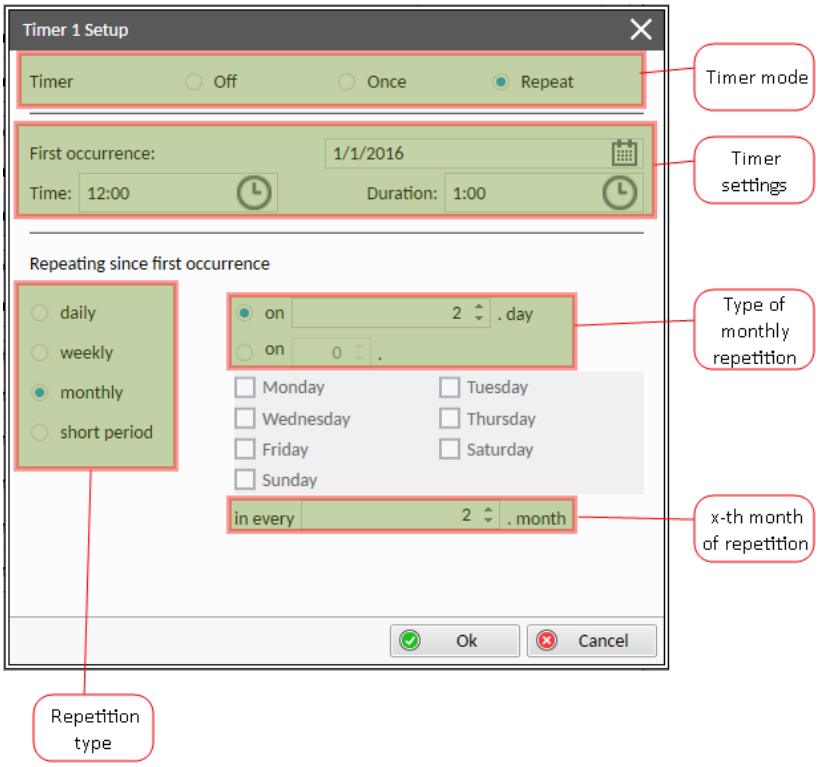


Image 5.89 Monthly mode – InteliConfig

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

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

Set-up via controller interface

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

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 501)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 503)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 502)**, **Timer 1 First Occur. Time (page 503)** and **Timer 1 Duration (page 503)**. In setpoint **Timer 1 Repeated (page 504)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 504)**, **Timer 1 Refresh Period (page 507)** (xth month of repetition) and **Timer 1 Repeat Day In Month (page 505)** (concrete day in repeated months).

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

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 501)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 503)** setpoint select Repeated mode. Than adjust **Timer 1 First Occur. Date (page 502)**, **Timer 1 First Occur. Time (page 503)** and **Timer 1 Duration (page 503)**. In setpoint **Timer 1 Repeated (page 504)** select Monthly and adjust type of monthly repetition via **Timer 1 Repeat Day (page 504)**, **Timer 1 Refresh Period (page 507)** (xth month of repetition), **Timer 1 Repeated Day In Week (page 505)** (days in week when timer is active) and **Timer 1 Repeat Week In Month (page 506)** (concrete week in repeated months).

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

Short period mode

Set-up via InteliConfig

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

***Note:** First, the timer functions must be adjusted via setpoint **Timer 1 Function (page 501)**.*

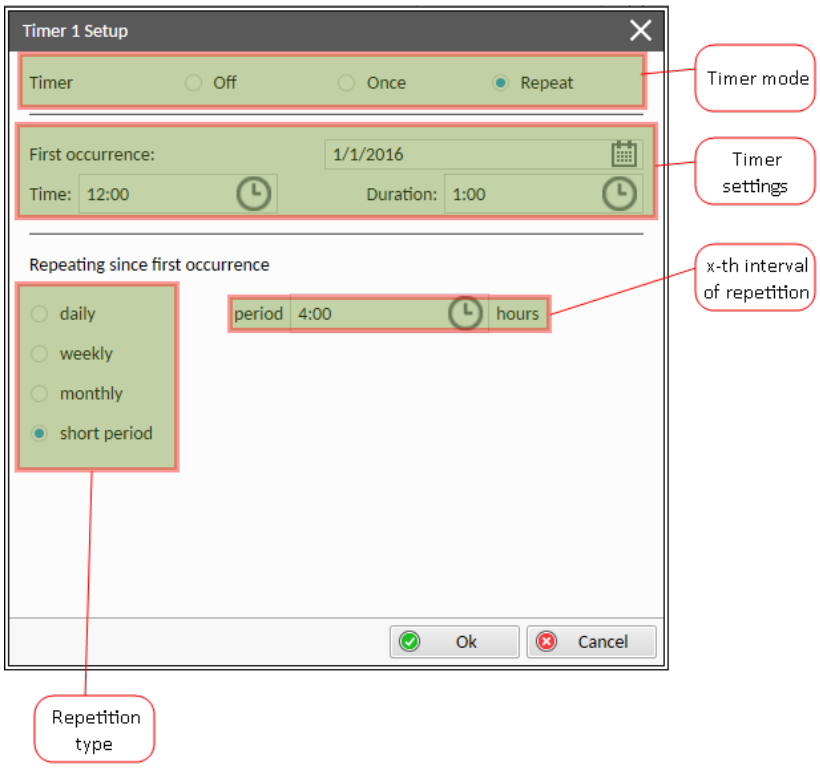


Image 5.90 Short period mode – InteliConfig

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

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

Set-up via controller interface

In controller go to the Scheduler setpoint group. Select the function of timer via **Timer 1 Function (page 501)** setpoint. Then go to *Timer 1 Setup* and press the Enter button. In **Timer 1 Repetition (page 503)** setpoint select Repeated mode. Then adjust **Timer 1 First Occur. Date (page 502)**, **Timer 1 First Occur. Time (page 503)** and **Timer 1 Duration (page 503)**. In setpoint **Timer 1 Repeated (page 504)**, select Short Period and adjust **Timer 1 Refresh Period (page 507)** (interval of repetition).

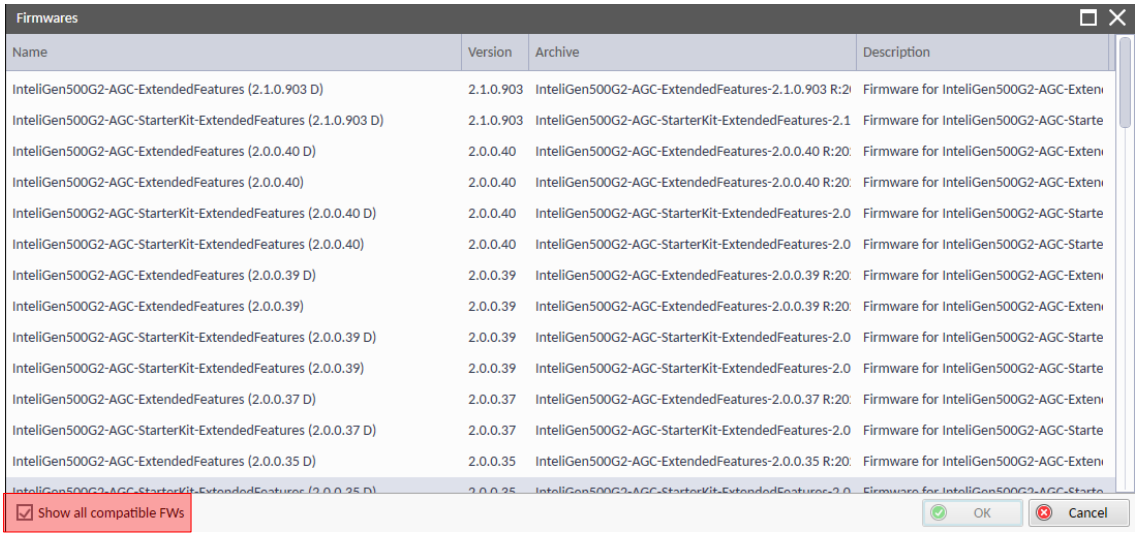
***Note:** Use the Left and the Right buttons to move between timer setpoints.*

5.4.17 Extended features

The controller offers the possibility to upgrade to the Extended features version. This version has to be unlocked by the software key (SW key). Once the correct SW key is inserted it is protected against rewriting during configuration update.

Note: *Each SW Key is unique and valid only for the specific serial number of a controller.*

1. Get your SW Key from the Comap website
2. Upgrade to the extended features in InteliConfig -> Firmware Upgrade or by the **Import/Export (page 175)** on the controller screen. List of available extended features FWs appears when the checkbox Show all compatible FWs is checked.



3. Insert your SW Key into the setpoint **SW Key* (page 326)**.
4. Restart the controller.

Note: *If the controller after restart remains in the init state, the inserted SW Key is not correct.*

List of SW key features

SW Key feature	Order code
Extended feature - IG500 G2 Suite	SKEFSUITE01

5.4.18 E-Stop

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

- The emergency stop circuit must be secured.
- The power supply of the associated binary outputs (BOUT1 and BOUT2) is supplied by the E-STOP input, not by the + battery voltage.

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

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

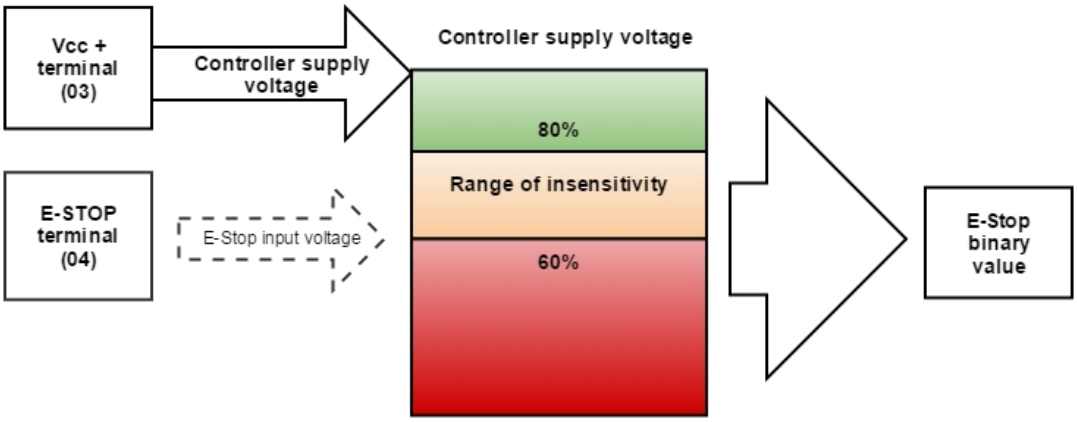


Image 5.91 SW principle of E-STOP

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

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

Visualization on CU screen

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

For more information about connection **see E-Stop on page 58**.

5.4.19 Firewall

The firewall function allows to restrict the access to the controller application services (ComAp/TCP server, MODBUS/TCP server etc.) or to the specific computers or networks. Firewall can be activated on Ethernet port.

> **Example:**
> **Adress:** 192.168.1.0
> **Netmask:** 255.255.255.0
> **Port:** 23
> Any computer with IP address from the network range 192.168.1.0 – 192.168.1.255 can connect to ComAp/TCP server (= connect to the controller with InteliConfig via Ethernet).

> **Example:**
> **Adress:** 192.168.1.100
> **Netmask:** 255.255.255.255
> **Port:** 502
> Only the single computer with IP address 192.168.1.100 can connect to MODBUS/TCP server

IMPORTANT: When enabling the firewall, If the rules are not set up properly and the connection is made remotely, loss of connection can happen.

5.4.20 Forced Value

This function allows forcing of preconfigured value into selected setpoints via activation of LBI. Each LBI can force only one value into one setpoint. There are 24 LBIs – **FORCED VALUE INPUT 01 (PAGE 728)** ... **FORCED VALUE INPUT 24 (PAGE 733)**. You can see current states of all LBIs in value **Forced Value Status (page 678)**. Setpoints for which is Forced Value already configured are marked with green arrow in InteliConfig and on display.

Note: *In the standard version, a limited number of setpoints can be forced replacing the Alternative configuration function known from the previous generation InteliGen 500 A wider range of setpoints can be forced in the* ***Extended features (page 157)****.*

Note: *LBIs can be renamed during configuration. We suggest you to rename them based on used function.*

IMPORTANT: You can not change value of setpoint which has active Forced Value function.

Forced Value Priority

- One setpoint can have multiple configured Forced Values which are ordered from highest to lowest priority. In case of conflict highest priority value, which is valid, is used.
- In case that Forced Value is out of setpoint's range, value is capped by either maximal or minimal limit or respective setpoint.
- In case that Forced Value is invalid, another active Forced Value is used based on priority order. If there is not any other active (or configured) Forced Value which could be used, setpoint keeps it's value.

Note: *Setpoints that are currently being forced their arrow turns to green color and they also have the option for writing of different value manually disabled.*

Configuration of Forced Value

Forced Value can be configured only via InteliConfig->Controller Configuration->Setpoints. Only selected setpoints can be forced.. Setpoints to which Forced Value can apply are marked with flag button. Clicking that button opens pop-up window containing all already configured Forced Values conditions. Priority of configured Forced Values is given by order and is descendent – first row has highest priority.

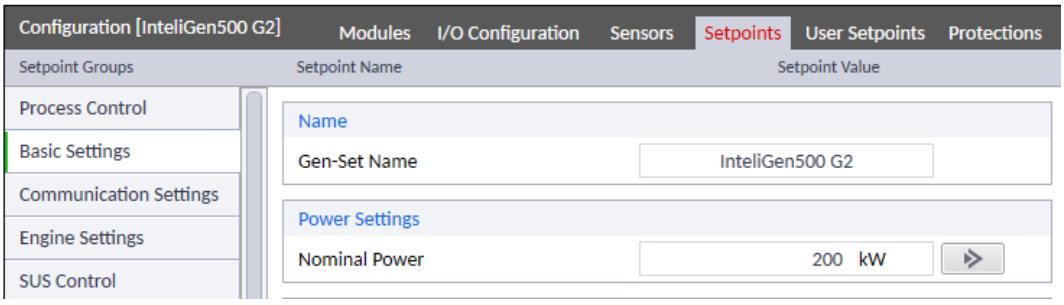
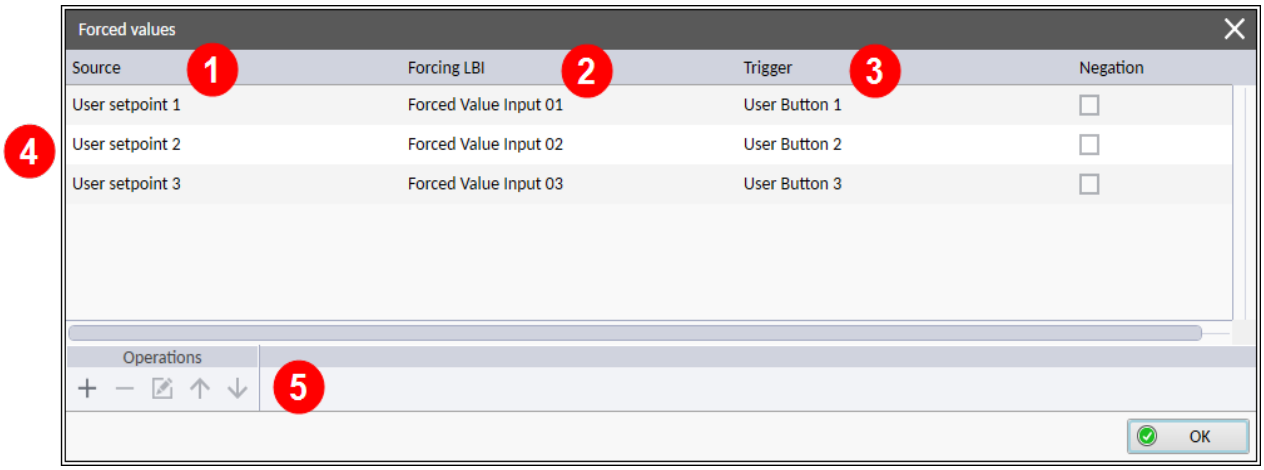


Image 5.92 Force value setpoint



1	Source from which is setpoint going to be forced. Source has to have same resolution and dimension as target setpoint.
2	Name of LBI which activates the Forced Value ***Note:*** *This can be also changed from the tab Functions.*
3	Used trigger which is connected with Forcing LBI (trigger is a signal activating the LBI).
4	List of already configured Forced Values for specific setpoint. First row has highest priority.
5	Options for adding, removing and editing Forced Values and options for changing order.

Forced value button and icon

Forced value button when forced value is not configured for the setpoint.	Forced value icon when setpoint is not forced.
	
Forced value button when at least one forced value is configured for the setpoint.	Forced value icon when setpoint is forced.
	

Configuration of the Forced Values as replacement of the Alternative configuration

1. Configure user setpoints as alternative values to the forced setpoints.

Forced setpoints with alternative user setpoints

Standard version forced setpoints	User setpoints		
Name	Name	Dimension	Resolution
Nominal RPM	Nominal RPM 2	[RPM]	1
Nominal Frequency	Nominal Frequency 2	[Hz]	1
Generator Nominal Voltage Ph-N	Generator Nominal Voltage Ph-N 2	[V]	1
Generator Nominal Voltage Ph-Ph	Generator Nominal Voltage Ph-Ph 2	[V]	1
Mains/Bus Nominal Voltage Ph-N	Mains/Bus Nominal Voltage Ph-N 2	[V]	1
Mains/Bus Nominal Voltage Ph-Ph	Mains/Bus Nominal Voltage Ph-Ph 2	[V]	1
Nominal Current	Nominal Current 2	[A]	1
Connection Type			
Nominal Power	Nominal Power 2	[kW]	1
Nominal Power Split Phase	Nominal Power Split Phase 2	[kW]	1
Speed Governor Bias	Speed Governor Bias 2	[V]	0.1
Voltage Regulator Bias	Voltage Regulator Bias 2	[V]	0.1

Note: *Setpoint Connection Type doesn't require to configure user setpoint. The alternative value can be selected directly in forced value configuration.*

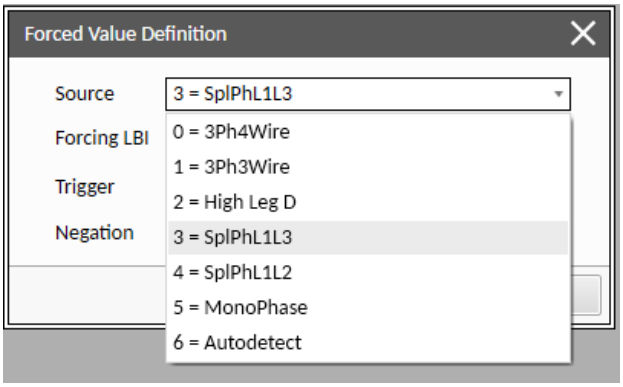


Image 5.93 Force Value definition

2. Every forced setpoint has to be configured individually. Go to InteliConfig ->Controller Configuration->Setpoints and press the button of forced setpoint. For the Source select the appropriate user setpoint created in step 1. Forcing LBI is selected automatically. Choose the Trigger (binary input, output, user button, PLC, etc.). By it's activation the setpoint will be forced.
3. Repeat the step 2 until all forced setpoints are configured. Make sure the Trigger is always the same for all forced setpoints.

5.4.21 Gen-set operation states

Engine state machine

Init	Autotest during controller power on. ***Note:*** *Sometimes controller stays in Init mode after FW upgrade. It means that there are new parameters which should be checked by user. It is possible to disable this control via InteliConfig.*
Not ready	Gen-set is not ready to start. **Example:** When shutdown alarm is active or unit is in OFF mode.
Ready	Gen-set is ready to run.
Prestart	Prestart sequence in process, **PRESTART (PAGE 812)** output is active. **Example:** Usually used for preheating or processes executed prior Gen-set start.
Cranking	Engine is cranking, **STARTER 1 (PAGE 818)** or **STARTER 2 (PAGE 819)** output is active.
Pause	Pause between start attempts.
Starting	Starting speed is reached and the Idle timer is running.
Running	Gen-set is running at nominal speed.
Soft load	Gen-set power is ramping up.
Loaded	Gen-set is running at nominal speed and **GCB CLOSE/OPEN (PAGE 788)** is active.
Soft unld	Gen-set power is ramping down.
Cooling	Gen-set is cooling before stop.
Stop	Stop. **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 or after shutdown stop.
EmergMan	**EMERGENCY MAN (PAGE 724)** Gen-set operation. **Example:** Used for bypass the controller and engine manual start. Controller mode, where the LBI **EMERGENCY MAN (PAGE 724)** is activated. All control functions are stopped

Engine started conditions

- Engine speed (RPM) > **Starting RPM (page 334)** or
- Oil pressure > **Starting Oil Pressure (page 335)** or
- Binary input **OIL PRESSURE (PAGE 744)** is in logical 0 or
- D+ terminal active (reached 80%**D+ Threshold (page 348)** of supply voltage) for minimum 1 s or
- Generator voltage > 25 % of **Generator Nominal Voltage Ph-N (page 316)** or **Generator Nominal Voltage Ph-Ph (page 316)** (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 334)****.*

Engine running conditions

- Engine speed (RPM) > **Starting RPM (page 334)** or
- Oil pressure > **Starting Oil Pressure (page 335)** or
- Binary input **OIL PRESSURE (PAGE 744)** is in logical 0 or
- Generator voltage > 25 % of **Generator Nominal Voltage Ph-N (page 316)**

Still engine conditions

- Engine speed (RPM) < **Starting RPM (page 334)** and
- Oil pressure < **Starting Oil Pressure (page 335)** and
- Binary input **OIL PRESSURE (PAGE 744)** is in logical 1 and
- Generator voltage < 50 V (all phases)

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

When any engine running conditions are observed in still engine, then the **Wrn Stop Fail (page 901)** is activated with the following delays:

- For generator voltage from 10 V to < 50 % of nominal voltage, Wrn Stop Fail has delay 1 s
- For generator voltage > 50 % of nominal voltage, Wrn Stop Fail has delay 200 ms
- Oil pressure > **Starting Oil Pressure (page 335)**, Wrn Stop Fail has delay 1 s
- Binary input **OIL PRESSURE (PAGE 744)** is in logical 0, Wrn Stop Fail has delay 1 s
- For detected RPM, there is no delay.

Stop engine conditions

If no engine running conditions are validated, then the controller will wait extra 12 s before leaving the Machine Stop state and releasing the **STOP SOLENOID (PAGE 821)** output.

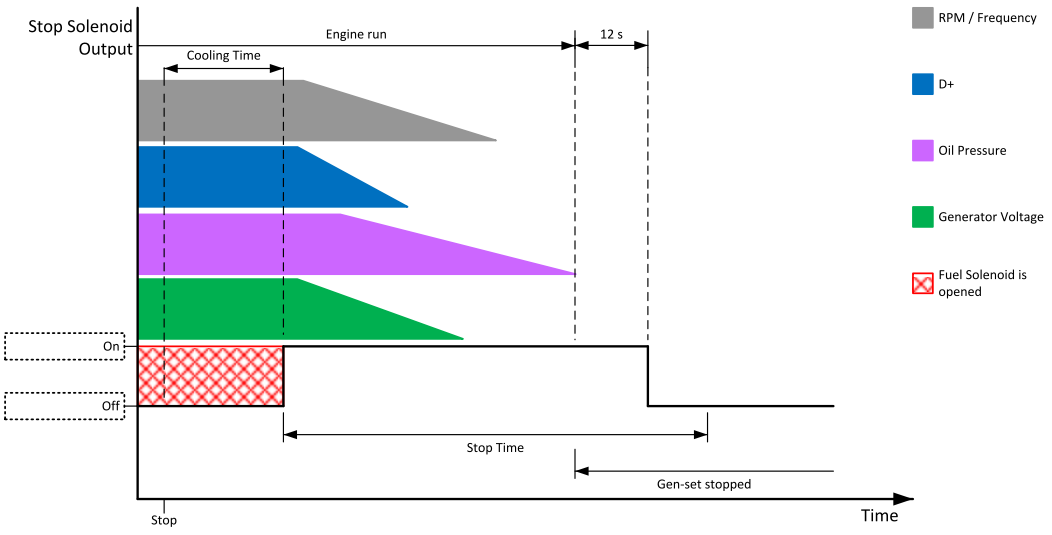


Image 5.94 Engine stops in **Stop Time (page 345)**

If the total stopping time will exceed setpoint **Stop Time (page 345)** then the **Wrn Stop Fail (page 901)** and binary outputs for stopping are activated. The controller will continuously try to stop the engine.

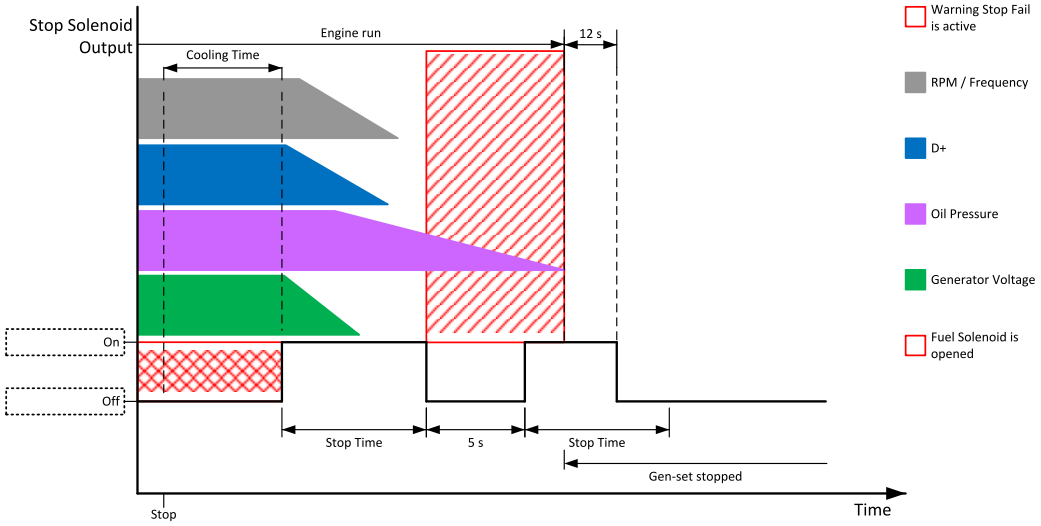


Image 5.95 Engine stops after first **Stop Time (page 345)**

Electric state machine

MainsOper	Mains is present and all its values are within limits. **Example:** MCB is closed, GCB is opened
MainsFlt	Mains fails
IslOper	Island operation **Example:** MCB is opened, GCB is closed
MainsRet	Mains recover
Synchro	Gen-set is synchronizing (MCB is closed, GCB is opened)
ParalOper	Gen-set is in parallel with mains (MCB is closed, GCB is closed)
BrksOff	GCB, MCB opened

5.4.22 Geo-fencing

Geo-fencing function (available with CM2-4G-GPS) is kind of protection that evaluates whether the actual GPS location is within a predefined area, then based on this evaluation takes an action (sends SMS message, stops engine, make history record etc.). This function is enabled by setpoint **Geo-Fencing (page 553)** or by logical binary input **GEO-FENCING ENABLE (PAGE 737)**.

Using InteliConfig, it is possible to set two concentric geo-circles within which the unit is allowed to be located. Each geo-circle is defined as a circular geographic area with its center (common for both geo-circles) named Home Position. This point is adjusted via setpoints **Home Latitude (page 553)** and **Home Longitude (page 554)** and radius named Fence Radius adjusted via setpoints **Fence 1 Radius (page 556)** and **Fence 2 Radius (page 558)**.

The Protection can be different for both circles and are adjusted via setpoints **Fence 1 Protection (page 555)** and **Fence 2 Protection (page 557)**.

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

5.4.23 History log

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

Each record has the same structure and contains:

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

Note: *It is possible to clear history on users demand. To execute history log clearing, navigate to History page in InteliConfig and select the option ClearHistory.*

Moving in the History log:

- When the first item is selected in history, pressing of the UP button leads to the last history item to be selected.
- When the last item is selected in history, pressing of the DOWN button leads to the first history item to be selected.

Record structure

Name	Abbreviation	Description
Number	No.	Row number (0 corresponds to the last record, -1 to the previous one, etc.)
Reason	Reason	Reason for history record (any event or alarm related to the gen-set
Time	Time	Time
Date	Date	Date
RPM	RPM	Engine rotations per minute
Power	Pwr	Generator active power
Reactive power	Q	Generator reactive power
Power Factor	PF	Generator power factor
Load Character	LChr	Generator load character
Generator Frequency	Gfrq	Generator Frequency
Generator Voltage	Vg1	Generator voltage Ph1
Generator Voltage	Vg2	Generator voltage Ph2
Generator Voltage	Vg3	Generator voltage Ph3
Generator Voltage	Vg12	Generator voltage Ph12
Generator Voltage	Vg23	Generator voltage Ph23
Generator Voltage	Vg31	Generator voltage Ph31
Generator Current	Ig1	Generator current Ph1
Generator Current	Ig2	Generator current Ph2
Generator Current	Ig3	Generator current Ph3

Bus Frequency	Bfrq	Bus Frequency
Bus Voltage	Vb1	Bus voltage Ph1
Bus Voltage	Vb2	Bus voltage Ph2
Bus Voltage	Vb3	Bus voltage Ph3
Bus Voltage	Vb12	Bus voltage Ph12
Bus Voltage	Vb23	Bus voltage Ph23
Bus Voltage	Vb31	Bus voltage Ph31
Mains Frequency	Mfrq	Mains Frequency ***Note:*** *Only for SPtM application.*
Bus Frequency	Bfrq	Bus Frequency ***Note:*** *Only for MINT application.*
Mains Voltage	Vm1	Mains voltage Ph1
Mains Voltage	Vm2	Mains voltage Ph2
Mains Voltage	Vm3	Mains voltage Ph3
Mains Voltage	Vm12	Mains voltage Ph12
Mains Voltage	Vm23	Mains voltage Ph23
Mains Voltage	Vm31	Mains voltage Ph31
Mains Current	IL1	Mains current Ph1
Voltage Battery	VBat	Voltage of battery
Analog Input 1	Ain1	Analog input 1
Analog Input 2	Ain2	Analog input 2
Analog Input 3	Ain3	Analog input 3
Analog Input 4	Ain4	Analog input 4
Binary Inputs	BIN	Controller binary inputs
E-Stop	E-Stop	State of dedicated E-Stop input
Binary Outputs	BOUT	Controller binary outputs
Speed regulator	SRO	Speed regulator output
Voltage regulator	VRO	Voltage regulator output
Running nominal power	TRPN	Nominal power of all running Gen-sets
Available nominal power	APN	Available nominal power of all Gen-sets
Controller Mode	Mode	Controller mode

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

5.4.24 Load shedding

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

Load shedding stages

The Load Shedding function consists of 52 stages which are numbered 1-52. Stages are disconnected in ascending order up to the last configured stage. Reconnecting of stages is in descending order and starts with higher configured stage. A stage is considered configured when the respective Load Shedding Output is configured. Highest activated load shedding stage is stored in value **Load Shedding Status (page 679)**.

Load shedding outputs

Stage	LBO
Stage 1	LOAD SHEDDING STAGE 1 (PAGE 801)
Stage 2	LOAD SHEDDING STAGE 2 (PAGE 801)
Stage 3	LOAD SHEDDING STAGE 3 (PAGE 801)
Stage 4	LOAD SHEDDING STAGE 4 (PAGE 801)
Stage 5	LOAD SHEDDING STAGE 5 (PAGE 802)

How the Load shedding controls the Load shedding outputs

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

Load shedding has 25 steps and each step is linked with its own binary output, LOAD SHEDDING STAGE 1 (PAGE 801), LOAD SHEDDING STAGE 2 (PAGE 801), LOAD SHEDDING STAGE 3 (PAGE 801), LOAD SHEDDING STAGE 4 (PAGE 801) and LOAD SHEDDING STAGE 5 (PAGE 802).

The Load shedding outputs can be activated one by one in the order 1, 2, 3, 4, 5. The conditions for activation are defined by setpoints **Load Shedding Level (page 413)** and **Load Shedding Delay (page 413)**.

The Load shedding outputs are deactivated one by one according to the conditions given by the setpoints **Load Reconnection Level (page 414)**, **Load Reconnection Delay (page 414)**, AUTO LOAD RECONNECTION (PAGE 415).

If manual reconnection of the load is desired the **Auto Load Reconnection (page 415)** setpoint must be disabled and the MANUAL LOAD RECONNECTION (PAGE 739) digital input must be configured.

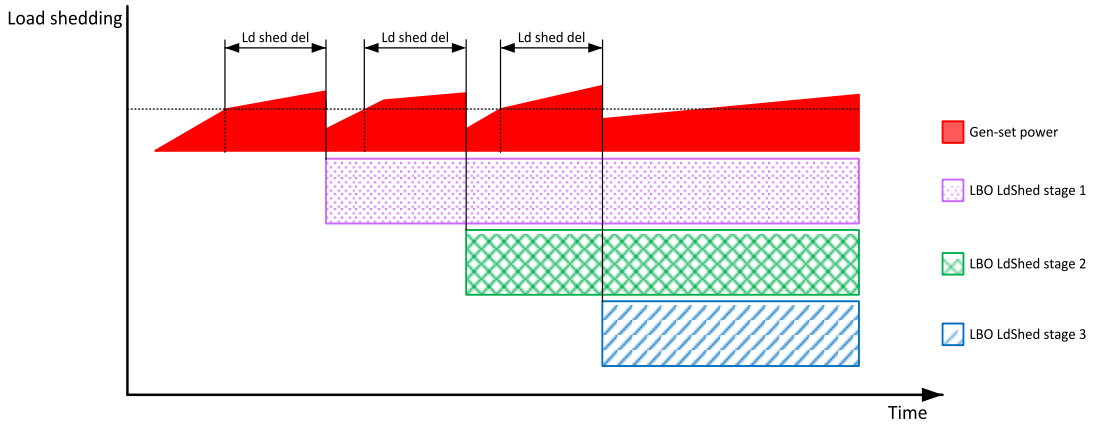


Image 5.96 Load shedding

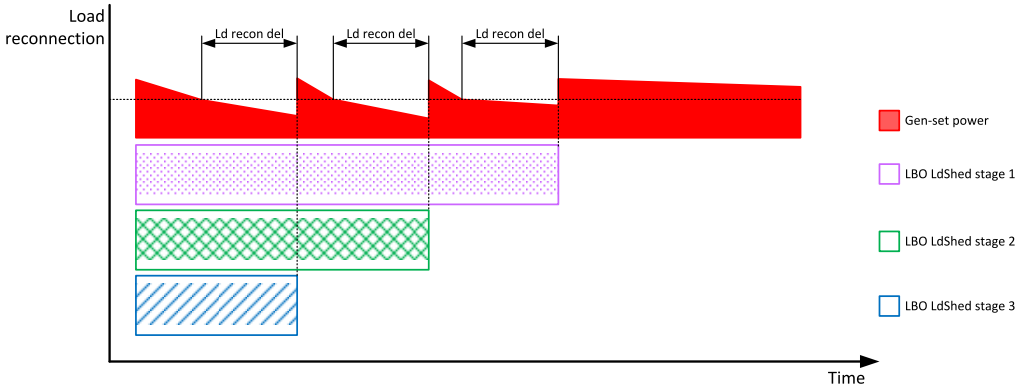


Image 5.97 Load reconnection

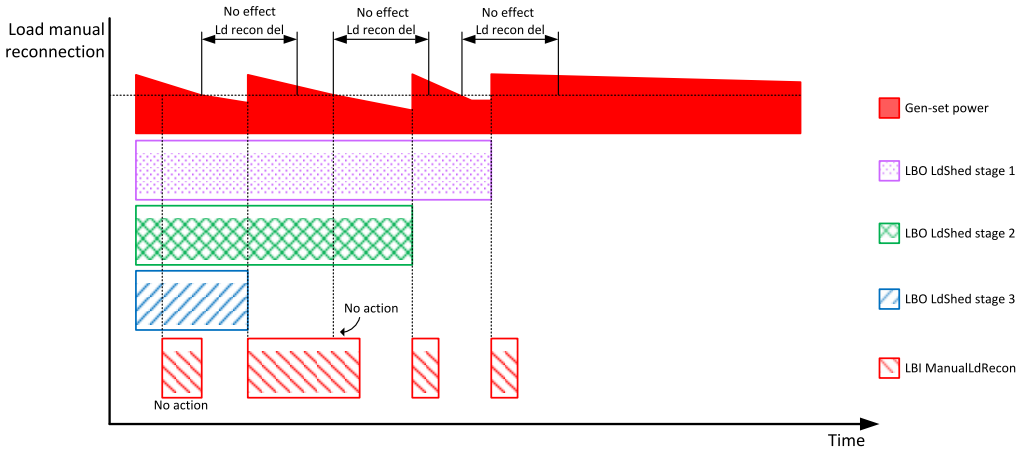


Image 5.98 Load manual reconnection

5.4.25 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 406)**. Limit of protection is adjusted via setpoint **Vector Shift Limit (page 407)**. When protection is activated, the breaker is opened. Which breaker is opened is adjusted via setpoint **Vector Shift CB Selector (page 409)**. Maximal value of vector shift is represented by value **Max Vector Shift (page 653)**.

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 393)** 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 408)**. Limit of protection is adjusted via setpoints **ROCOF df_dt (page 409)** and **ROCOF Windows Length (page 408)**. When protection is activated, the breaker is opened. Which breaker is opened is adjusted via setpoint **Vector Shift CB Selector (page 409)**.

5.4.26 Mains import measurement

This functionality is available only when the **Active Application (page 674)** = SPTM. The mains measurement can be measured by dedicated CT terminals or by analog inputs, and it is divided to **Mains Measurement P (page 304)** and **Mains Measurement Q (page 305)**. The Mains Measurement P has to be enabled for proper work of active power Import/Export.

> **IMPORTANT: The Earth Fault Current Protection (page 626) and Mains Import Measurement shares same physical input. At one moment this input can be used only for one purpose. The protection will work only if Mains Measurement P (page 304) and Mains Measurement Q (page 305)!= Mains CT.**

Mains Measurement P

- If **Mains Measurement P (page 304)** = Mains CT then **Mains Measurement P (page 304)** is counted from the current which is measured on Mains current.
- If **Mains Measurement P (page 304)** = Analog Input then **Mains Measurement P (page 304)** is taken from LAI **MAINS IMPORT MEASUREMENT P (PAGE 833)**. Mains current can still be measured if **Mains Measurement Q (page 305)** = Mains CT.
- If **Mains Measurement P (page 304)** = None then **Mains Measurement P (page 304)** is not counted because there is no current measurement.

Mains Measurement Q

- If **Mains Measurement Q (page 305)** = Mains CT then **Mains Measurement Q (page 305)** is counted from the current which is measured onMains current.
- If **Mains Measurement Q (page 305)** = Analog Input then **Mains Measurement Q (page 305)** is taken from the LAI **MAINS MEASUREMENT Q (PAGE 834)**. Mains current can be still measured if **Mains Measurement P (page 304)** = Mains CT.
- If **Mains Measurement Q (page 305)** = None then **Mains Measurement Q (page 305)** is not counted because there is no current measurement.

5.4.27 Maintenance Timers

Maintenance timer contains two types of timers – **Maintenance Timer RunHours** and **Maintenance Timer Interval**.

- **Maintenance Timer RunHours** is based on engine running hours and it only counts down when engine is running. When engine runs value **Maintenance Timer RunHours** counts down, but setpoint **Maintenance Timer RunHours** will not change.
- **Maintenance Timer Interval** is set in months. Specific date is calculated as the setpoint is set. E.g. when the timer is set to 6 months on June 10th, corresponding **Maintenance Timer Interval** value is set to the number of days remaining to December 10th, the timer count down is done in days and alarm is issued on December 10th. The setpoint value does not change, as the remaining days count down is done.
- Timers can be reset by changing the corresponding setpoint value.
- When either of the timers elapse, appropriate LBO **Maintenance** will be activated and stays active until timers are reset.

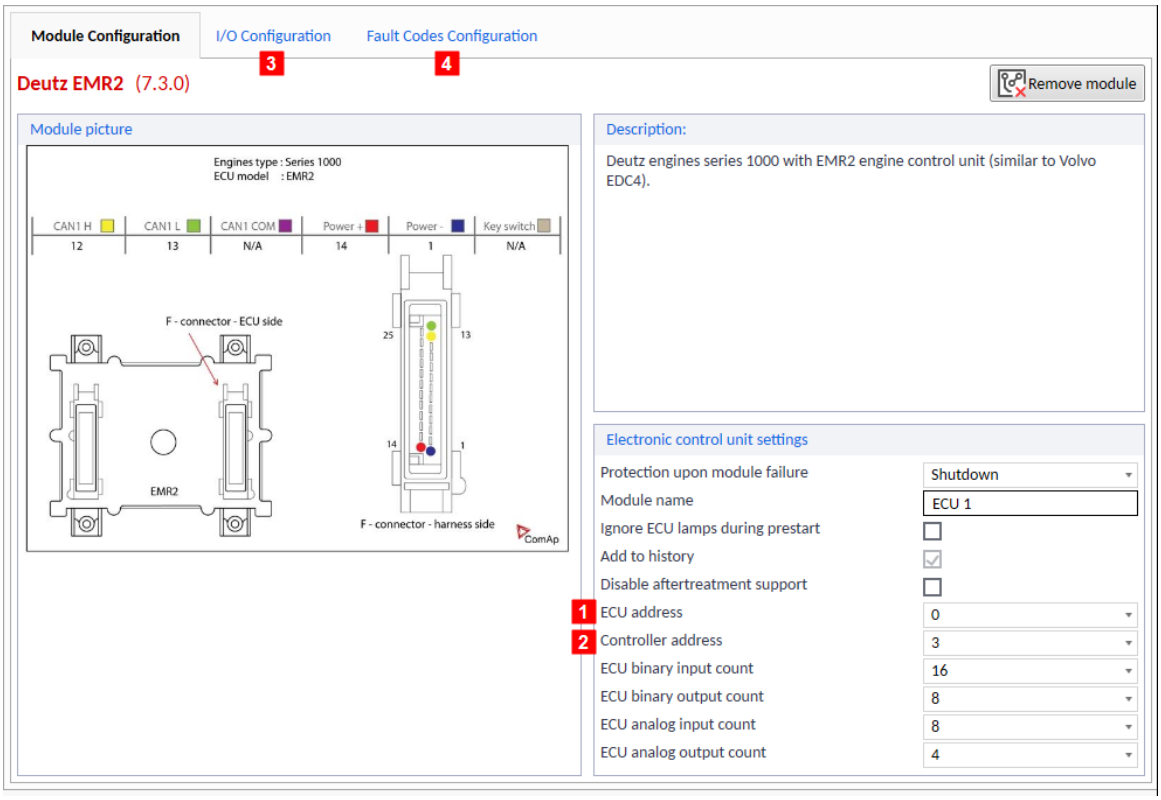
Note: *For more information* ***see Group: Maintenance Timers on page 365****.*

5.4.28 Multi ECU

InteliGen 500 G2 allows you to configure, monitor and control multiple Electronic Control Units (ECUs), such as Engine Control Units, AVR modules, Breakers and Modbus modules which are connected to the CAN. At this moment there are 4 (8 in the Extended features version) ECU slots available, each slot can contain one ECU which settings can be separately configured.

In order to ensure proper functionality you shall pay extra attention to settings ❶ ECU address and ❷ Controller address. ECU address has to be always unique whereas Controller address is required to be set to same value as **Subgroup: Controller Address (page 327)** of the Controller Unit that sends commands frames to this ECU.

Moreover you can now also modify ❸ I/O Configuration and recognized ❹ Fault Codes.



Note: *Module name effects name of the value screen shown on the controller.*

Controller objects related to ECU

ECU Slot	LBI	LBO	Alarm
1	**ECU Communication Fail Block 1 (page 720)**	**ECU 1 Comm Fail (page 779)**	**Wrn ECU 1 Comm Fail (page 871)**
2	**ECU Communication Fail Block 2 (page 720)**	**ECU 2 Comm Fail (page 779)**	**Wrn ECU 2 Comm Fail (page 871)**
3	**ECU Communication Fail Block 3 (page 721)**	**ECU 3 Comm Fail (page 779)**	**Wrn ECU 3 Comm Fail (page 872)**
4	**ECU Communication Fail Block 4 (page 721)**	**ECU 4 Comm Fail (page 780)**	**Wrn ECU 4 Comm Fail (page 872)**
5*	**ECU Communication Fail Block 5 (page 721)**	**ECU 5 Comm Fail (page 780)**	**Wrn ECU 5 Comm Fail (page 872)**
6*	**ECU Communication Fail Block 6 (page 721)**	**ECU 6 Comm Fail (page 780)**	**Wrn ECU 6 Comm Fail (page 872)**
7*	**ECU Communication Fail Block 7 (page 722)**	**ECU 7 Comm Fail (page 780)**	**Wrn ECU 7 Comm Fail (page 873)**
8*	**ECU Communication Fail Block 8 (page 722)**	**ECU 8 Comm Fail (page 781)**	**Wrn ECU 8 Comm Fail (page 873)**

Note: *ECU Blocks 5-8 are only available in the Extended features version.*

For each ECU there is LBO which gets activated when communication issue with respective ECU is detected. For easier detection whether all configured ECUs are communicating, there is LBO **ECU Comm OK (page**

781). During detected communication issue an alarm is issued for respective ECU. This alarm and all user protections related to respective ECU can be suppressed by appropriate LBI. To suppress all protections of all ECUs use LBI **ECU COMMUNICATION FAIL BLOCK (PAGE 720)**. See table above to find relative LBO, LBI and alarm to respective ECU slot.

All protections which evaluation depends on values from the ECU with communication error are blocked in order to prevent showing of invalid protections in the Alarm list.

5.4.29 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 741) 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 751)** 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 203)** settings. Please see this chapter for more information.

5.4.30 Operating Modes

Selecting the operating mode is done with the Left and the Right buttons on the front panel or by changing the **Controller Mode (page 322)** 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 750)**
- **Remote TEST (page 752)**
- **Remote MAN (page 750)**
- **Remote AUTO (page 749)**

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 405)** = GenRun) or is open or closed according to whether the mains is present or not (**MCB Opens On (page 405)** = MainsFail). No AMF or Power management function will be performed. The buttons MCB , GCB , Start and Stop including the appropriate binary inputs for external buttons are not active.

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

MAN

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

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

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

Controller does not respond to external signals and/or conditions. The gen-set is fully in manual control; there is no automatic way to stop it (except protections). The Gen-set stays running until STOP button is pressed. Controller does not take place in **Power management (page 203)** in MINT application.

AUTO

Gen-set is controlled based on external signal (**REMOTE START/STOP (PAGE 751)**) or by conditions (AMF, Power management system, …).

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

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

> **IMPORTANT: If a red alarm is present and the Gen-set is in AUT mode, it can start by itself after all red alarms become inactive and are acknowledged!!! To avoid this situation, adjust the setpoint Fault Reset To Manual (page 323) 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 752)**.

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 443)** the GCB will be closed and the Gen-set will supply the load. After the mains have recovered, the delay **Mains Return Delay (page 393)** 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 443)** 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 445)** and **Transfer Mains To Gen (page 444)** and on binary inputs **FORCE ISLAND (PAGE 728)** and **FORCE PARALLEL (PAGE 728)**.

5.4.31 Parallel to mains operation – MINT application

If the MCB is closed (**MCB FEEDBACK (PAGE 741)** 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 301)** 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 447)**. 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 447)** and the end level is given by **Generator Unload GCB Open Level (page 446)**.

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 741)** 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 301)**. Each loaded Gen-set takes equal part (relative to their nominal power) from **#System BaseLoad (page 301)** 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 301)** is also used for determining which Gen-sets have to run or not. Control is adjusted via setpoints **Load Int (page 442)** and **Load Gain (page 441)**.

PF control

If **MCB Feedback (page 741)** 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 301)**. 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 451)** and **PF Int (page 451)**.

5.4.32 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 447)**. The setpoint adjusts the ramp time for a change from 0 % to 100 % of nominal power.

It is possible to adjust the load start level by the setpoint **Ramp Start Level* (page 447)**.

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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 447)** and the end level is given by **Mains Unload MCB Open Window (page 446)**.

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 741)** and **GCB FEEDBACK (PAGE 735)** = active).

There are available two modes of load control. Type of control is adjusted via setpoint **Load Control PTM Mode (page 294)**.

Note: *In both modes, the lower level of the power is always limited by the setpoint* ***MINIMAL POWER PTM (PAGE 372)****. 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 Mode (page 294) = Baseload. Gen-set produces amount of the power given by setpoint **Baseload (page 298)**. The rest of power is supplied from the mains or exported to the mains (depends on proportions of load and **Baseload (page 298)** setpoint). Even in baseload control mode can be the Import/Export limited. This function can be activated by setpoint **Import/Export Limitation (page 300)** = Enabled. Then the request for the power of the Gen-set operating in baseload can be limited to prevent the Import/Export go below the limit given by setpoint **Import Load (page 299)**.

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

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

It is possible to set the baseload by LAI **LOAD CONTROL: ANEXT BASELOAD* (PAGE 833)**. For this purpose the setpoint **Load Request Source* (page 295)** has to be switched to Analog External Value.*

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

Import/Export

Load Control PTM Mode (page 294) = 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 299)**. 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.

It is possible to set the import/export by LAI **LOAD CONTROL: ANEXT IMP/EXP LOAD* (PAGE 833)**. For this purpose the setpoint **Load Request Source* (page 295)** has to be switched to Analog External Value.*

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

PF control

PF control ensures that the Gen-set keep the certain reactive load in parallel to mains operation (**MCB Feedback (page 741)** and **GCB Feedback (page 735)** = active).

There are available two modes of PF control. Type of control is adjusted via setpoint **PF Control PTM Mode (page 296)**.

Base PF

The power factor on the Gen-set is kept on the level given by the setpoint **BasePower Factor (page 299)** 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 Power Factor (page 300)**. Values >1 means that the Gen-set is pushing the capacitive power to the system (system Gen-set – Load – Mains), values <1 means that the Gen-set is pushing the inductive power to the system.

Transfers of load

Type of transfer of load between mains and Gen-set and vice versa is adjusted via setpoints **Transfer Gen To Mains (page 445)** and **Transfer Mains To Gen (page 444)**.

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 443)** 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 443)**. 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 443)**. 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 447)**. The transfer is succeed only when the Gen-set is fully loaded/unloaded (level of load when mains is considered as unloaded – Gen-set is loaded is adjusted via setpoint **Generator Unload GCB Open Level (page 446)**), level of load when Gen-set is considered as unloaded is adjusted via setpoint **Generator Unload GCB Open Level (page 446)**).

Transfer of load in MAN mode

Behavior of transfer of load in MAN mode is adjusted via setpoint **CB Control In MAN Mode (page 303)**. 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 728)**, **FORCE PARALLEL (PAGE 728)** and **REMOTE START/STOP (PAGE 751)**.

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

- **FORCE ISLAND (PAGE 728)** (highest priority).
- **REMOTE START/STOP (PAGE 751)**.
- **FORCE PARALLEL (PAGE 728)** (lowest priority).

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

Logical binary input	AUTO mode	TEST mode
FORCE ISLAND (PAGE 728)	When activated: › starts Gen-set › the transfer of load from mains to generator is done When deactivated: › the transfer of load from generator to mains is done › cooling and stopping of the Gen-set	The Gen-set is started anyway due to the TEST mode. When activated: › the transfer of load from mains to generator is done When deactivated: › the transfer of load from generator to mains is done
Remote Start/Stop (page 751)	When activated: › starts Gen-set › if mains parameters ok – synchronize, run in parallel › if mains parameters not ok – run in island When deactivated: › unloading (if Gen-setwas in parallel), cooling and stopping of the Gen-set	The Gen-set is started anyway due to the TEST mode. When activated: › if mains parameters ok – synchronize, run in parallel When deactivated: › unloading, of the Gen-set, opening GCB
FORCE PARALLEL (PAGE 728)	When activated: › check mains parameters – if not ok no action, if ok the procedure follows › starts the Gen-set, synchronize, parallel operation › in case of mains fail – Gen-set is stopped (if AMF function is disabled, otherwise it goes to island operation) When deactivated:	The Gen-set is started anyway due to the TEST mode. When activated: › check mains parameters – if not ok no action, if ok the procedure follows › synchronize, parallel operation When deactivated: › unloading, of the Gen-set, opening

Logical binary input	AUTO mode	TEST mode
	› unloading, cooling and stopping of the Gen-set	GCB

Type of transfer of load between mains and Gen-set and vice versa is adjusted via setpoints **Transfer Gen To Mains (page 445)** and **Transfer Mains To Gen (page 444)**.

5.4.33 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 306)** and for period longer than **Peak Shaving Start/Stop Delay (page 307)** the Gen-set is started. If load consumption decreases below **Peak Shaving Stop Level (page 306)** and period longer than **Peak Shaving Start/Stop Delay (page 307)** the Gen-set is stopped. The activation of the function is indicated by LBO: **PEAK SHAVING ACTIVE (PAGE 811)**.

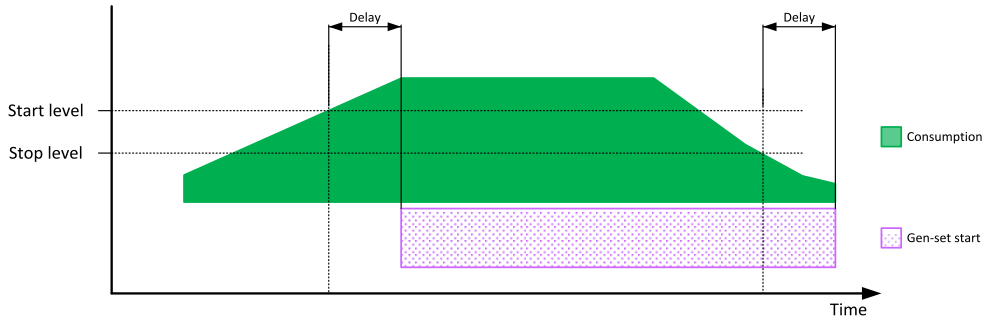


Image 5.99 Peak shaving

5.4.34 PLC

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

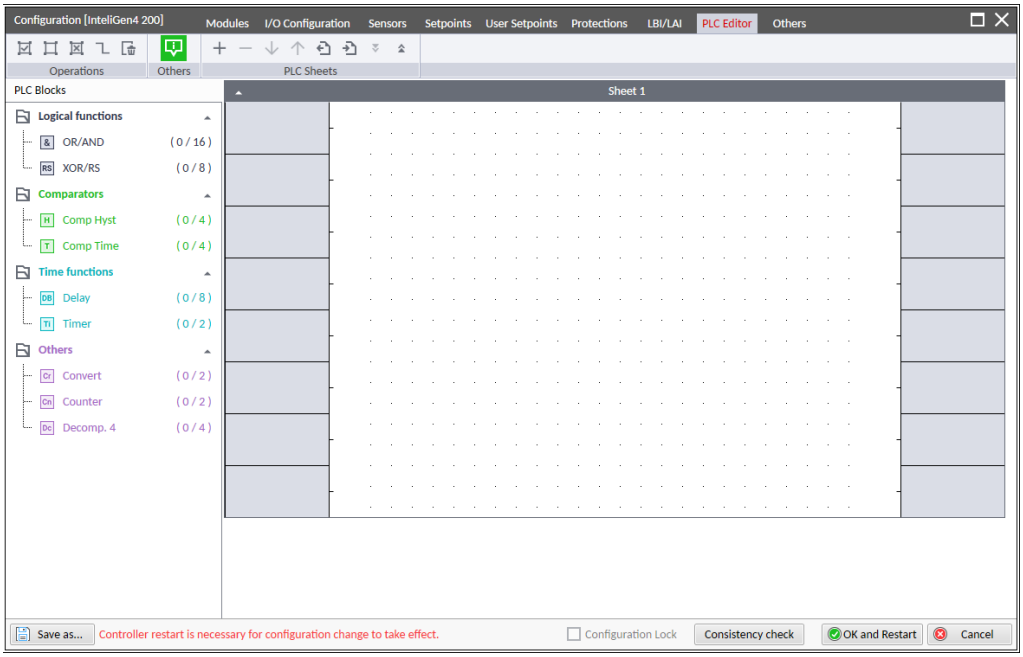


Image 5.100 PLC Editor main page

List of available PLC blocks

PLC block	Number of blocks in the Standard version	Number of blocks in the Extended features version
OR/AND	32	64
XOR/RS	16	32
Comparator with hysteresis (Comp Hyst)	4	4
Comparator with delay (Comp Time)	18	18
Comp Win	4	4
Math Fc	2	4
Interpolation	-	2
Math (AxB/C)±D	-	2
Timer	2	2
Delay	8	8
Ramp	-	2
Up/Down	-	2
Inc/Dec	-	2

LowPassFlt	-	1
Counter	2	2
Hold	-	2
Decomposer	4	4
Analog Switch	2	2
Convert	2	4

Working with the editor

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

- Adjust the sheet to your needs. See **Working with sheets (page 180)** for more information.
- Add PLC blocks into the sheets. See **Adding PLC blocks (page 181)** for more information.
- Define inputs and outputs of the PLC program. See **Define inputs and outputs (page 182)** for more information.
- Create connections between inputs, blocks and outputs. See **Creating wires (page 184)** for more information.
- Adjust properties of the blocks. See **List of PLC blocks (page 835)** for more information about blocks.

Working with sheets

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

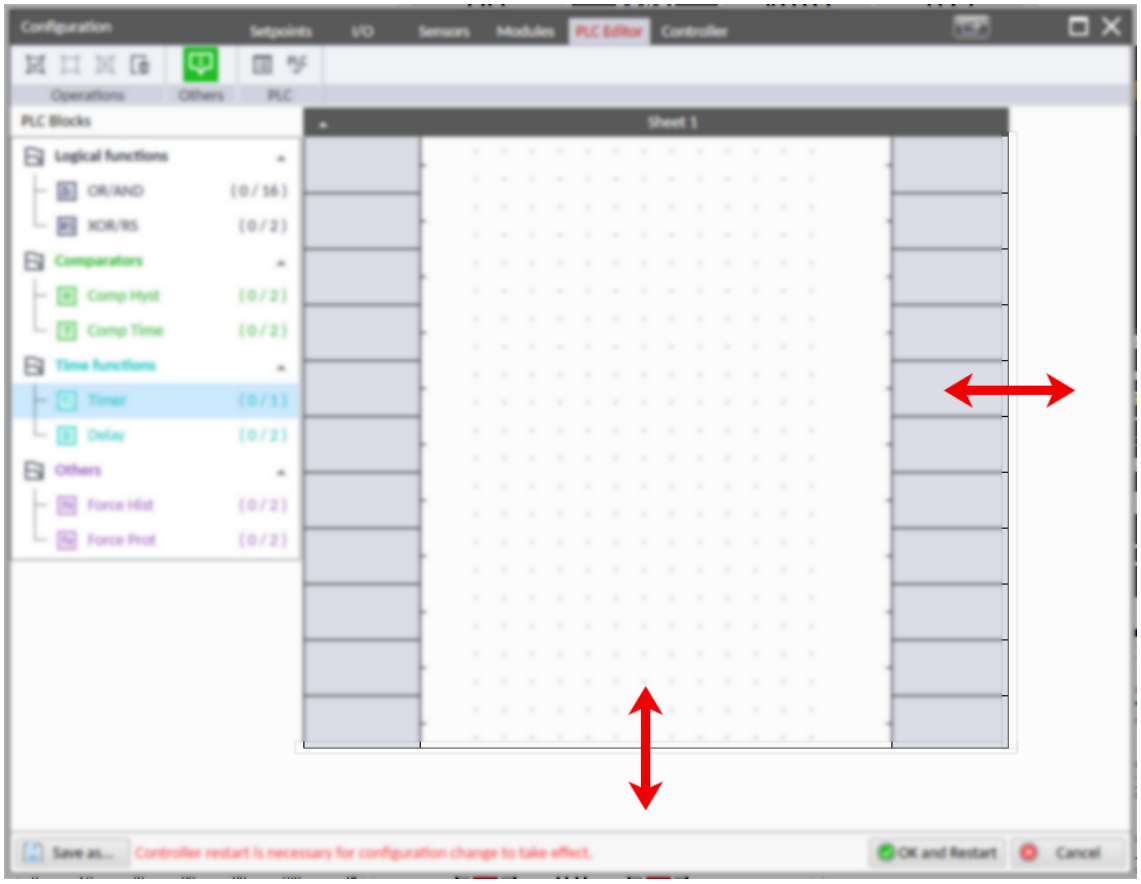


Image 5.101 Adjusting PLC sheet

Adding PLC blocks

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

- Select the required block from the list of available PLC blocks at the left and drag it into the sheet.
- Double-click on the block and adjust the properties of the block. See **List of PLC blocks (page 835)** for more information about blocks.
- Connect the block inputs and outputs by drawing wires in the sheet. See **Define inputs and outputs (page 182)** for more information. It is also possible to connected inputs and outputs via properties of selected PLC block.

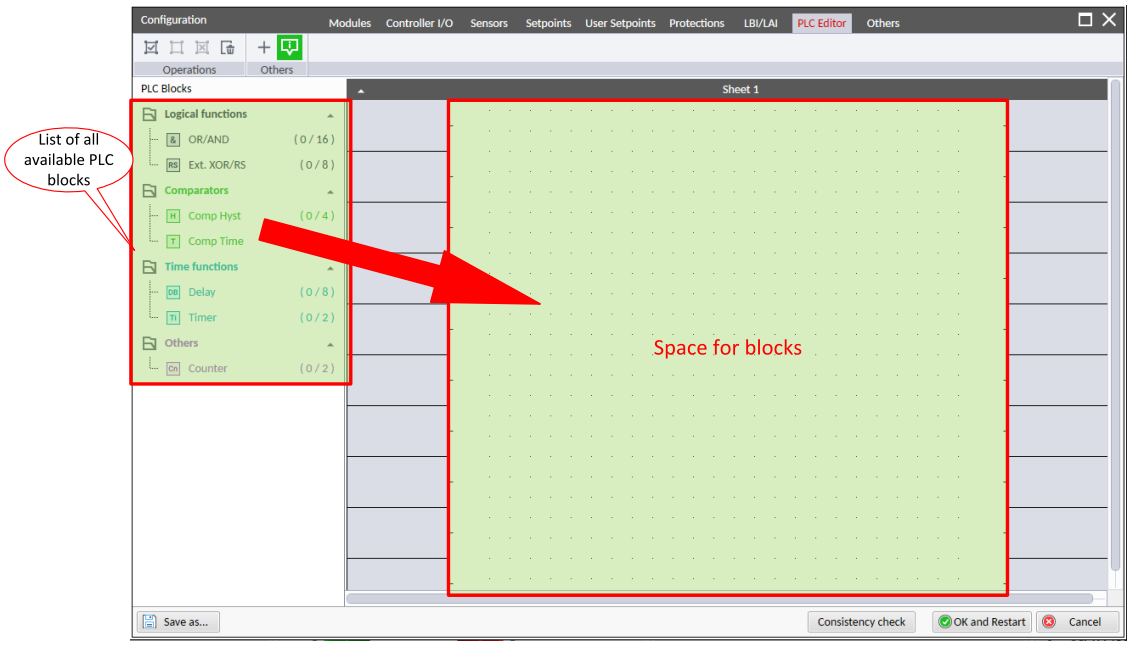


Image 5.102 Adding PLC blocks

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

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

Define inputs and outputs

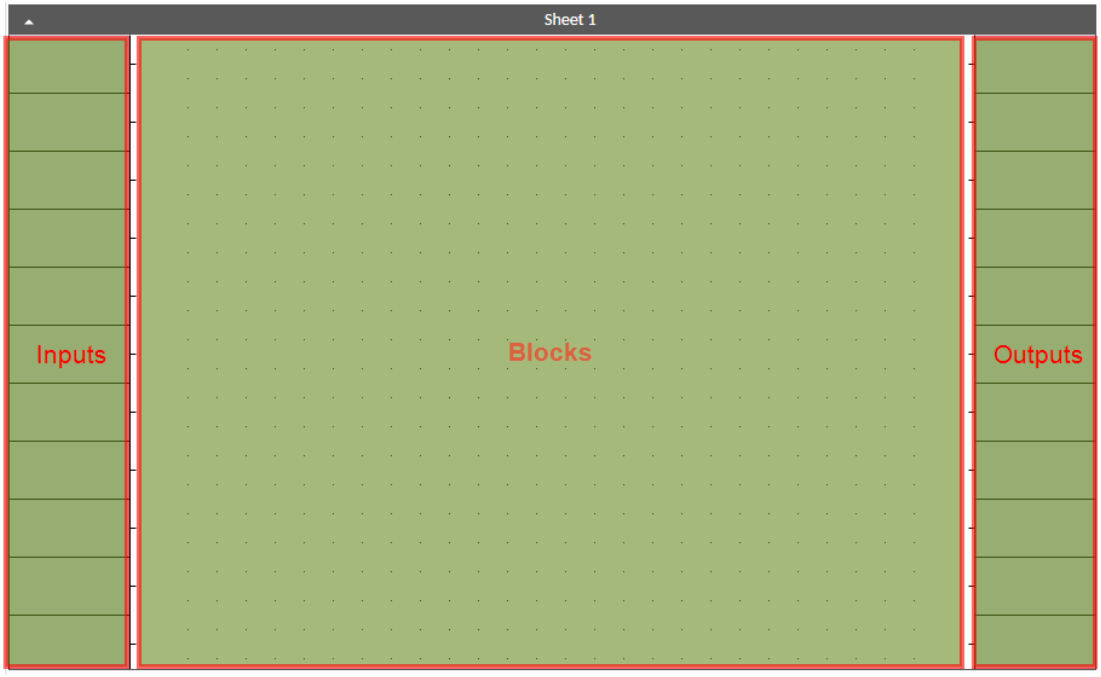


Image 5.103 Blank sheet of PLC Editor

Inputs

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

- Double-click on a free input position or existing input to add new input or edit the existing one.
- Select the source for the input.
  - If you create a binary input, you can select a source from the following categories:
    - Bin. values – this category contains all binary values available in the controller as binary inputs, logical binary outputs, fixed protection states, user buttons, user protection states.
    - PLC outputs – this category contains all PLC blocks binary outputs available in the controller.
  - If you create an analog input, you can select a source from the following categories:
    - Ana. values – this category contains all analog values available in the controller as analog inputs, electrical values, values from ECU etc.
    - All setpoints – this category contains all setpoints of the controller except the dedicated PLC setpoints. Names, resolutions and dimensions of these setpoints can not be modified.

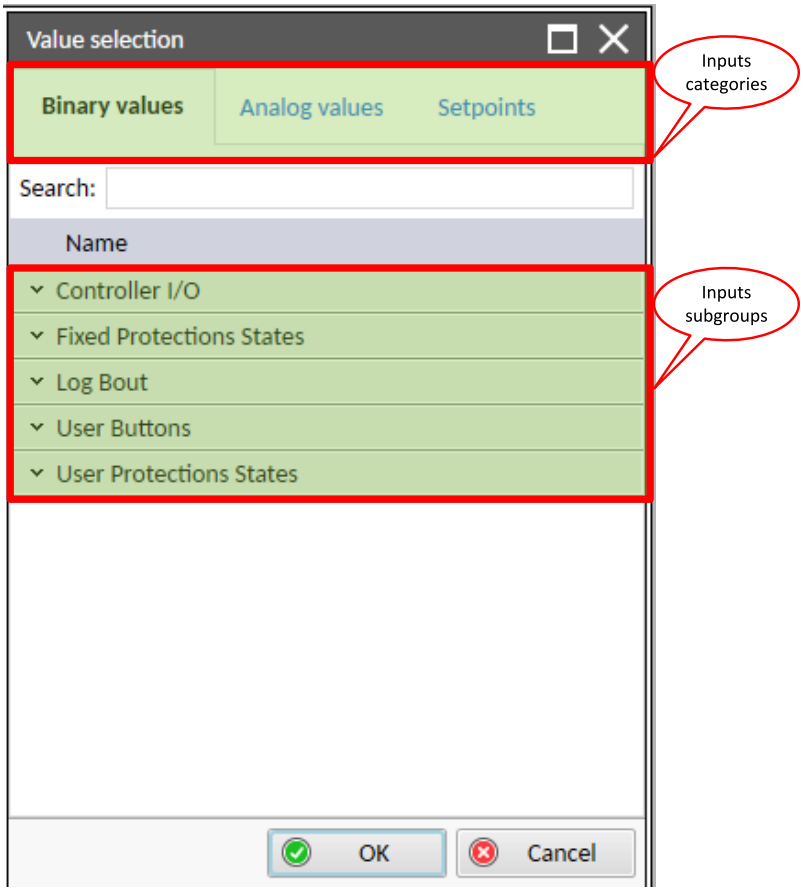


Image 5.104 PLC inputs

Outputs

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

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

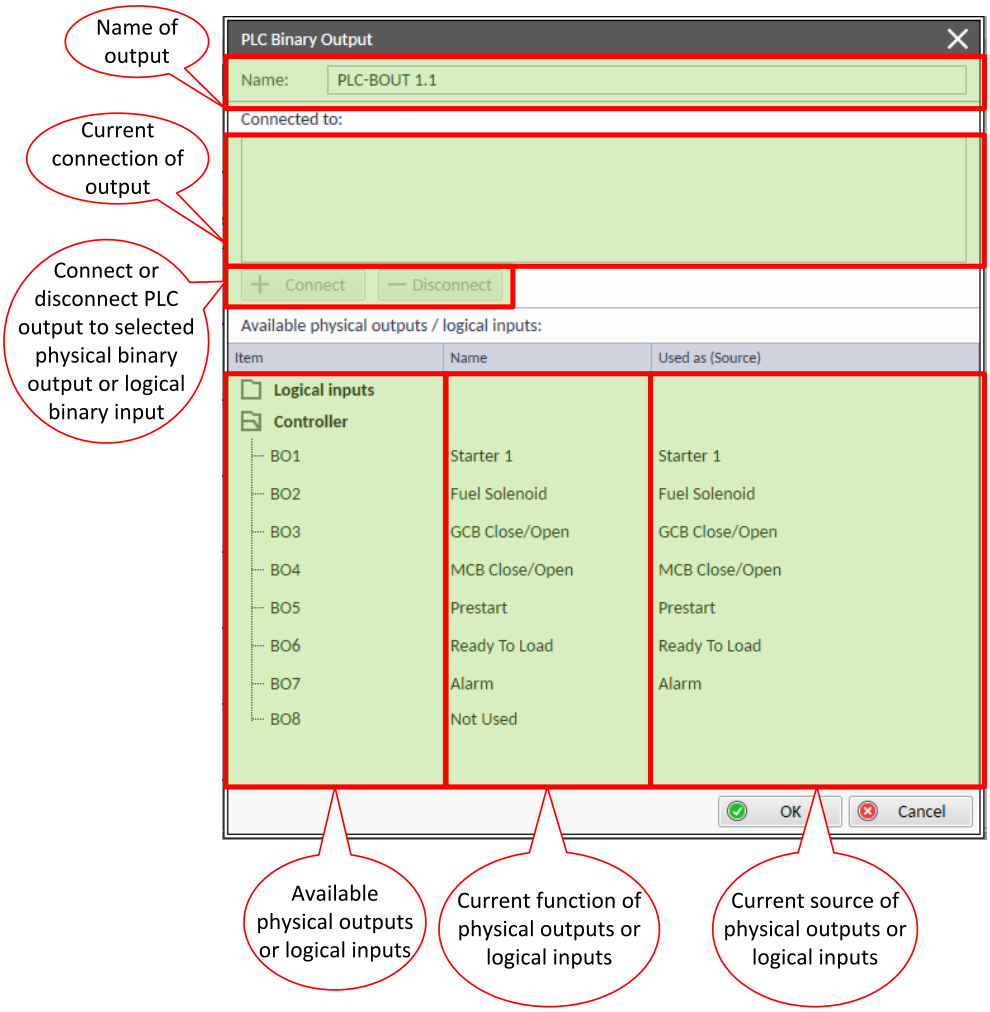


Image 5.105 PLC outputs

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

Creating wires

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

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

Follow the procedure below to create wire:

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

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

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

PLC logic execution rules

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

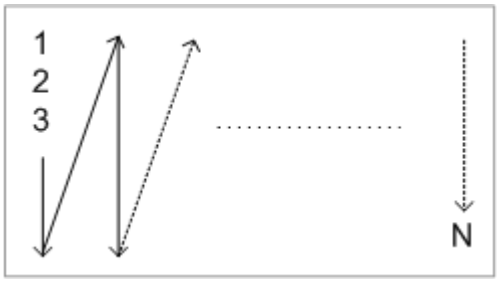
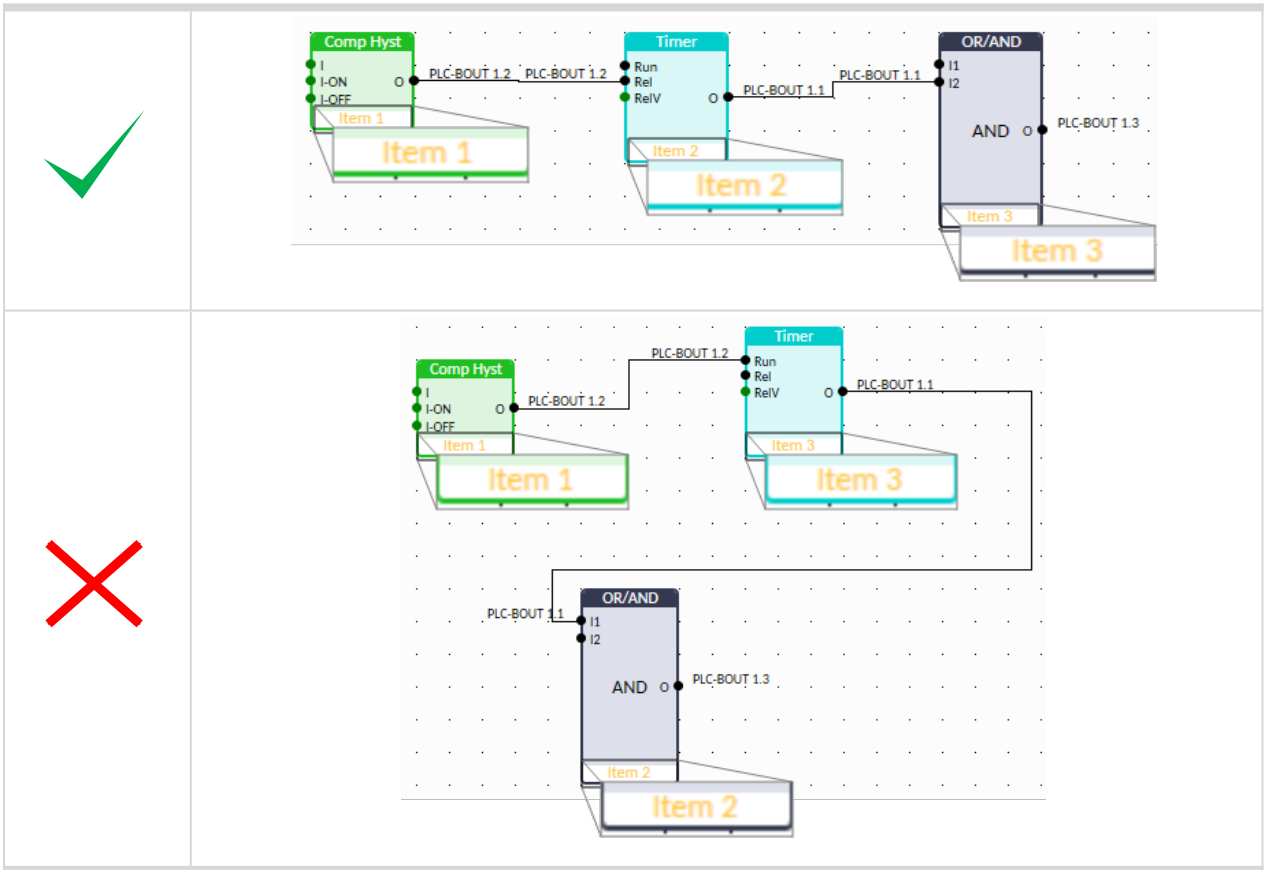


Image 5.106 PLC execution logic

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



Other functions

Consistency check

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

Delete whole content of sheet

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

Hints

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

PLC monitor

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

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

5.4.35 Prelubrication

This function keeps engine lubricated while it is not running. The function is adjusted by setpoints **Prelubrication Time (page 342)**, which determines for how long will be lubrication performed, and **Prelubrication Pause (page 342)**, which determines the pause between each prelubrication cycle. For whole time lubrication is performed is LBO **PRELUBRICATION PUMP (PAGE 812)** active.

Prelubrication Cycle starts with active LBO **PRELUBRICATION PUMP (PAGE 812)** when:

- Controller power supply is switched on
- **Controller Mode (page 322)** changes from OFF to MAN or AUT
- **E-Stop (page 58)** or LBI **EMERGENCY STOP (PAGE 725)** was reconnected
- LBI **EMERGENCY MAN (PAGE 724)** is deactivated

Note: *Prelubrication Cycle has to be enabled, i.e.* ***Prelubrication Time (page 342)*** *!= OFF*

In this situation alarm **ALI Not Lubricated (page 894)** is active until the first lubrication cycle is completed. Start of the engine is blocked for this period.

After the period adjusted by **Prelubrication Time (page 342)** the LBO **PRELUBRICATION PUMP (PAGE 812)** is deactivated for the period adjusted by **Prelubrication Pause (page 342)** after which whole cycle repeats.

The engine is allowed to be started up when LBO **PRELUBRICATION PUMP (PAGE 812)** is active due to standard Prelubrication cycle. In this case LBO **PRELUBRICATION PUMP (PAGE 812)** is deactivated with activation of LBO **CRANKING (PAGE 777)** and stays deactivated until the engine is running.

In case of unsuccessful start Prelubrication cycle starts with active phase (LBO **PRELUBRICATION PUMP (PAGE 812)** is activated). In case of successful start and subsequent STOP of the engine (no matter of purpose) Prelubrication cycle continues with deactivated phase (LBO **PRELUBRICATION PUMP (PAGE 812)** is deactivated).

5.4.36 Protections

Fixed Protections

Fixed protections are built in protections for Generator, Engine, Mains or for other functionalities (battery voltage, fuel theft, D+, etc…). Their purpose is to inform or perform actions when the malfunction is detected.

Fixed Protection types

Name	Level	Abbreviation	Alarm List	History	Fault Reset needed	LBO Horn activation (inc. Flashing)	LBO Alarm activation (inc. Flashing)	Action: CB open	Action: Gen-set stop	SD Override blocking	Common LBO
Mains protection	2	MP	-	✓	-	-	-	✓	-	-	COMMON MAINS PROTECTION (PAGE 769)
History Record Only	1	Hst	-	✓	-	-	-	-	-	-	-
Alarm List Indication	1	ALI	✓	-	-	-	-	-	-	-	-
Alarmlist indication + history record	1	AHI	✓	✓	-	-	-	-	-	-	-
Alarm only	1	-	✓	-	✓	✓	✓	-	-	-	-
Warning	1	Wrn	✓	✓	✓	✓	✓	-	-	-	AL COMMON WRN (PAGE 770)
Shutdown	2	Sd	✓	✓	✓	✓	✓	✓	✓	✓	AL COMMON SD (PAGE 769)
Breaker Open & Cool Down	2	BOC	✓	✓	✓	✓	✓	✓	✓	✓	AL COMMON BOC (PAGE 768)
Slow stop	2	Stp	✓	✓	✓	✓	✓	✓	✓	✓	AL COMMON STP (PAGE 770)
Shutdown Override	2	Sd	✓	✓	✓	✓	✓	✓	✓	-	

Protection blocking

Engine and generator fixed protections are blocked during starting phases or Ready and Stop states. They become unblocked once **Maximal Stabilization Time (page 340)** has elapsed or GCB is closed whichever happens first.

Exceptions are:

- Overspeed protection which has two limits defined via setpoints **Overspeed Sd (page 349)** and **Starting Overspeed Sd (page 349)**. Starting Overspeed limit is considered in the starting phase till Starting Overspeed Time elapses. This time starts to count once the RPM exceeds the value of **Starting RPM (page 334)**.
- E-Stop and Emergency stop

The other way fixed protections can be blocked is by active LBI **SD OVERRIDE (PAGE 754)**.

Note: *LBI **SD OVERRIDE (PAGE 754)** (Shutdown Override) does not block evaluation of fixed protection conditions and their visualization. They are recorded into alarm list or history. It only blocks their actions. Shutdown Override blocks all level 2 (Sd, BOC) fixed protection. It does not block level 1 (Wrn, AHI, Hist) or protection of type Sd Override.*

Some generators or engine protections have an option to DISABLE the protection.

The setting is done by using the setpoint which is associated to the fixed protection. Each setpoint offers these options.

Setpoint options

Options	Description
Enable	Protection is enabled
Disable	Protection is blocked
ExtDisable	Disabling of the protection can be forced by LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)**
ExtDisable 2	Available only in extended archive
ExtDisable 3	Available only in extended archive

Generator and engine protections lists

Generator protections

	Setpoint for protection ON / OFF	Alarms / Protection name
Current	*Always active*	**BOC Short Circuit (page 940)**
	IDMT Generator >A Protection (page 383)	**BOC Overcurrent IDMT (page 936)**
	Generator Current Unbalance Protection (page 383)	**BOC Current Unbalance (page 911)**
Frequency	**Generator Frequency Protection (page 388)**	**BOC Generator Overfrequency (page 924)**
	Generator Frequency Protection (page 388)	**BOC Generator Underfrequency (page 924)**

	Setpoint for protection ON / OFF	Alarms / Protection name
Others	*Always active*	**ALI Gen Ph L1 Inverted (page 879)**
	Always active	**ALI Gen Ph L2 Inverted (page 880)**
	Always active	**ALI Gen Ph L3 Inverted (page 880)**
	Always active	**ALI Gen Ph Rotation Opposite (page 880)**
	Earth Fault Current Protection (page 626)	**Sd Earth Fault Current (page 912)**
Power	**Overload Protection (page 382)**	**BOC Overload (page 937)**
	Reverse Power Protection (page 390)	**BOC Reverse Power (page 938)**
	Excitation Loss Protection (page 391)	**BOC Excitation Loss (page 917)**
Voltage	**Generator <> Voltage Protection (page 385)**	**Sd Generator L1 Overvoltage (page 919)**
		Sd Generator L2 Overvoltage (page 920)
		Sd Generator L3 Overvoltage (page 920)
		Sd Generator L1L2 Overvoltage (page 920)
		Sd Generator L2L3 Overvoltage (page 921)
		Sd Generator L3L1 Overvoltage (page 921)
		BOC Generator L1 Undervoltage (page 921)
		BOC Generator L2 Undervoltage (page 921)
		BOC Generator L3 Undervoltage (page 922)
		BOC Generator L1L2 Undervoltage (page 922)
		BOC Generator L2L3 Undervoltage (page 922)
		BOC Generator L3L1 Undervoltage (page 922)
	Generator V Unbalance Protection (page 386)	**BOC Gen Voltage Unbalance Ph-N (page 919)**
		BOC Gen Voltage Unbalance Ph-Ph (page 919)

Engine protections

	Protection Enable / Disable	Alarms / Protection name
Speed	*Always active*	**Sd Overspeed (page 937)**
	Underspeed Protection (page 392)	**Sd Underspeed (page 942)**

Mains protections

	Alarms / Protection name
Frequency	**Mains/Bus Overfrequency (page 907)**
	Mains/Bus Underfrequency (page 907)
Others	**ALI Mains Ph L1 Inverted (page 884)**
	ALI Mains Ph L2 Inverted (page 885)
	ALI Mains Ph L3 Inverted (page 885)
	ALI Mains Ph Rotation Opposite (page 885)
	ALI Bus Ph L1 Inverted (page 870)
	ALI Bus Ph L2 Inverted (page 870)
	ALI Bus Ph L3 Inverted (page 870)
	ALI Bus Ph Rotation Opposite (page 870)
Voltage	**MP Mains/Bus L1 Overvoltage (page 925)**
	MP Mains/Bus L1 Undervoltage (page 925)
	MP Mains/Bus L2 Overvoltage (page 926)
	MP Mains/Bus L2 Undervoltage (page 926)
	MP Mains/Bus L3 Overvoltage (page 927)
	MP Mains/Bus L3 Overvoltage (page 927)
	MP Mains/Bus L1L2 Overvoltage (page 926)
	MP Mains/Bus L1L2 Undervoltage (page 926)
	MP Mains/Bus L2L3 Overvoltage (page 927)
	MP Mains/Bus L2L3 Undervoltage (page 927)
	MP Mains/Bus L3L1 Overvoltage (page 928)
	MP Mains/Bus L3L1 Undervoltage (page 928)
	Mains Voltage Unbalance ph-n (page 885)
	Mains Voltage Unbalance ph-ph (page 886)

User Protections

InteliGen 500 G2 allows users to configure their own protections to any analog input or binary input/output. Only one protection of 1st level and/or one protection of 2nd level can be configured on logical binary input/output. More than one protection can be configured on analog input. Max simultaneous number of configured user protections is 128.

Source upon which the protection is configured can be selected. It can be any analog value or binary state.

Source

Analog values	Binary states
› Analog inputs » Controller, Modules › Values » ECU, Generator, Mains, others › Statistics	› Binary inputs » Controller, Modules, ECU › Binary outputs » PLC › Protection states › LBOs

Protection activation

Type	Name of activation	Description
Analog	Over Limit	Protection is activated if value is over limit.
	Over Limit + Fls	Protection is activated if value is over limit or in a fault state.
	Under Limit	Protection is activated if value is under limit.
	Under Limit + Fls	Protection is activated if value is under limit or in a fault state.
	Fls only	Protection is activated if value is in a fault state.
Binary	True	Protection is activated if value is Logical 1.
	TrueOrFls	Protection is activated if value is Logical 1 or in a fault state.
	False	Protection is activated if value is Logical 0.
	FalseOrFls	Protection is activated if value is Logical 0 or in a fault state.

User Protection types

Name	Level	Abbreviation	Alarm List	History	Fault Reset needed	LBO Horn activation (inc. Flashing)	LBO Alarm activation (inc. Flashing)	Action: CB open	Action: Gen-set stop	SD Override blocking	Common LBO
Mains protection	2	MP	-	✓	-	-	-	✓	-	-	**Common Mains Protection (page 769)**
Slow stop	2	Stp	✓	✓	✓	✓	✓	✓	✓	✓	**AL Common Stp (page 770)**
Offload	2	OfL	✓	✓	✓	✓	✓	✓	✓	✓	**AL Common Off Load (page 769)**
History Record Only	1	Hst	-	✓	-	-	-	-	-	-	-
Alarm List Indication	1	ALI	✓	-	-	-	-	-	-	-	-
Alarmlist indication + history record	1	AHI	✓	✓	-	-	-	-	-	-	-
Alarm only	1	-	✓	-	✓	✓	✓	-	-	-	-
Warning	1	Wrn	✓	✓	✓	✓	✓	-	-	-	**AL Common Wrn (page 770)**
Shutdown	2	Sd	✓	✓	✓	✓	✓	✓	✓	✓	**AL Common Sd (page 769)**
Breaker Open & Cool Down	2	BOC	✓	✓	✓	✓	✓	✓	✓	✓	**AL Common BOC (page 768)**
Slow stop	2	Stp	✓	✓	✓	✓	✓	✓	✓	✓	**AL Common Stp (page 770)**
Shutdown Override	2	Sd	✓	✓	✓	✓	✓	✓	✓	-	

Protection blocking

It is possible to configure one Protection Blocking to any **User Protections (page 192)**. This function is used to block certain protections when their function is unwanted or meaningless. Each user protection has an option to set the blocking condition.

Protection blocking

Block Type	Description
All the time	The protection is not blocked. It can be blocked only by LBI **SD OVERRIDE (PAGE 754)**.
Run Only Block Delay	The protection is blocked depending on engine state and time defined by setpoint **Run Only Block Delay (page 341)**. It can also be blocked by LBI **SD OVERRIDE (PAGE 754)**.
Force Block	The protection is blocked by LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** or by LBI **SD OVERRIDE (PAGE 754)**.
Force Block 2	Available only in extended archive
Force Block 3	Available only in extended archive
Electrical Protection	The protection is blocked depending on engine state. It is unblocked once **Maximal Stabilization Time (page 340)** is elapsed or GCB is closed. It can also be blocked by LBI **SD OVERRIDE (PAGE 754)**.

Note: *LBI **SD OVERRIDE (PAGE 754)** (Shutdown Override) does not block evaluation of user protection conditions and their visualization. They are recorded into alarm list or history. It only blocks their actions. Shutdown Override blocks all level 2 (Sd,BOC) protection. It does not block level 1 (Wrn, AHI, Hist) or protection of type **SD OVERRIDE (PAGE 754)**.*

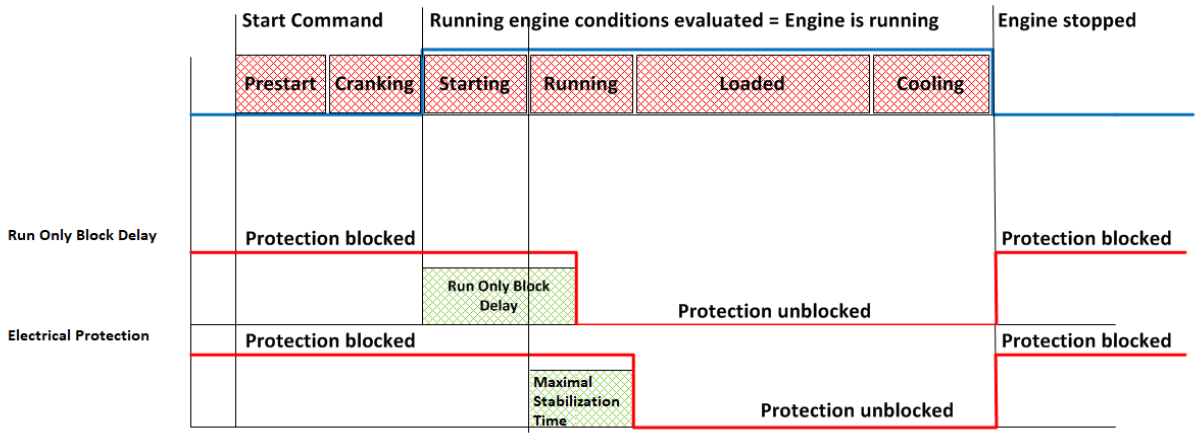


Image 5.107 Run only block delay and electrical protection blocking

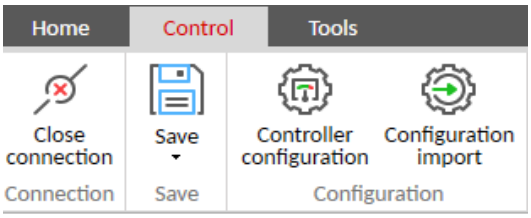
History record

- Always – History is recorded all the time.
- Once – History is recorded only once after fault reset.

Note: *Every User protection is evaluated with period 0.1 s.*

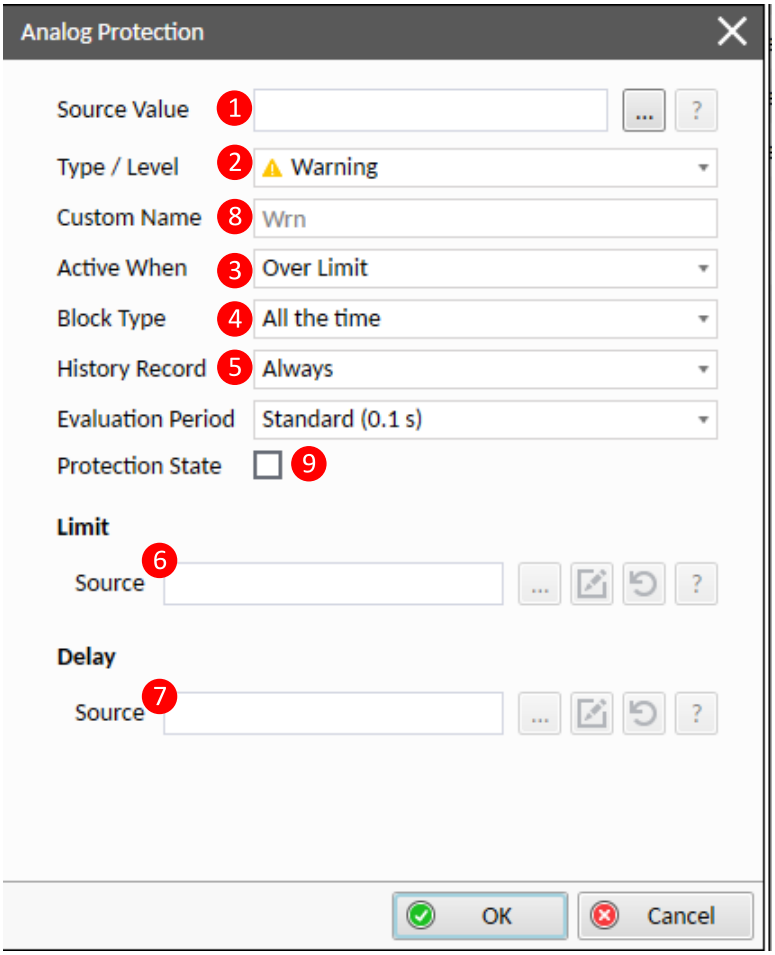
Configuration of protections in InteliConfig

Control tab → Controller configuration → Protections tab → Analog / Binary protections



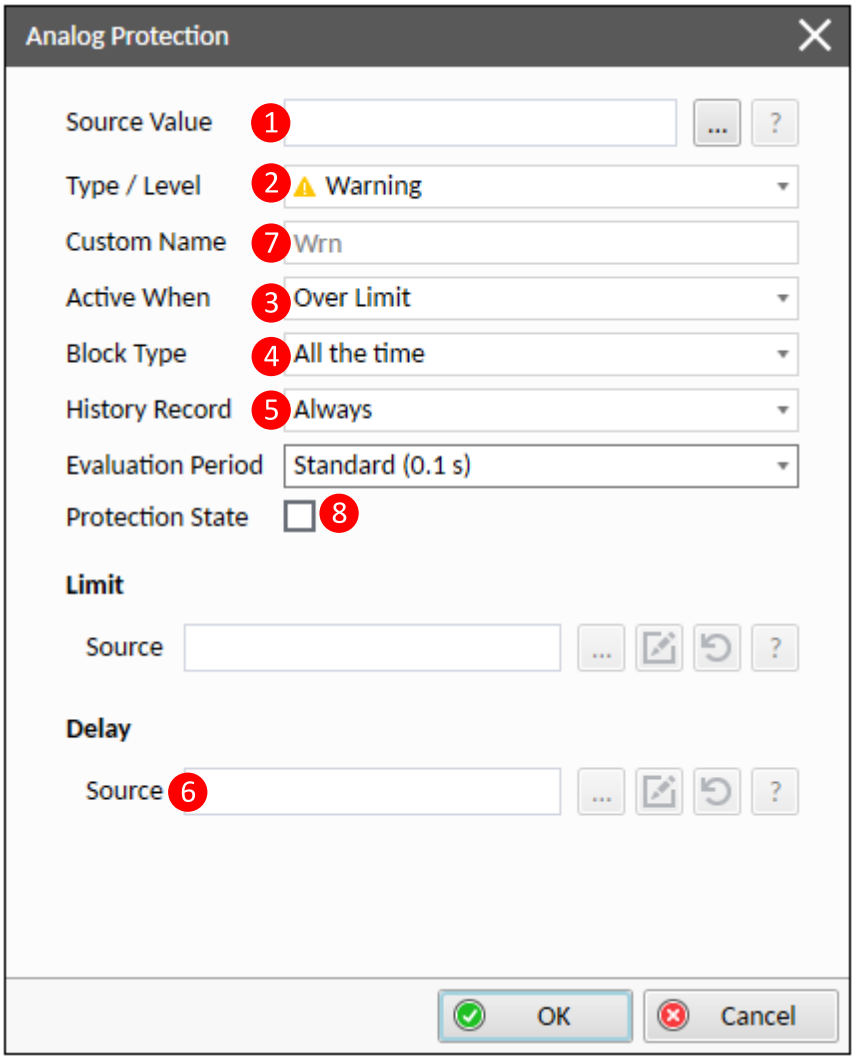
1	Select the desired protections to be configured (Analog protections / Binary protections).
2	Add protection by clicking on the icon  . Delete selected protection by clicking on the icon  . Edit selected protection by clicking on the icon  .

Adding analog protection



1	Selecting the input source **see User Protections on page 192**.
2	Selecting the protection type **see Fixed Protection types on page 188**.
3	Selecting the protection activation **see Protection activation on page 192**.
4	Selecting the block type **see Protection blocking on page 194**.
5	Selecting if the occurrence of a protection is recorded every time or only once after a Fault Reset.
6	Selecting the input for limit. Setpoints must have the correct resolution and dimension as protection source value. › Existing setpoint › New user setpoint › Existing user setpoint Prefix is added to the name based on protection type / level
7	Selecting the input for delay. Setpoints must have the correct resolution **0.1** and dimension **[s]** › Existing setpoint › New user setpoint › Existing user setpoint Prefix is added to the name based on protection type / level.
8	Text input for Alarm / History message.
9	If user protection state is checked then created user protection has LBO located in Bin Values in the **Group: User Protection States (page 684)**.

Adding binary protection



1	Selecting the input source **see User Protections on page 192**.
2	Selecting the protection type **see Fixed Protection types on page 188**.
3	Selecting the protection activation **see Protection activation on page 192**.
4	Selecting the block type **see Protection blocking on page 194**.
5	Selecting if the occurrence of a protection is recorded every time or only once after a Fault Reset.

6	Selecting the input for delay. Setpoints must have the correct resolution **0.1** and dimension **[s]** › Existing setpoint › New user setpoint › Existing user setpoint
7	Text input for Alarm / History message
8	If user protection state is checked then created user protection has LBO located in Bin Values in the **Group: User Protection States (page 684)**.

Protection states

Protection states are states of fixed and user protections. These states can be configured as binary output or used in PLC logic.

Fixed protection states

Important **Fixed Protections (page 187)** have a protection state. The protection state is (usually) named the same as the alarm. Fixed protection states are in a group of 32 values.

Protection states groups:

- **Fixed Protections States 1 (page 682)**
- **Fixed Protections States 2 (page 682)**
- **Fixed Protections States 3 (page 683)**
- **Fixed Protections States 4 (page 683)**
- **Fixed Protections States 5 (page 683)**

User protections states

During the **Configuration of protections in InteliConfig (page 195)**, you can decide whether you want to add user protection state for the protection. The name is the same as the alarm's message.

User protection states are in a group of 32 values.

Note: *Group of User protection states is showed only when there is at least 1 protection state in it.*

Protection states group:

- **User Protections States 1 (page 684)**

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.

Analog input alarm evaluation principle

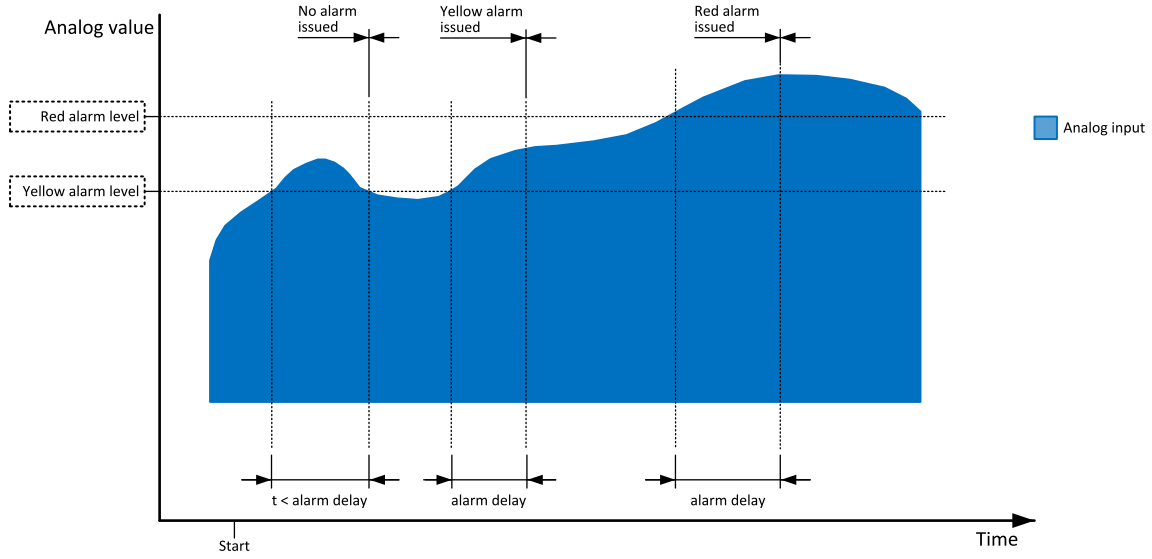


Image 5.108 Analog input alarm evaluation principle

Alarm handling

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

- The alarm is evaluated all the time the controller is switched on.
- The alarm is evaluated only when the engine is running. This type should be used for e.g. oil pressure. These alarms begin to be evaluated after the engine has been started with the delay given by the setpoint **Run Only Block Delay (page 341)**.
- 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 340)** 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.
- The alarm is evaluated only when LBI **Protection Force Disable 1 (page 745)** is not active.

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 725)**, all active alarms change to confirmed state. Confirmed alarms will disappear from the Alarm list as soon as the respective condition dismisses. If the condition is dismissed before acknowledging the alarm, the alarm will remain in the Alarm list as Inactive.

Note: *The input **SD Override (page 754)** can be used for temporary disabling of red alarms to shutdown the engine. This input may be used in situations where providing the power is extremely important – e.g. if the Gen-set drives pumps for fire extinguishers (sprinklers).*

Alarm states

An alarm can have the following states:

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

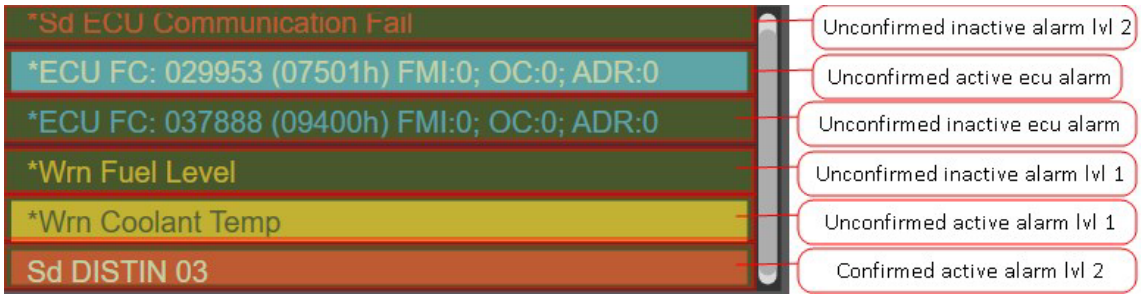


Image 5.109 Alarm List

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 Alarm list and is recorded into the history log. Activates the output **AL COMMON WRN (PAGE 770)** as well as the standard alarm outputs (**HORN (PAGE 797)** and **ALARM (PAGE 772)**).

Alarm only

The alarm appears in the Alarm list. Standard alarm outputs (**HORN (PAGE 797)** and **ALARM (PAGE 772)**) are activated.

Alarm list indication + History record (AHI)

The alarm appears in the Alarm list and is recorded into the history log.

Alarm list indication (ALI)

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 797)** and **ALARM (PAGE 772)**) are not activated.

History record only (Hst)

The event is recorded into the history. Standard alarm outputs (**HORN (PAGE 797)** and **ALARM (PAGE 772)**) are not activated.

Alarm types – Level 2

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

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

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

Shutdown (Sd)

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

while there is a shutdown alarm in the Alarm list. Activates the output **AL COMMON SD (PAGE 769)** as well as the standard alarm outputs (**HORN (PAGE 797)** and **ALARM (PAGE 772)**).

Shutdown override

If the Logical binary input **SD OVERRIDE (PAGE 754)** is closed, all 2nd level protections are disabled to allow the Gen-set run in an emergency situation, e.g. sprinkler devices power supply.

All protections are shown in Alarmlist and recorded into History, but the controller does not stop the engine because of them. If the input is deactivated and some protections are still active or not yet reset, the controller starts to take these protections into account and consequently stops the engine.

All 2nd level protections are locked out, except of these:

- Emergency stop
- Overspeed
- Underspeed
- Binary and analog protections configured as Sd override type. In fact this protection type means "Unoverridable shutdown", i.e. it works the same way as standard shutdown protection, however it cannot be overridden (blocked) by the **SD OVERRIDE (PAGE 754)** input.

Breaker open and cool down (BOC)

The event appears in the Alarm list and is recorded into the history log. It causes immediate opening of the GCB and then the standard stop sequence with cooling follows. The Gen-set cannot be started again while there is a BOC alarm in the Alarm list. Activates the output **AL COMMON BOC (PAGE 768)** as well as the standard alarm outputs (**HORN (PAGE 797)** and **ALARM (PAGE 772)**).

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 770)** as well as the standard alarm outputs (**HORN (PAGE 797)** and **ALARM (PAGE 772)**).

Offload

The alarm appears in the alarmlist and is recorded into the history log. It causes immediate opening of the GCB. In AUTO mode the Gen-set remains running for 60 seconds and then it's stopped by the standard stop sequence. In MAN mode the Gen-set remains running until the operator changes it's operational state manually. If the controller is in AUTO mode and all previously active Off load alarms disappeared the Gen-set is automatically started back and connected to the load if the condition for the Gen-set to be running persists.

It activates the output AL COMMON OFF LOAD (PAGE) as well as the standard alarm outputs (**HORN (PAGE 797)** and **ALARM (PAGE 772)**).

Sensor failure detection (FLS)

If the measured resistance on an analog input exceeds the valid range, a sensor failure will be detected and a sensor failure message will appear in the **Alarm list (page 202)**. The valid range is defined by the far left (RL) and far right (RH) points of the sensor characteristic ±12.5 % from RH-RL.

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

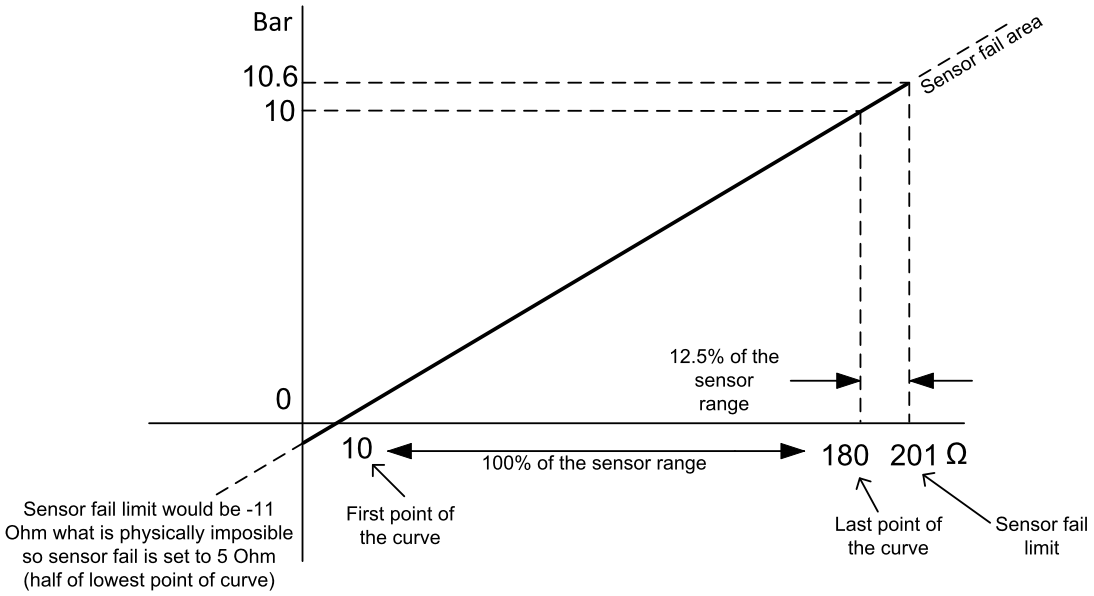


Image 5.110 Sensor failure detection principle

Remote alarm messaging

If the communication plug-in module is connected to the controller, the controller can send SMS messages (CM2-4G-GPS module) and emails (onboard ethernet, CM2-4G-GPS or CM3-Ethernet modules) at the moment when a new alarm appears in the **Alarm list (page 202)** or new event is written in the **History log (page 165)**. The message will contain a copy of the **Alarm list (page 202)** or reasons from the **History log (page 165)**. To enable this function first to check the controller internet connection (**Subgroup: TCP/IP Settings (page 584)** for onboard ethernet or **Subgroup: TCP/IP Settings (page 567)/Subgroup: Cellular Interface (page 563)** for CM2-4G-GPS). Then adjust setpoints **Event Message (page 622)**, **Wrn Message (page 603)**, **BOC Message (page 622)** and **Sd Message (page 623)** to ON. Also enter a valid GSM phone number or email address to the setpoints **Telephone Number 1 (page 579)**, **Telephone Number 2 (page 580)**, **Telephone Number 3 (page 580)**, **Telephone Number 4 (page 581)**, **Email Address 1 (page 619)**, **Email Address 2 (page 620)**,**Email Address 3 (page 620)**, and **Email Address 4 (page 621)**.

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
CM3-Ethernet	no	no	no	no	yes	yes	yes	yes
CM2-4G-GPS	yes	yes	yes	yes	yes*	yes*	yes*	yes*

Note: ** Only with enabled **Internet Connection (page 563)**.*

Alarm list

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

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

Alarm list contains three types of alarms:

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

Controller built-in alarms

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

User configured alarms

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

ECU alarms

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

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

5.4.37 Power formats and units

InteliGen 500 G2 allows users to choose from several Power Formats that affect dimensions in which values and some setpoints are interpreted or adjusted. Power formats and units can be changed with InteliConfig in the following way. Control tab → Controller configuration → Others tab → Units/Power format

Power formats are available in decimal and non decimal format. Units can be changed to metric or US units.

Units

Metric	20 °C	10.0 bar	11.4 l/h
US	68 °F	145 psi	3.01 gph

Power Format

Identification/Name	Power	Voltage	Current	Availability
Small	0.1 kW / kVA / kVAr	1 V	1 A	Standard
Standard	1 kW / kVA / kVAr	1 V	1 A	Standard
Large LV*	0.01 MW / MVA / MVAr	1 V	1 A	Extended features version
Large HV*	0.01 MW / MVA / MVAr	0.01 kV	1 A	Extended features version

Range of some setpoints and values is changed significantly when different Power Formats are selected. Affected setpoint are displayed during selection of power format.

5.4.38 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 416)** 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 415)** 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 751)**.

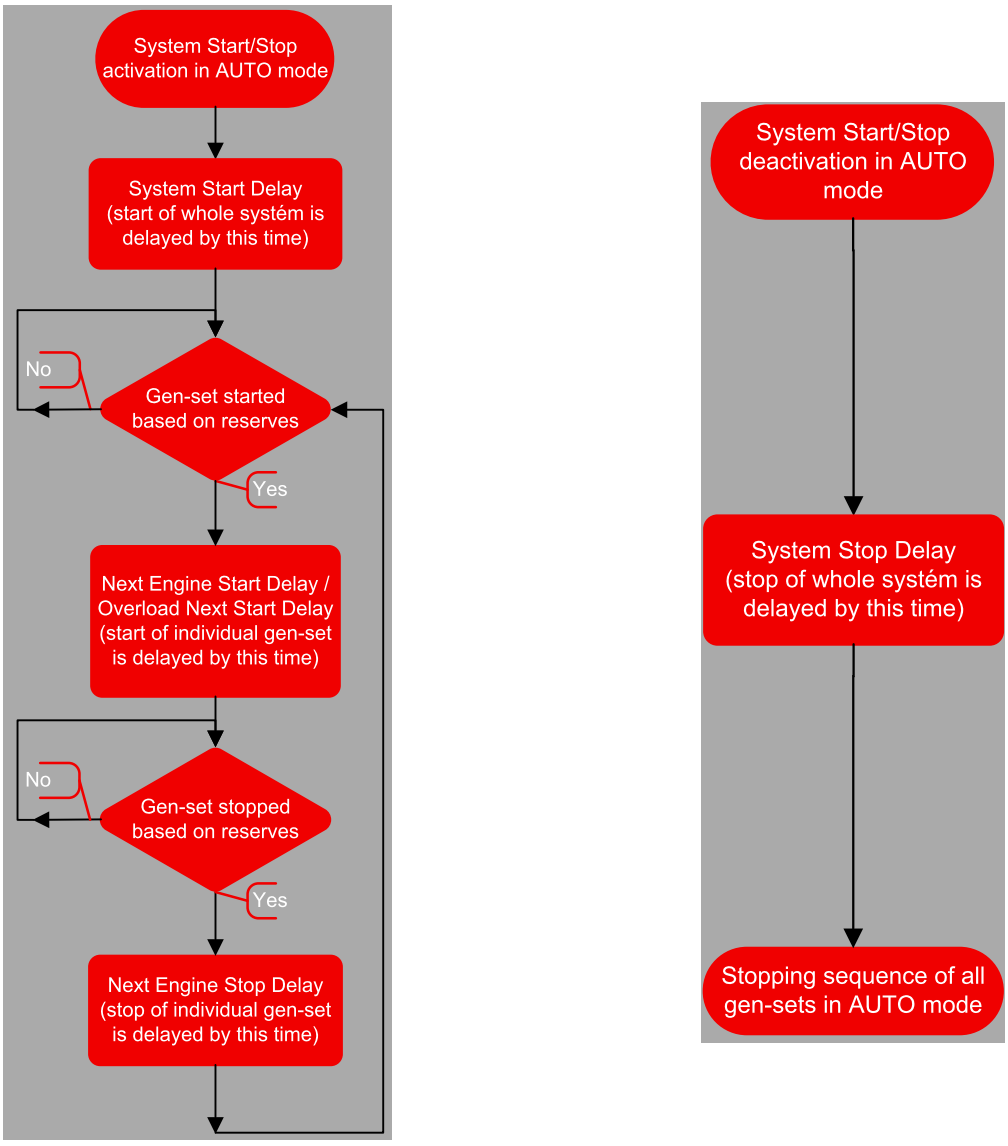
The Logical binary inputs **REMOTE START/STOP (PAGE 751)** requests the system to start or stop. If the input is not active, the system stops with delay **#System Stop Delay (page 419)** after the input has been deactivated and will not start again if in AUTO mode. If the input is activated again, the delay **#System Start Delay (page 418)** 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 751)** is activated, the option of setpoint **Power Management (page 415)** = 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 751)** activation a count down of **#System Start Delay (page 418)**. The delay is given by setpoint **Power Management Delay (page 416)**. 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 430)** 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 431)** is elapsed. All the time the system stop condition – i.e. the Logical binary inputs **REMOTE START/STOP (PAGE 751)** deactivated – is evaluated as well. Once the delay given by the setpoint **#System Stop Delay (page 419)** 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 432)** is used in case that **#Overload Next Start Protection (page 432)** is enabled and Gen-sets are running at **#Overload Next Start Level (page 432)** or more of their nominal power.

Load reserve

The power management is based on the load reserve concept. The load reserve is defined as a difference of the running nominal power of the group within power management and the total load of the system. There are two ways how to determine the load reserve. The absolute power management allows the system to keep the load reserve higher or equal to value in kW given by a relevant setpoint. The relative power management

assures that load reserve is kept higher or equal to relative portion in % of the nominal power of group (i.e. running Gen-sets active in power management) given by a relevant set-point. Depending of the situation, load reserves are calculated differently in two cases:

Case #1

This case is used in island operation.

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

Case #2

This case is used in parallel to mains operation.

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

List of abbreviations:

- ARstrt .. Actual Absolute reserve in kW or kVA – for engine start calculation.
- ARstp .. Actual Absolute reserves in kW or kVA – for engine stop calculation.
- RRstrt .. Actual Relative reserve in % – for engine start calculation.
- RRstp .. Actual Relative reserves in % – for engine stop calculation.
- ΣPgNom .. Sum of Nominal power of all Gen-sets on the bus.
- ΣPg*Nom .. Sum of Nominal power of all Gen-sets on the bus apart of the one, which is going to be stopped.
- ΣPgAct .. Sum of Actual power of all Gen-sets on the bus = system load.
- BaseLd .. Baseload is given by the setpoint **#System BaseLoad (page 301)**

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.

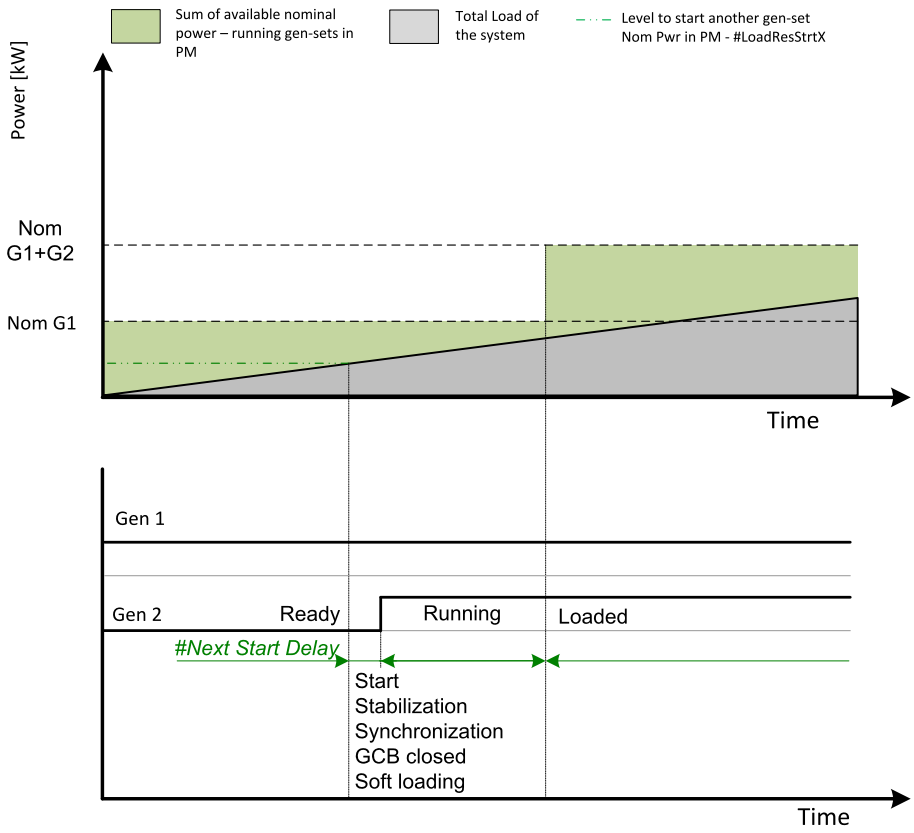


Image 5.111 Start sequence of power management

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 208)** and **Relative power management (page 211)**.

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 430)**, 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.

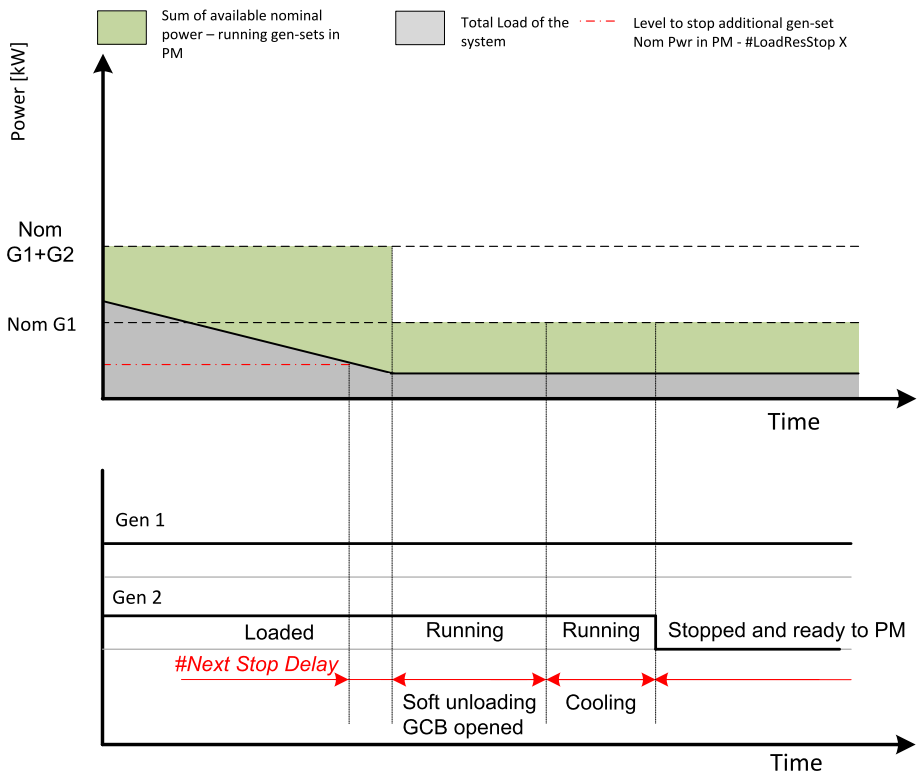


Image 5.112 Stopping sequence of power management

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 208)** and **Relative power management (page 211)**.

The level is illustrated by the red dashed line. If the load reserve keeps over this limit for longer time than defined by setpoint **#Next Engine Start Delay (page 430)**, 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 416)** is set to ABS [kW] mode.

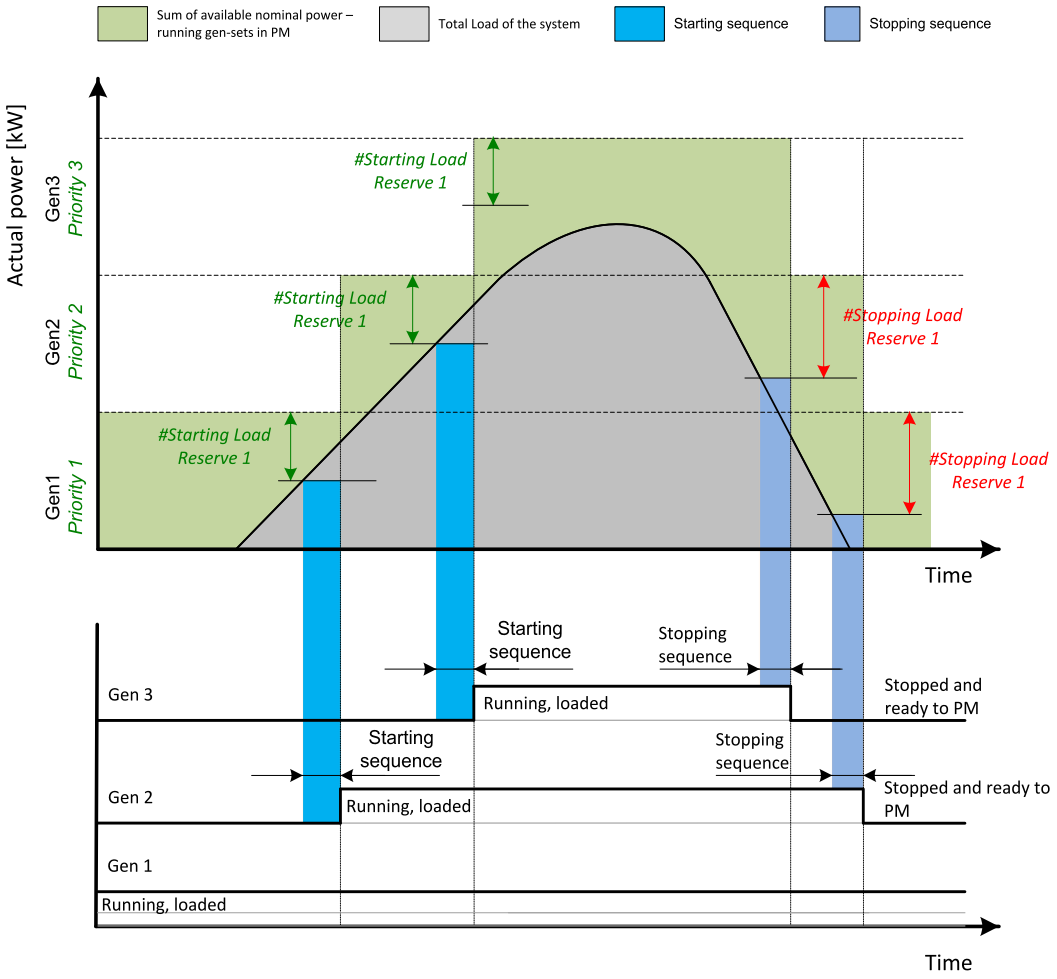


Image 5.113 Power management based on absolute load reserve

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

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

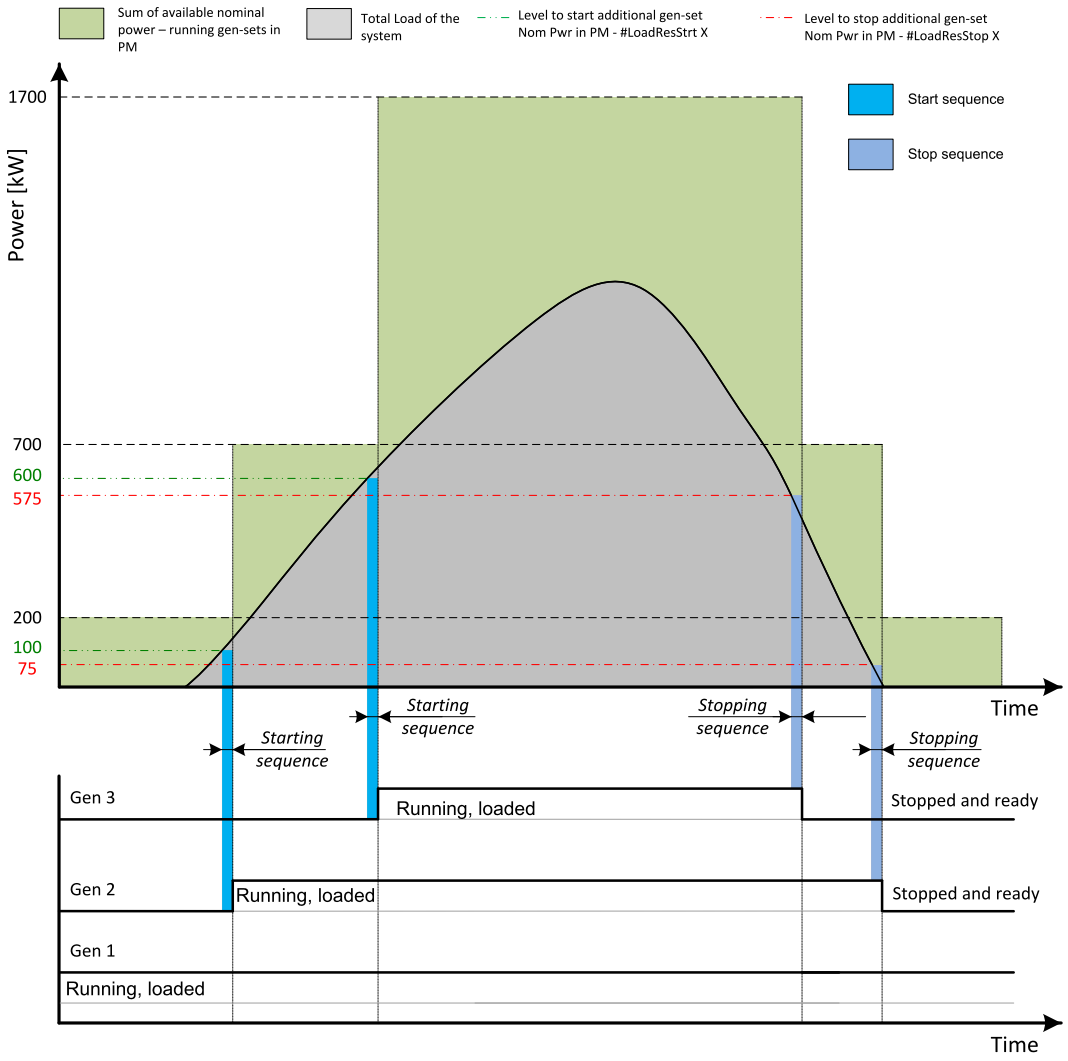


Image 5.114 Absolute power management example

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

The green dashed line depicts the value of load at which the additional Gen-set is requested to start. This value of the load is linked with the setpoint **#Starting Load Reserve 1 (page 419)** (or other selected reserve set) in following way:

Sum of nominal power for start – **#Starting Load Reserve 1 (page 419)** (or other selected reserve set) = value of load when additional Gen-set requested to start (e.g.: 700 kW - 100 kW = 600 kW).

The red dashed line depicts the value of load at which the additional Gen-set is requested to stop. This value of the load is linked with the setpoint **#Stopping Load Reserve 1 (page 420)** (or other selected reserve set) in following way:

Sum of nominal power for stop – **#Stopping Load Reserve 1 (page 420)** (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 419)** and **#Stopping Load Reserve 1 (page 420)**
- **#Starting Load Reserve 2 (page 421)** and **#Stopping Load Reserve 2 (page 422)** considered if binary input **LOAD RES 2 ACTIVE (PAGE 738)** 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 416)** is set to REL [%] mode.

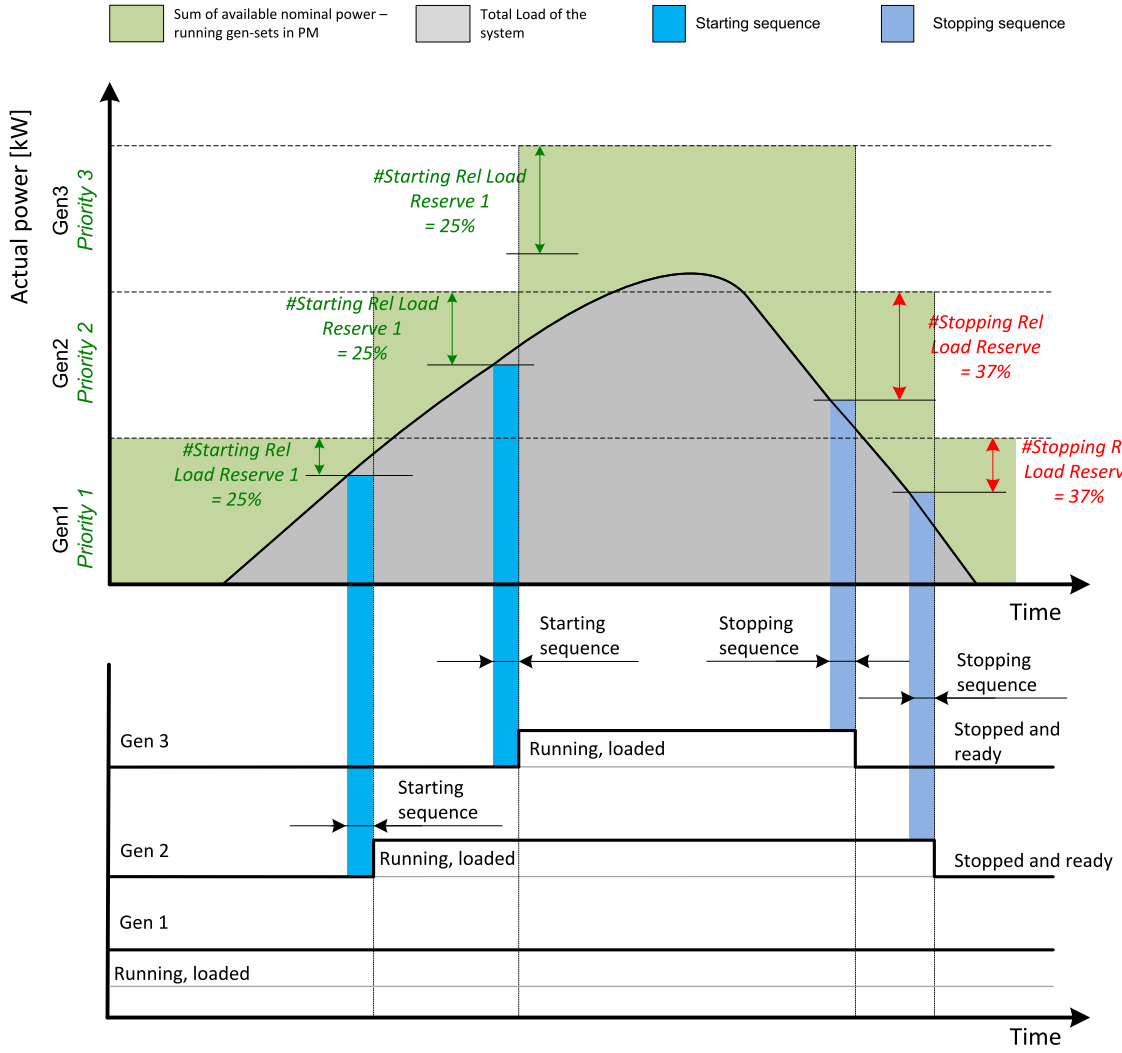


Image 5.115 Power management based on relative load reserve

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

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

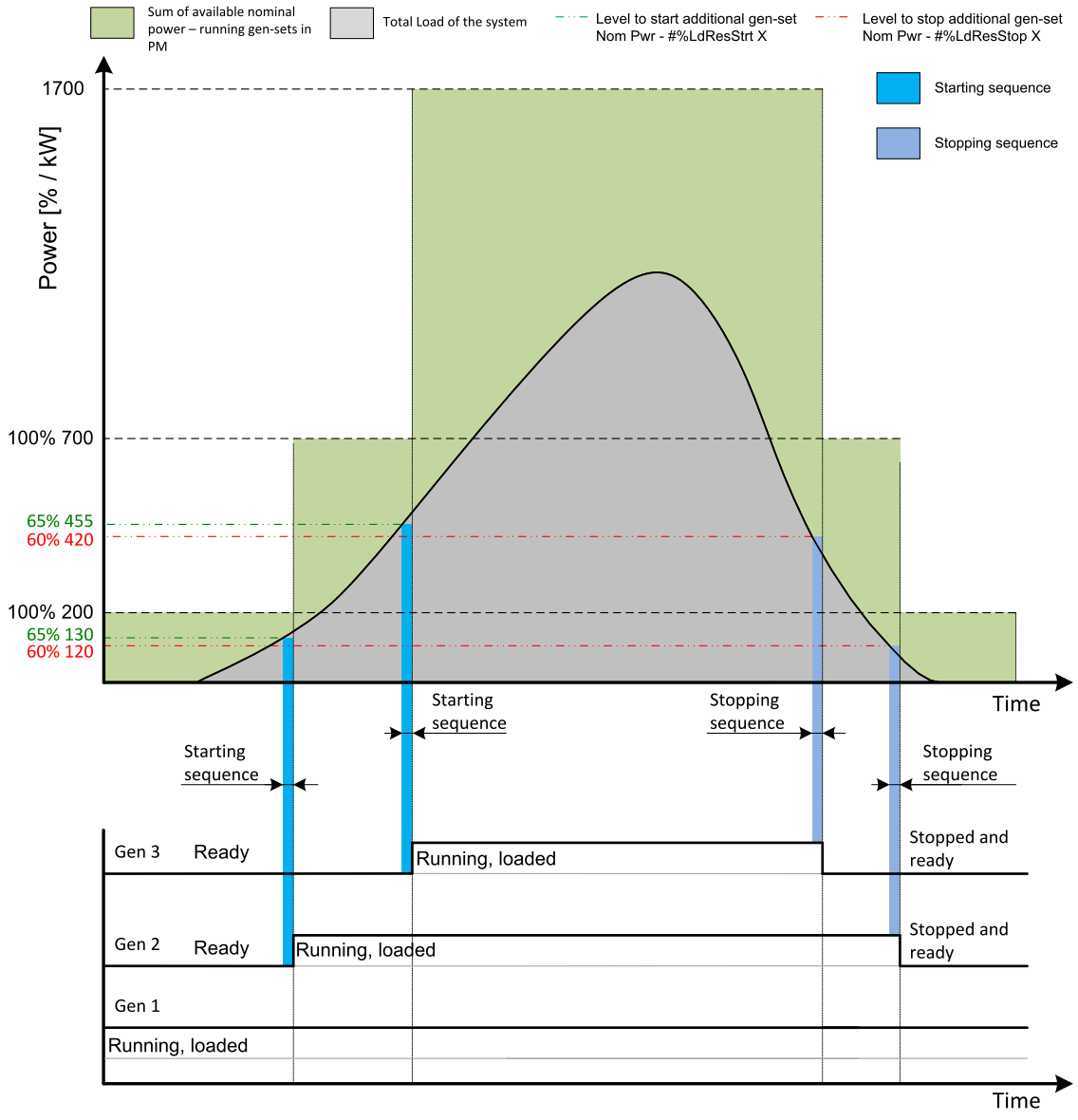


Image 5.116 Relative power management example

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

The green dashed line depicts the value of load at which the additional Gen-set is requested to start. This value of the load is linked with the setpoint **#Starting Rel Load Reserve 1 (page 420)** (or other selected reserve set) in following way:

(100 % - **#Starting Rel Load Reserve 1 (page 420)** (or other selected reserve set)) * Sum of Nominal power = Value of load when additional Gen-set requested to start in kW (in % of nominal power), e.g.: (100 % – 35 %) * 700 kW = 455 kW (65 % of nominal power).

The red dashed line depicts the value of load at which the additional Gen-set is requested to stop. This value of the value is linked with the setpoint **#Stopping Rel Load Reserve 1 (page 421)** (or other selected reserve set) in following way:

(100 % - **#Stopping Rel Load Reserve 1 (page 421)** (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 420)** and **#Stopping Rel Load Reserve 1 (page 421)**
- **#Starting Rel Load Reserve 2 (page 422)** and **#Stopping Rel Load Reserve 2 (page 423)** considered if binary input **Load Res 2 Active (page 738)** 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 417)**. 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 417)** 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

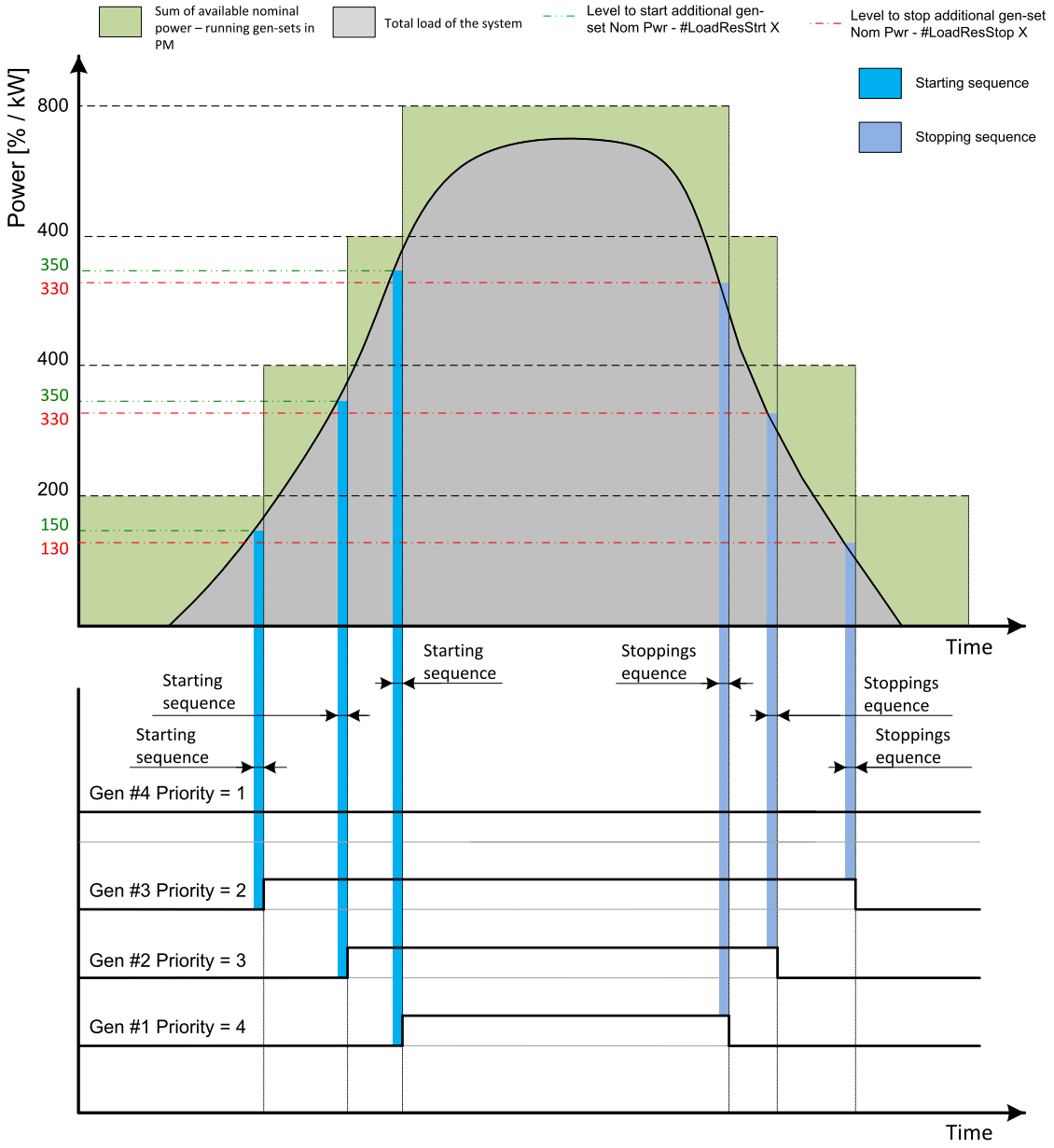


Image 5.117 Example of priorities in power management

By choosing the setpoint **Priority (page 417)** = 1, the Gen-set #4 is running all the time in the example shown on the image above (AUTO mode selected, Power management enabled and LBI **REMOTE START/STOP (PAGE 751)** ctivated).

The LBI **TOP PRIORITY (PAGE 758)** can be used to force priority 0 into the setpoint **PRIORITY (PAGE 417)**. 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 213)**, 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 417)****. 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 418)** = RUN HOURS.

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

RHE = **Running Hours (page 674)** – **Run Hours Base (page 433)**

RHE is considered value for running hours equalization, **Running Hours (page 674)** is a cumulative sum of run hours available in statistic values of the controller, **Run Hours Base (page 433)** 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 433)** (i.e. **#Run Hours Max Difference (page 433)** + 1), the Gen-set(s) with the lowest RHE is/are started.

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

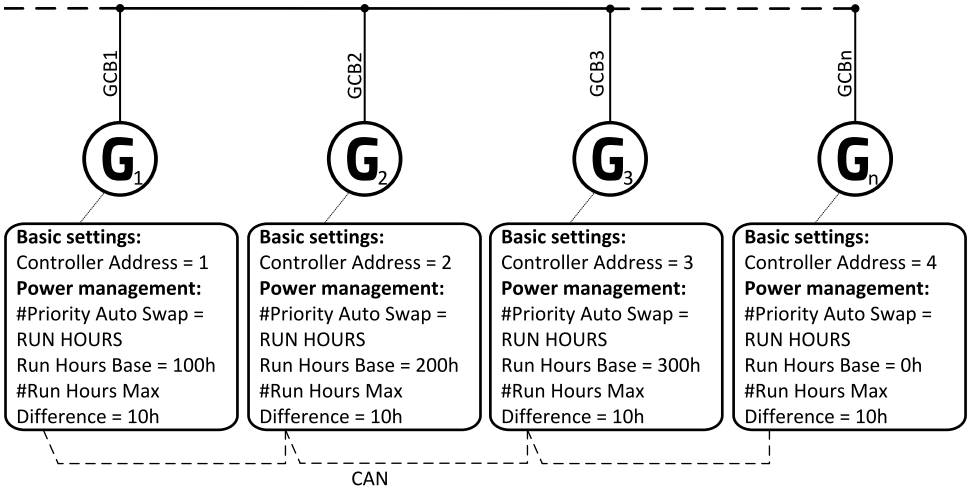


Image 5.118 Example of the system

3 cases are considered:

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

Case #1:

- Gen-set 1 running hours = 250 -> running hours considered in RHE = 100 (150 - **Run Hours Base (page 433)**)
- Gen-set 2 running hours = 450 -> running hours considered in RHE = 200 (250 - **Run Hours Base (page 433)**)

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 433)** that is set to 10 h.

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

The Gen-set 1 runs for 100 hours to equalize the RHE of both Gen-sets. The Gen-set 1 keeps running until the difference between RHE1 and RHE2 exceeds **#Run Hours Max Difference (page 433)** (i.e. 10h). The Gen-set 1 runs 100 + **#Run Hours Max Difference (page 433)** + 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 433)**. The Gen-set 2 runs 11 hours to equalize the RHE of both Gen-sets and then additional **#Run Hours Max Difference (page 433)** + 1 hours (i.e. 11 + 10 + 1 = 22 hours). The evolution of RHE1 and RHE2 is shown on the figure below.

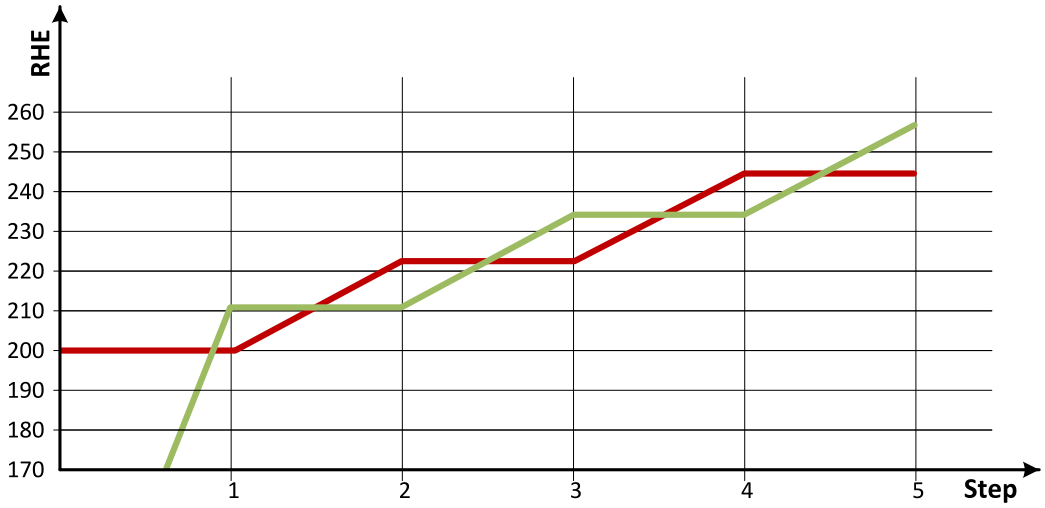


Image 5.119 Run hours equalization – case #1

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 433)** +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.

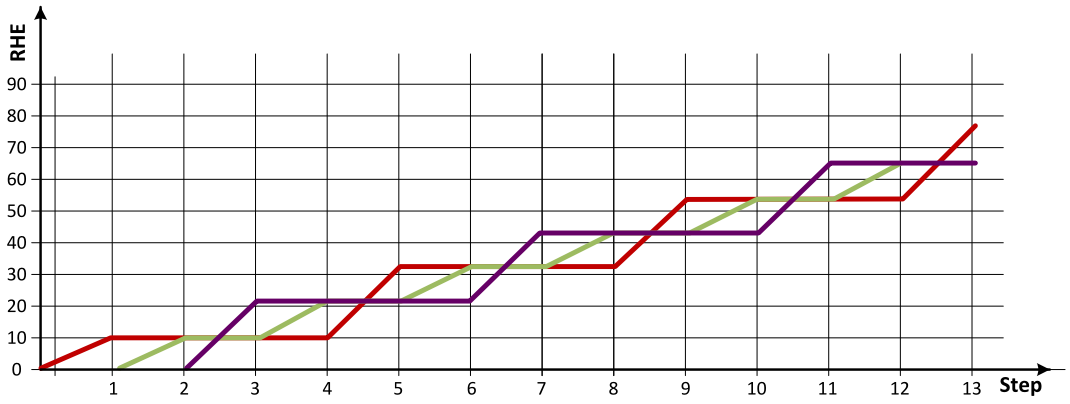


Image 5.120 Run hours equalization – case #2

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.

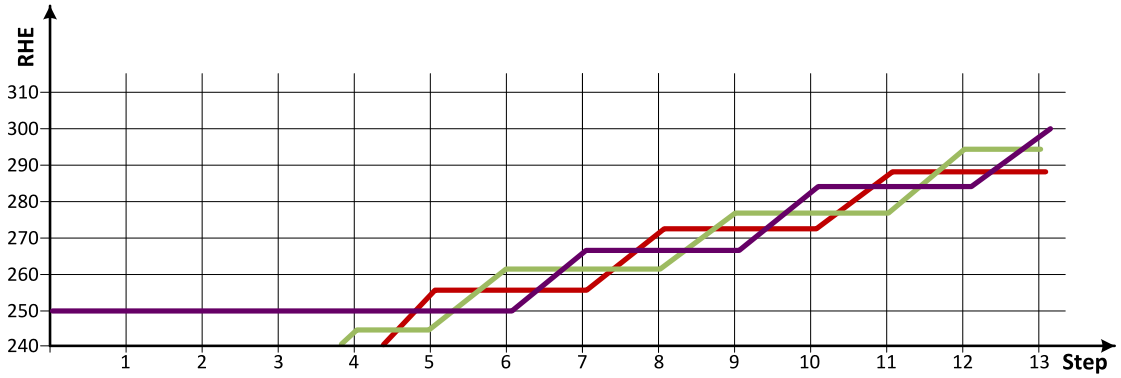


Image 5.121 Run hours equalization – case #3

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

Note: *Setting* ***#Run Hours Max Difference (page 433)*** *= 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 433)*** *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 418)** = 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 416)** = ABS (kW)
    - Nominal power of Gen-set > actual load demand + **#Starting Load Reserve 1 (page 419)**
  - **#Power Management Mode (page 416)** = REL (%)
    - Nominal power of Gen-set > (actual load demand × 100)/(100 - **#Starting Rel Load Reserve 1 (page 420)**)
- If two or more Gen-sets are available for taking over the load always the one with the lowest CAN address is chosen.
- If load demand is higher than nominal power of the biggest Gen-set, this one is fixed and the whole process repeats from the third bullet.

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

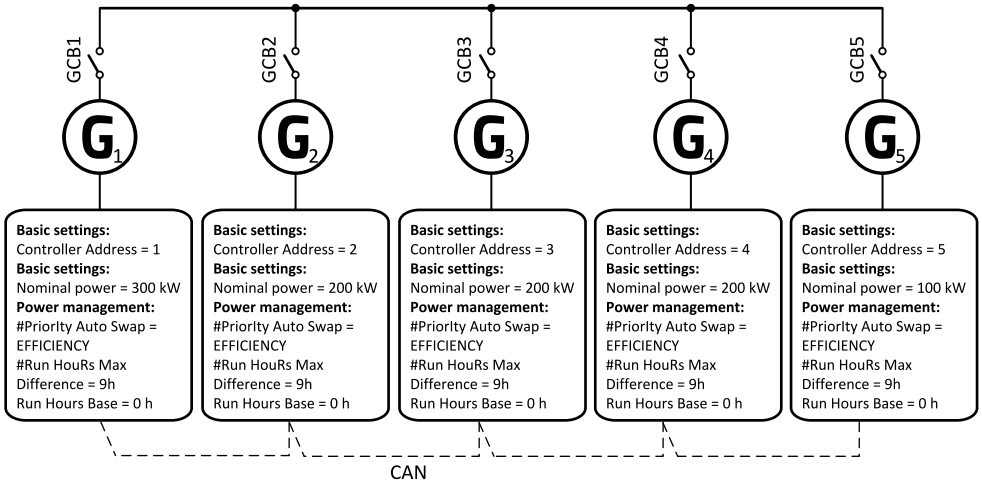


Image 5.122 Example of the system

Following table provide an example of Gen-set selection in respect to the system load evolution. The table is an example of Efficiency priority optimization function (**#Power Management Mode (page 416)** = ABS (kW) and **#Starting Load Reserve 1 (page 419)** = 20 kW).

System Load [kW]	Running Gen-sets		Description	Total Running power within PM [kW]	Relative load of Gen-sets [%]
40	**5**			**100**	**40**
60	5			100	60
80	5 2 [0h]	2 start 5 stop	LDS Swap	300	26
100	2 [10h]			200	50
120	2 [20h]			200	60
120	2 [30h] 3 [10h]	3 start 2 stop	RHE Swap	400	30

System Load [kW]	Running Gen-sets		Description	Total Running power within PM [kW]	Relative load of Gen-sets [%]
120	3 [20h]			200	60
140	3 [30h]			200	70
180	3 [40h] 1	1 start 3 stop	LDS Swap	500	36
200	1			300	67
240	1			300	80
280	1 5	5 start	Gen#5 joins (LDS)	400	70
340	1 5			400	85
380	1 5 4 [20h]	4 start 5 stop	LDS + RHE Swap	600	63
400	1 4			500	80
440	1 4			500	88
480	1 4 5	5 start	Gen#5 joins (LDS)	600	80
540	1 4 5			600	90
580	1 4 5 2 [30h]	2 start 5 stop	LDS Swap	800	73
600	1 4 2			700	86
640	1 4 2			700	91
680	1 4 2 5	5 start	Gen#5 joins (LDS)	800	85
740	1 4			800	93

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

Minimal running power

Minimum Running Power function is used to adjust a minimum value of the sum of nominal power of all running Gen-sets. If the function is active, then the Gen-sets would not be stopped, although the reserve for stop is fulfilled. Function is activated via logical binary input **MIN RUN POWER ACT (PAGE 742)**.

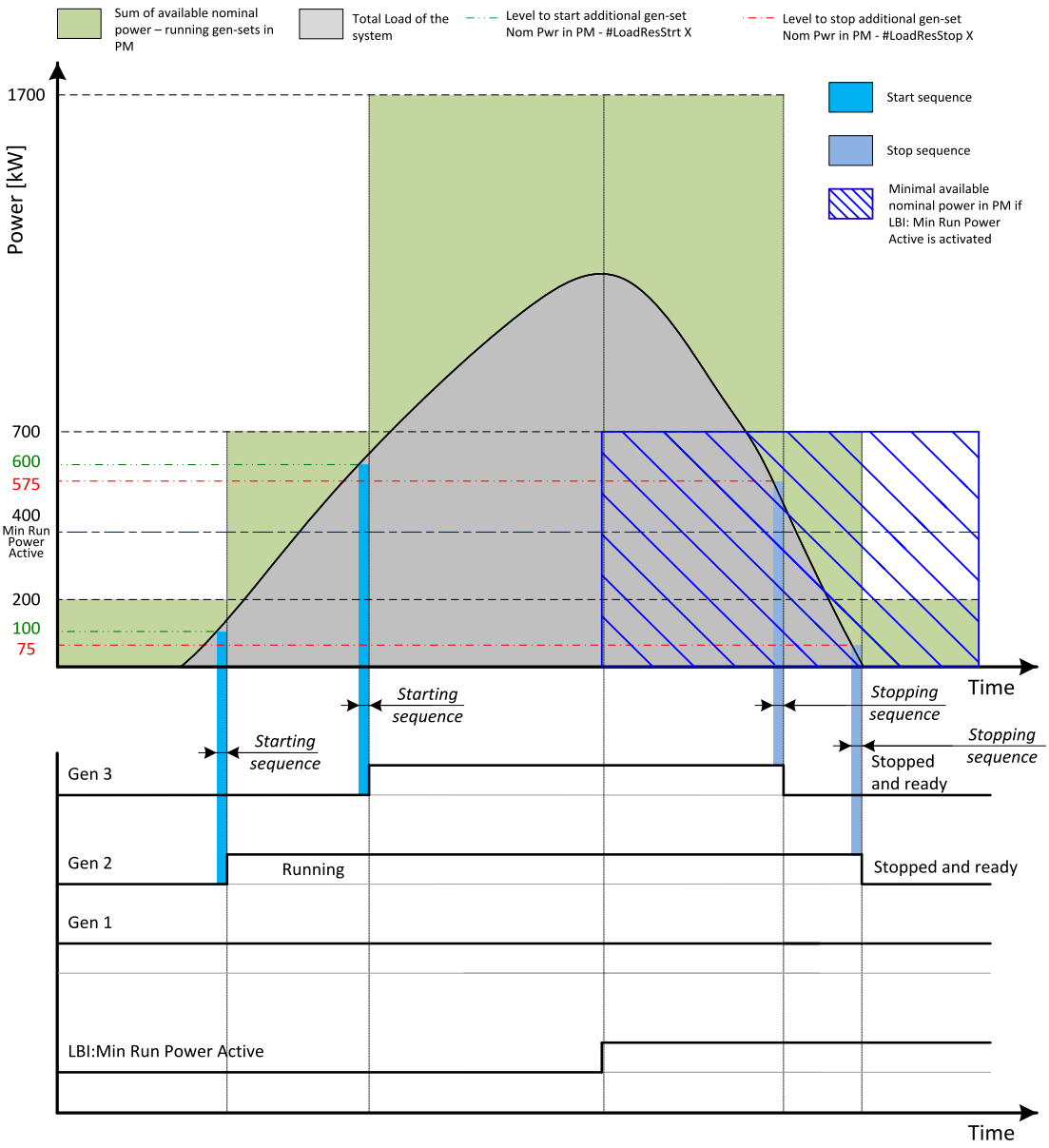


Image 5.123 Minimal running power

Setpoint **#Min Run Power 1 (page 429)** is adjusted to 400 kW. Once the **MIN RUN POWER ACT (PAGE 742)** is activated, the available nominal running power has to be equal or higher to 400 kW. Even if the load reserve is big enough to stop the Gen-set #2 (nominal power 500 kW), the Gen-set keeps running as at least 400 kW has to be available. The Gen-set#1 (nominal power 200 kW) is not enough.

5.4.39 Regulation loops

Regulation loops overview

Regulation loops overview

Loop type	Related applications	Related setpoints
Frequency	MINT, SPtM	**Frequency Gain (page 440)**, **Frequency Int (page 440)**
Load sharing	MINT	**Load Sharing Gain (page 442)**, **Load Sharing Int (page 442)**
Load	MINT, SPtM	**Load Gain (page 441)**, **Load Int (page 442)**
Voltage	MINT, SPtM	**Voltage Gain (page 450)**, **Voltage Int (page 450)**
VAr sharing	MINT	**VAr Sharing Gain (page 451)**, **VAr Sharing Int (page 452)**
PF control	MINT, SPtM	**PF Gain (page 451)**, **PF Int (page 451)**
Angle regulation	MINT, SPtM	**Angle Gain (page 441)**

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 437)** or **Voltage Regulator Bias (page 448)** in case of voltage regulator output.

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

MINT regulation loops

Loop type	Description
Frequency	After Idle timer elapses, the frequency loop is active to reach the nominal frequency. It is also activated in the first phase of synchronization when the **Minimal Stabilization Time (page 339)** has elapsed. 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 339)**. The loop is deactivated at the beginning of cooling sequence.

Loop type	Description
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 339)**. The loop is deactivated at the beginning of cooling sequence. Loop is not active in parallel operation. In parallel operation Load Regulation Loop is used.
Load	The load regulation loop is active when Gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa.
Voltage	The voltage regulation loop gets active after **Minimal Stabilization Time (page 339)**. The loop is deactivated at the beginning of cooling sequence. Loop is not active in parallel operation. In parallel operation PF control loop is used.
PF control	The PF control loop is active when Gen-set is running in parallel with mains and during load transfers from mains to generator or vice versa.
Angle regulation	The differential angle control loop is active during the synchronization when phase match type of synchronization is used.

Adjustment of regulation loops

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

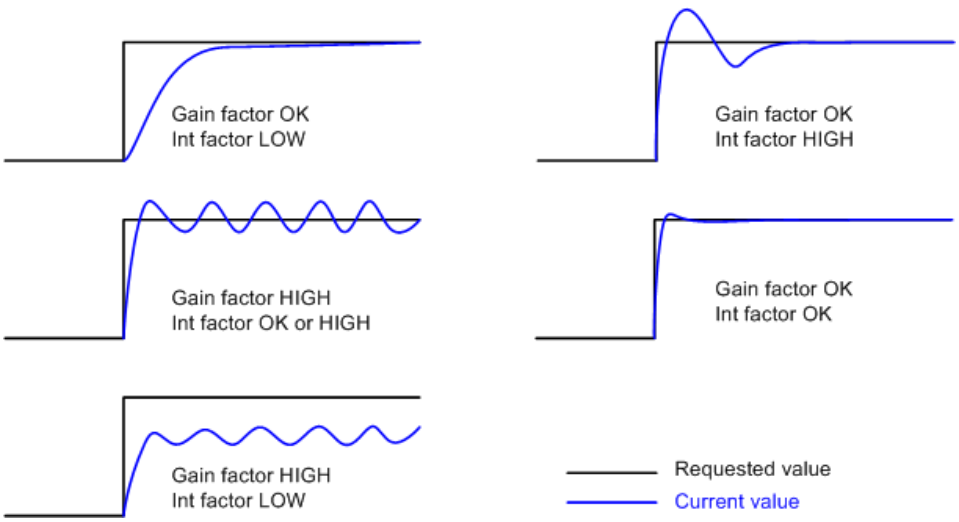


Image 5.124 Typical responses of PI regulator

For manual tuning of a control loop use following method:

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

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

5.4.40 Rental Timers

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

How to set-up rental timer

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

- Choose the type of rental timer
  - **Rental Timer 1 (page 548)** (based on engine running hours)
  - **Rental Timer 2 (page 550)** (based on date)
- Adjust the length of chosen timer
- Adjust the warning for user **Rental Timer 1 Wrn (page 550)** or **Rental Timer 2 Wrn (page 552)** (warning will be displayed in Alarm list before elapsing of rental timer)
- Adjust **Rental Timer BOC (page 552)** – common for both timers (if engine is still running after rental timer counts down, this timer will start tocount down. After the time has elapsed, the Gen-set will be cooled down and stop).

5.4.41 RPM Measurement

InteliGen 500 G2 offers multiple methods to measure the RPM of the engine. Please pay close attention during configuration to ensure that you will use correct method.

Measuring using dedicated RPM input

Connect magnetic pick-up sensor to dedicated input **Magnetic pick-up (page 55)**. Received data are converted using setpoint **Gear Teeth (page 321)**.

Measuring from generator frequency

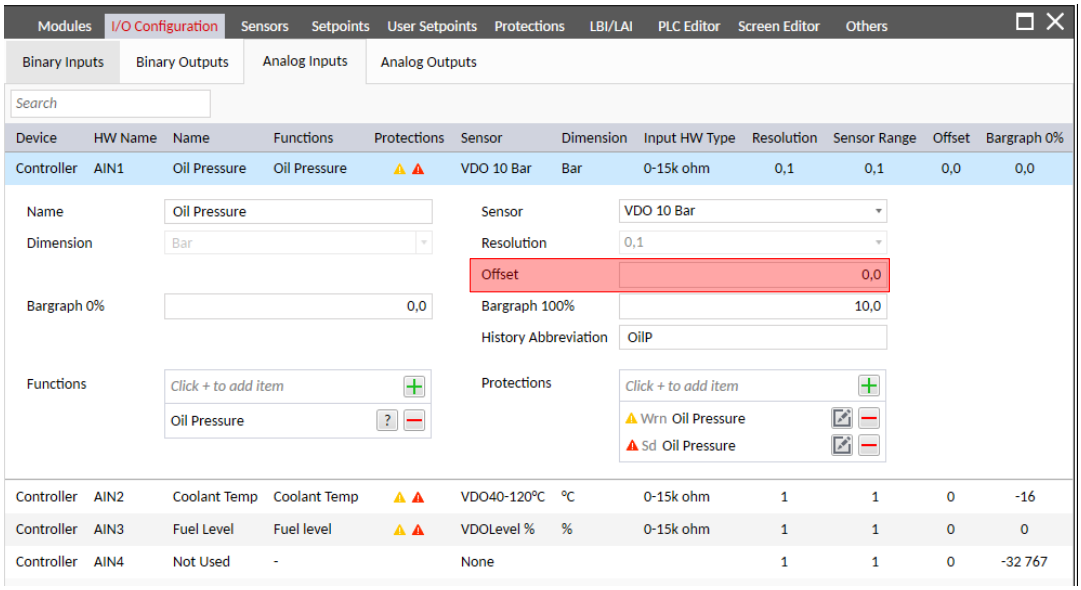
RPM is calculated from generator frequency which is received from **Generator Voltage L1-N (page 640)**. To enable this measurement method adjust setpoint **Gear Teeth (page 321)** to Fgen->RPM. The calculation is based on expectation of 4 pole alternator. Following formula is used:

$$RPM = Hz * \frac{120}{4}$$

5.4.42 Sensor curves

Background of the sensor calibration

To correct measuring error of each analog input (pressure, temperature, level, etc.), calibrating constants should be set. To correct an offset of each analog input, select an option Offset in InteliConfig and set the appropriate value.



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

Default sensor curves

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

Curve	Min [Ω]	Max [Ω]	Units
VDO 10 Bar	10	180	Bar
VDO40-120°C	22	3200	°C
VDOLevel%	0	180	%
General line 1	0	1000	Ω
General line 2	0	1000	Ω
General line 3	0	1000	Ω
General line 4	0	1000	Ω
General line 5	0	1000	Ω
General line 6	0	1000	Ω
General line 7	0	1000	Ω
General line 8	0	1000	Ω
General line 9	0	1000	Ω

General line 10	0	1000	Ω
General line 11	0	1000	Ω
General line 12	0	1000	Ω
General line 13	0	1000	Ω

Note: *Curves can be modified via InteliConfig. Some standard curves are also prepared in InteliConfig.*

> **IMPORTANT: For right behavior of function Total Fuel Consumption, curve for analog input FUEL LEVEL (PAGE 832) has to be in percentage and setpoint Fuel Tank Volume (page 351) has to be adjusted correctly.**

5.4.43 Stabilization

When the **Engine start (page 143)** sequence is finished, the Gen-set goes into the stabilization phase. There are two timers (setpoints) in this phase:

- **Minimal Stabilization Time (page 339)** 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 340)** starts to count down just after the idle period has finished. Generator voltage and frequency are not checked (respective protections are not evaluated), but contrary to the previous timer, the GCB can be closed if generator voltage and frequency are within limits.

In situations where the GCB is closed automatically (AUTO, TEST modes), the closing of GCB will occur as soon as the generator voltage and frequency will get into limits and the **Minimal Stabilization Time (page 339)** has elapsed.

In the event that the generator voltage or frequency are not within limits of the **Maximal Stabilization Time (page 340)** 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 371)**.*

Note: *The value of the **Minimal Stabilization Time (page 339)** setpoint has to be lower than the value of **Maximal Stabilization Time (page 340)** setpoint.*

5.4.44 Start-stop sequence

State	Condition of the transition	Action	Next state
Ready	Start request	**PRESTART (PAGE 812)** on **Prestart Time (page 334)** counter started	Prestart
	RPM > 2 or Oil pressure > **Starting Oil Pressure (page 335)** or Generator voltage > 10V or D+ voltage is higher than 80%**D+ Threshold (page 348)**		Stop (Stop fail)
	OFF Mode selected or Shutdown alarm active		Not Ready

Not Ready	RPM < 2, Oil pressure not detected, Generator voltage < 10 V, D+ not Active no shutdown alarm active, other than OFF Mode selected		Ready
Prestart	Prestart time elapsed	**Fuel Solenoid (page 786)** on, **Starter 1 (page 818)** or**Starter 2 (page 819)** on, **Maximum Cranking Time (page 333)** counter started	Cranking
Cranking	RPM > Starting RPM	**Starter 1 (page 818)** or **Starter 2 (page 819)** off, **Prestart (page 812)** off	Starting
	D+ input activated or oil pressure detected or Generator voltage > 25% Nominal voltage	**Starter 1 (page 818)** or **Starter 2 (page 819)** off, **Prestart (page 812)** off	Cranking
	Maximum Cranking Time (page 333), 1st attempt	**Starter 1 (page 818)** or **Starter 2 (page 819)** off, **Fuel Solenoid (page 786)** off, **Stop Solenoid (page 821)** on, **Cranking Fail Pause (page 333)** timer started	Crank pause
	Maximum Cranking Time (page 333) elapsed, last attempt	**Starter 1 (page 818)** or **Starter 2 (page 819)** off, **Prestart (page 812)** off	Shutdown (Start fail)
	all cranking attempts elapsed	**Fuel Solenoid (page 786)** off, **Stop Solenoid (page 821)** on	Shutdown (Start fail)
Crank pause	**Cranking Fail Pause (page 333)** elapsed	**Starter 1 (page 818)** or **Starter 2 (page 819)** off, **Fuel Solenoid (page 786)** on, **Stop Solenoid (page 821)** off, **Maximum Cranking Time (page 333)** counter started	Cranking
Starting	**Idle Time (page 337)** elapsed	**Minimal Stabilization Time (page 339)** and **Maximal Stabilization Time (page 340)** counter started	Running
	any shutdown condition	**Fuel Solenoid (page 786)** off, **Stop Solenoid (page 821)** on	Shutdown
Running	Stop request	**Ready To Load (page 814)** off,**Cooling Time (page 345)** counter started	Cooling
	RPM = 0 or any other shutdown condition	**Ready To Load (page 814)** off, **Fuel Solenoid (page 786)** off	Shutdown
	GCB Close/Open (page 788) closed		Loaded
Loaded	**GCB Close/Open (page 788)** opened		Running

	RPM = 0 or any other shutdown condition	**FUEL SOLENOID (PAGE 786)** off, **STOP SOLENOID (PAGE 821)** on, **READY TO LOAD (PAGE 814)** off,	Shutdown
Cooling	**Cooling Time (page 345)** elapsed	**FUEL SOLENOID (PAGE 786)** off, **STOP SOLENOID (PAGE 821)** on	Stop
	RPM = 0 or any other shutdown condition	**FUEL SOLENOID (PAGE 786)** off, **STOP SOLENOID (PAGE 821)** on	Shutdown
	Start request	**READY TO LOAD (PAGE 814)** on	Running
Stop	RPM = 0, Oil pressure not detected, Generator voltage <10 V, D+ not active		Ready
	If at least one of engine running indication is detected when **Stop Time (page 345)** elapsed.		Stop (Stop fail)

Note: *If all generator parameters are OK and **Minimal Stabilization Time (page 339)** elapsed, indicates that GCB is possible to close. In AUTO Mode GCB is closed in this moment automatically.*

Note: *The start-up sequence can be interrupted atn any time by a stop request.*

5.4.45 Start Up Synchronization (SUS)

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

Conditions when Start up Synchronization can be used

- Setpoint **SUS Sequence (page 359)** = Enabled
- RPM pick-up is connected (i.e. Setpoint **Gear Teeth (page 321)**FGen->RPM
- Voltage < 15 V on the bus/mains line
- MCB is opened (SPtM)
- LBI **GCB DISABLE (PAGE 734)** is not activated
- LBI **SUS EXCITATION BLOCK (PAGE 755)** is activated before Start command, if setpoint **Excitation Control (page 362)** = External
- GCB Feedback must activate latest during **Prestart Time (page 334)**. Otherwise the Gen-set is switched to standard start sequence.
- Bus voltage has to be below the **Dead Bus Limit (page 360)** during the SUS starting sequence. GCB is immediately opened, if bus voltage is above the limit and standard start sequence is used.

Reasons of Start up Synchronization Fail

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

SUS seq break-1	MCB gets closed in SUS start sequence (**MCB FEEDBACK (PAGE 741)** gets active)
SUS seq break-2	MCB is open, Mains voltage is higher then level given by setpoint **Dead Bus Limit (page 360)**
SUS seq break-3	Bus voltage is higher than limit given by setpoint **Dead Bus Limit (page 360)**
SUS seq break-4	The **GCB FEEDBACK (PAGE 735)** does not response until the **Prestart Time (page 334)** elapsed.
SUS seq break-5	When the setpoint **Excitation Control (page 362)** = External. The LBI **SUS EXCITATION BLOCK (PAGE 755)** is not active before the SUS sequence starts or is deactivated during the SUS sequence in advance the LBO **READY TO EXCITE (PAGE 814)** gets active.
SUS seq break-6	RPM reached window given by **SUS RPM Window (page 363)** and stayed there for a while, but run away
No History record needed	The setpoint GCB Control Mode = Follow. When the GCB is tripped externally, the SUS sequence has to be canceled. However no history record is needed because the reason is described by history record "GCB opened Externally".

SUS in SPTM application

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

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

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

Most important setpoints

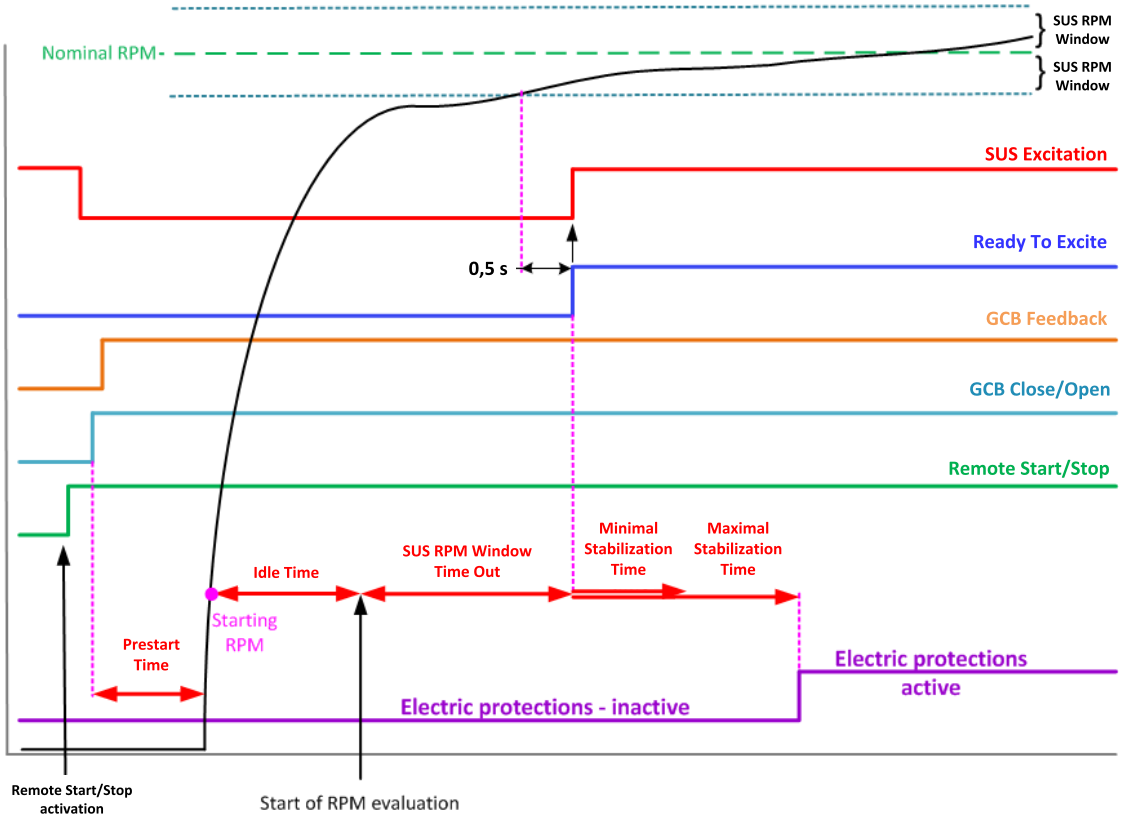
- **SUS Sequence (page 359)** – for activation and deactivation of SUS sequence.
- **Excitation Control (page 362)** – for configuration of internal or external excitation on/off control.
- **SUS RPM Window (page 363)** – defines the RPM window, where a Gen-set can be excited.
- **SUS RPM Window Time Out (page 363)** – defines the maximal time for achieving the RPM window and activating LBO **READY TO EXCITE (PAGE 814)**. If the controller does not activate LBO **READY TO EXCITE (PAGE 814)** in this time, the GCB is opened and Gen-set is started in the standard way.

Examples

Example 1

Active Application (page 674) = SPtM, **Excitation Control (page 362)** = Internal

RPM reaches **SUS RPM Window (page 363)** in time of **SUS RPM Window Time Out (page 363)**



After **REMOTE START/STOP (PAGE 751)** activation, **Prestart Time (page 334)** is counted. Then the Gen-set is started.

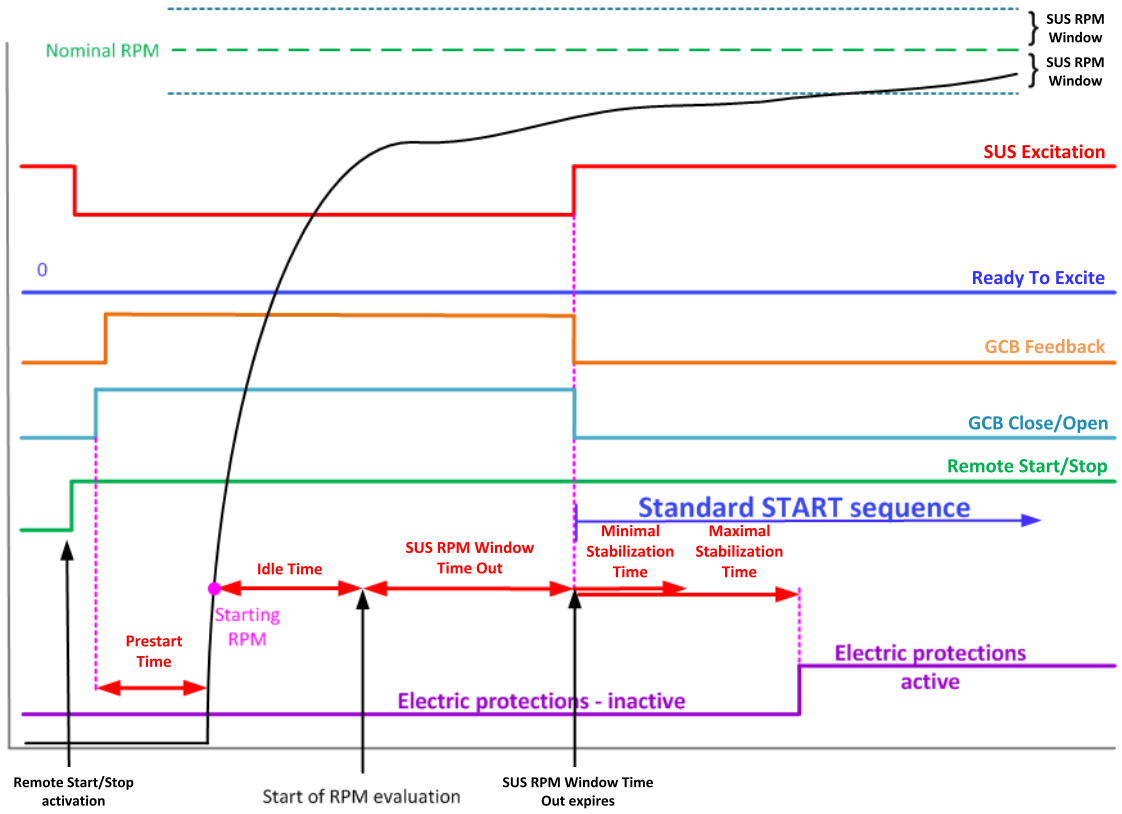
If the start command comes from **AMF operation (page 120)**, the delay **Emergency Start Delay (page 393)** is counted before the start sequence is initiated.

After reaching **Starting RPM (page 334)** the **Idle Time (page 337)** is counted. When the Idle time is up, the evaluation or **SUS RPM Window (page 363)** is activated.

Example 2

Active Application (page 674) = SPtM, **Excitation Control (page 362)** = Internal

RPM does not reaches **SUS RPM Window (page 363)** in time of**SUS RPM Window Time Out (page 363)**

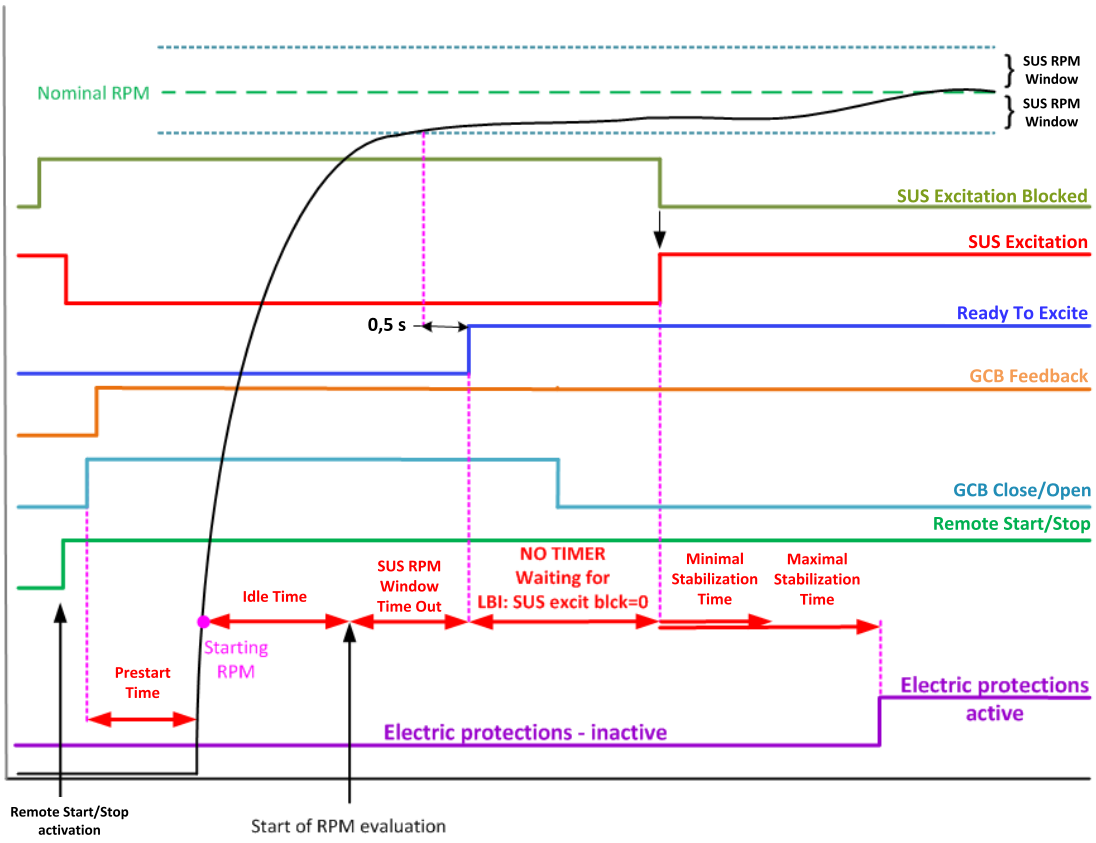


RPM did not reach **SUS RPM Window Time Out (page 363)** and LBO **READY TO EXCITE (PAGE 814)** did not get activated before **SUS RPM Window Time Out (page 363)** expired. This caused opening of the GCB and standard start sequence has been initiated.

Example 3

Active Application (page 674) = SPtM, **Excitation Control (page 362)** = External

RPM reaches **SUS RPM Window (page 363)** in time of **SUS RPM Window Time Out (page 363)**.

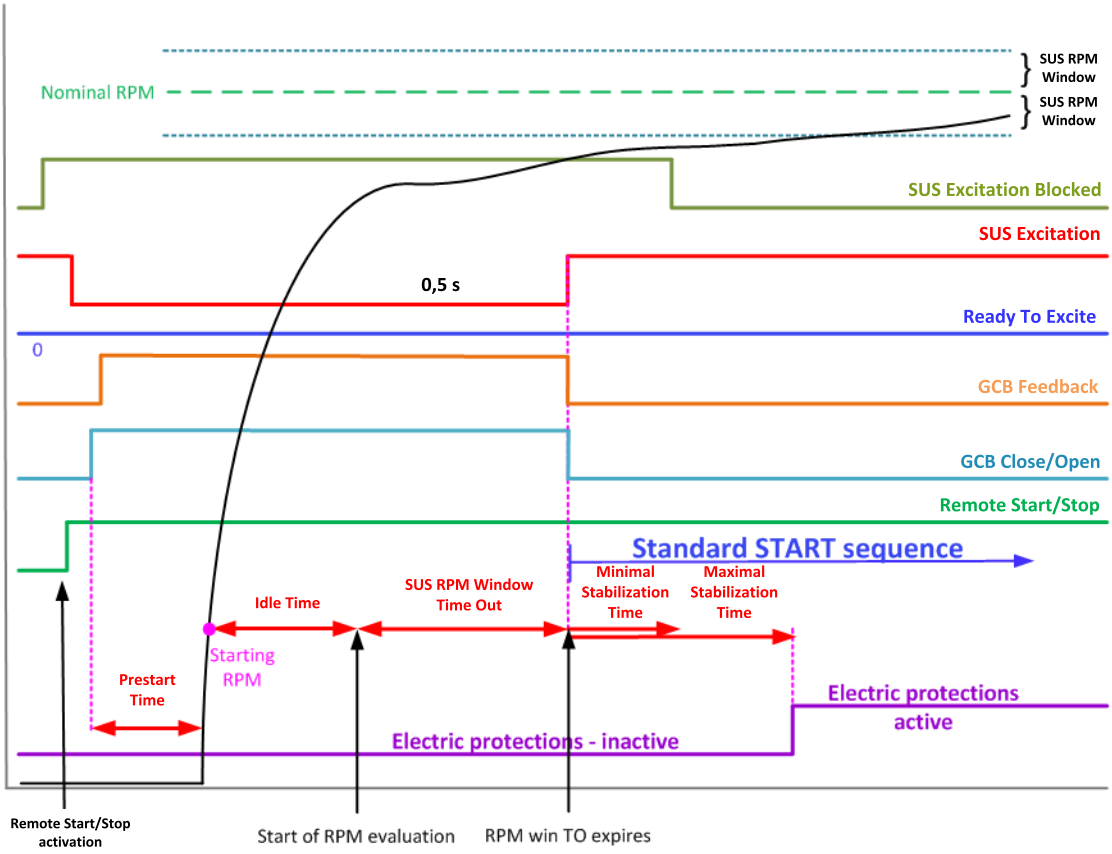


Gen-set achieved the **SUS RPM Window (page 363)** and LBO **READY TO EXCITE (PAGE 814)** has been activated during **SUS RPM Window Time Out (page 363)**. After this there is no timer and controller/system waits for activation of excitation (deactivation of LBI **SUS EXCITATION BLOCK (PAGE 755)**. After the excitation is activated, **Minimal Stabilization Time (page 339)** and **Maximal Stabilization Time (page 340)** follows.

Example 4

Active Application (page 674) = SPtM, **Excitation Control (page 362)** = External

RPM does not reach **SUS RPM Window (page 363)** in time of**SUS RPM Window Time Out (page 363)**.



When timer **SUS RPM Window Time Out (page 363)** is up and LBO **READY TO EXCITE (PAGE 814)** is not activated, the system is switched over to standard start sequence. This causes GCB to open and the controller activates excitation (LBI **SUS EXCITATION BLOCK (PAGE 755)** is ignored from the moment and excitation is controlled **INTERNALLY**).

SUS in MINT application

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

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

All Gen-sets are started with closed GCBs and without excitation (no voltage). Required sum of **Nominal Power (page 311)** of all Gen-sets is set by **#SUS Min Power 1 (page 360)**, **#SUS Min Power 2 (page 361)** or **#SUS Min Power 3 (page 362)** (based on LBI **SUS MIN POWER 2 (PAGE 756)** and LBI **SUS MIN POWER 2 (PAGE 756)**. When sum of **Nominal Power (page 311)** of these Gen-sets achieves active condition, rest of Gen-sets (without of activated LBO **READY TO EXCITE (PAGE 814)** are switched to STANDARD sequence (GCBs are opened) and Gen-sets with active LBO **READY TO EXCITE (PAGE 814)** are excited.

If the active condition of minimal power is not met, and on the bus all Gen-sets have LBO **READY TO EXCITE (PAGE 814)** activated, timer **#SUS Excitation Delay (page 364)** is started (only if **#SUS Excitation Delay (page 364)** > 0). After the timer expires, excitation of Gen-sets with active LBO **READY TO EXCITE (PAGE 814)** is activated.

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

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

Most important setpoints

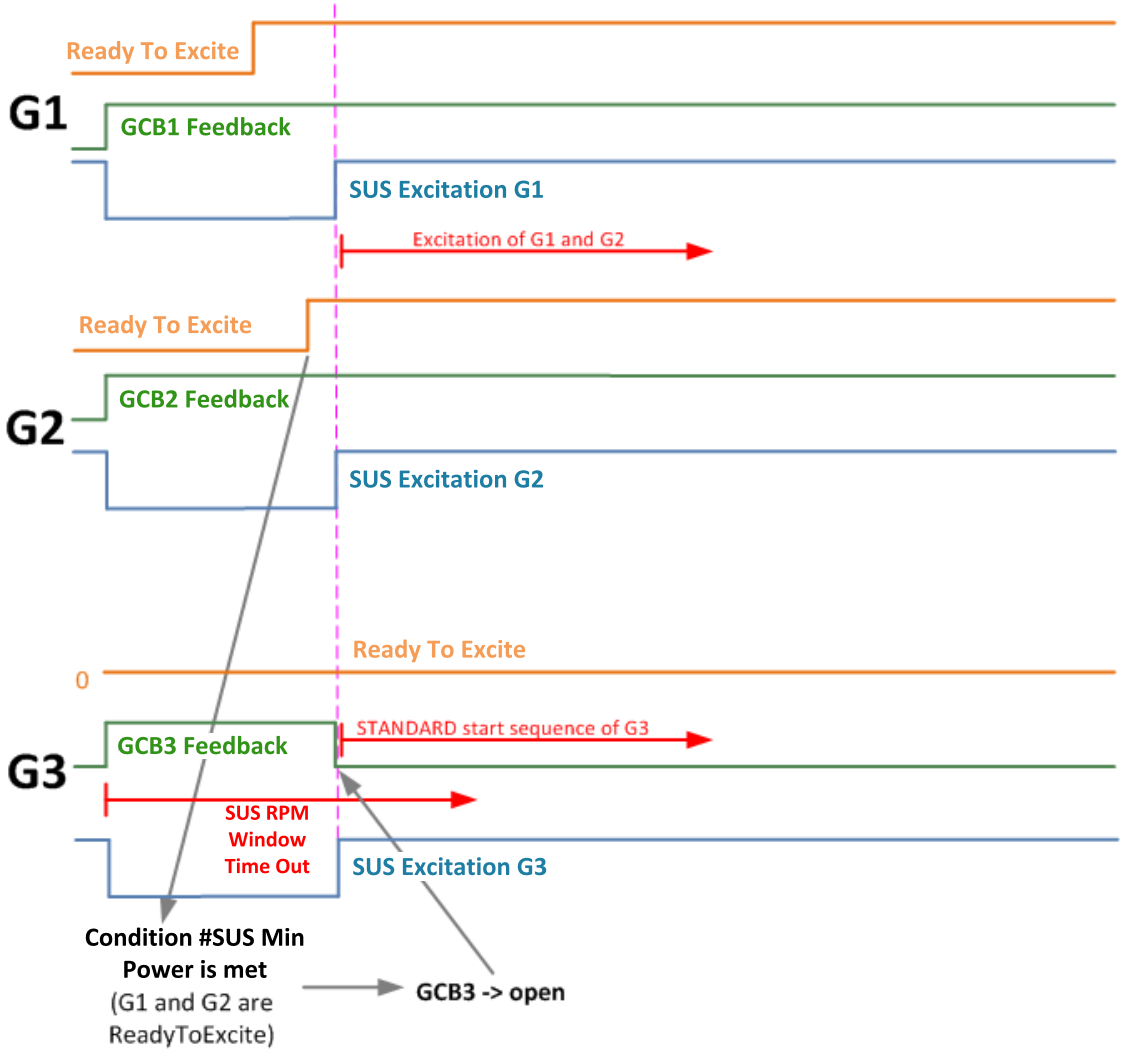
- **SUS Sequence (page 359)** – for activation and deactivation of SUS sequence.
- **Excitation Control (page 362)** – for configuration of internal or external excitation on/off control.
- **SUS RPM Window (page 363)** – defines the RPM window, where a Gen-set can be excited.
- **SUS RPM Window Time Out (page 363)** – defines the maximal time for achieving the RPM window and activating LBO **Ready To Excite (page 814)**. If the controller does not activate LBO **Ready To Excite (page 814)** in this time, the GCB is opened and Gen-set is started in the standard way.
- **#SUS Excitation Delay (page 364)** – Delay for which Gen-sets will be waiting for other Gen-sets before excitation
- **#SUS Min Power 1 (page 360) - #SUS Min Power 3 (page 362)** – Minimal power required for allowing excitation

Examples

Example 1

Active Application (page 674) = MINT, **Excitation Control (page 362)** = Internal, **#SUS Min Power 1 (page 360)** = 2x **Nominal Power (page 311)**

Condition **#SUS Min Power 1 (page 360)** is met.



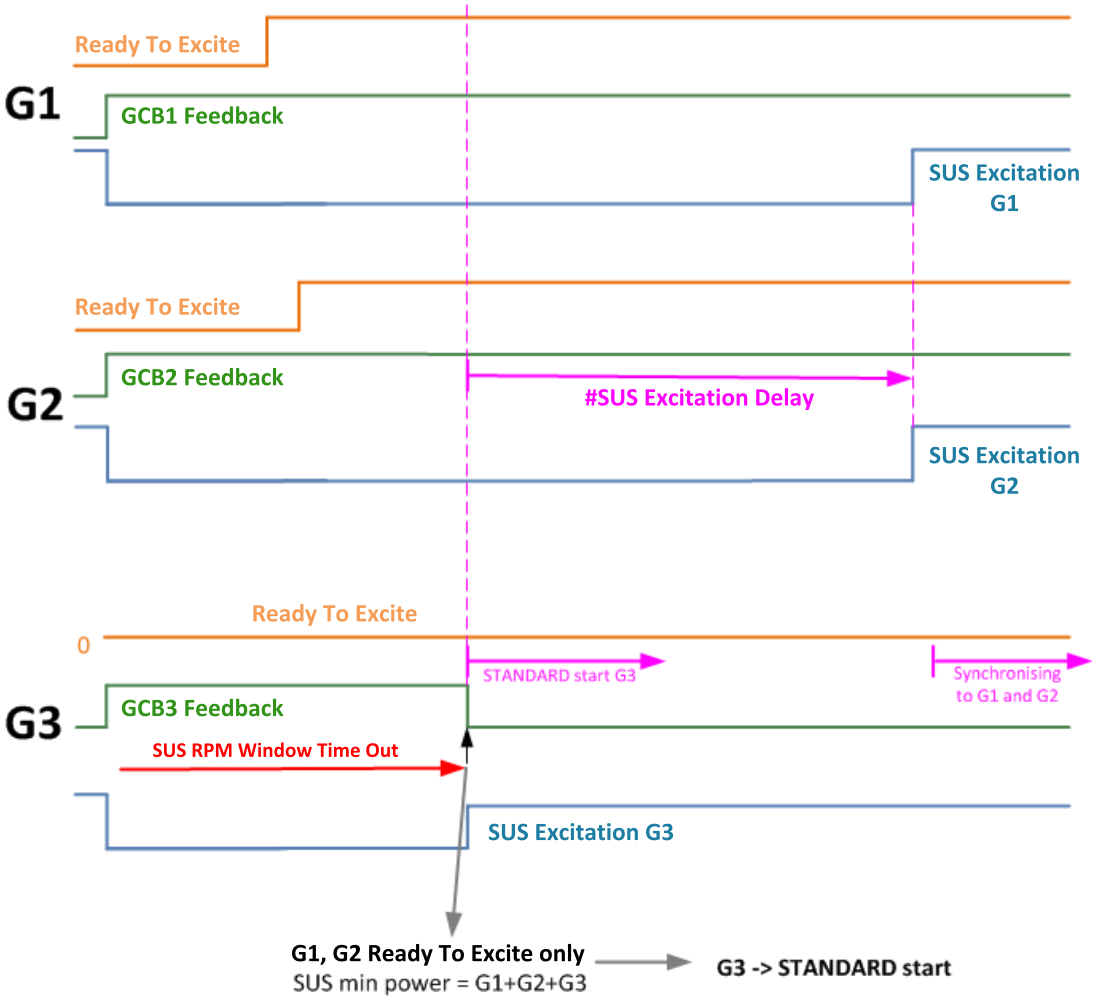
First two Gen-sets are in **SUS RPM Window (page 363)** with active LBO **Ready To Excite (page 814)** so the condition **#SUS Min Power 1 (page 360)** is met → G3 opens the GCB3 and G1, G2 are excited (LBO

SUS EXCITATION (PAGE 823) is activated). G3 is switched to standard start and will be synchronized to the bus.

Example 2

Active Application (page 674) = MINT, **Excitation Control (page 362)** = Internal, **#SUS Min Power 1 (page 360)** = 3x Gen-set **Nominal Power (page 311)**

Condition **#SUS Min Power 1 (page 360)** is not met.

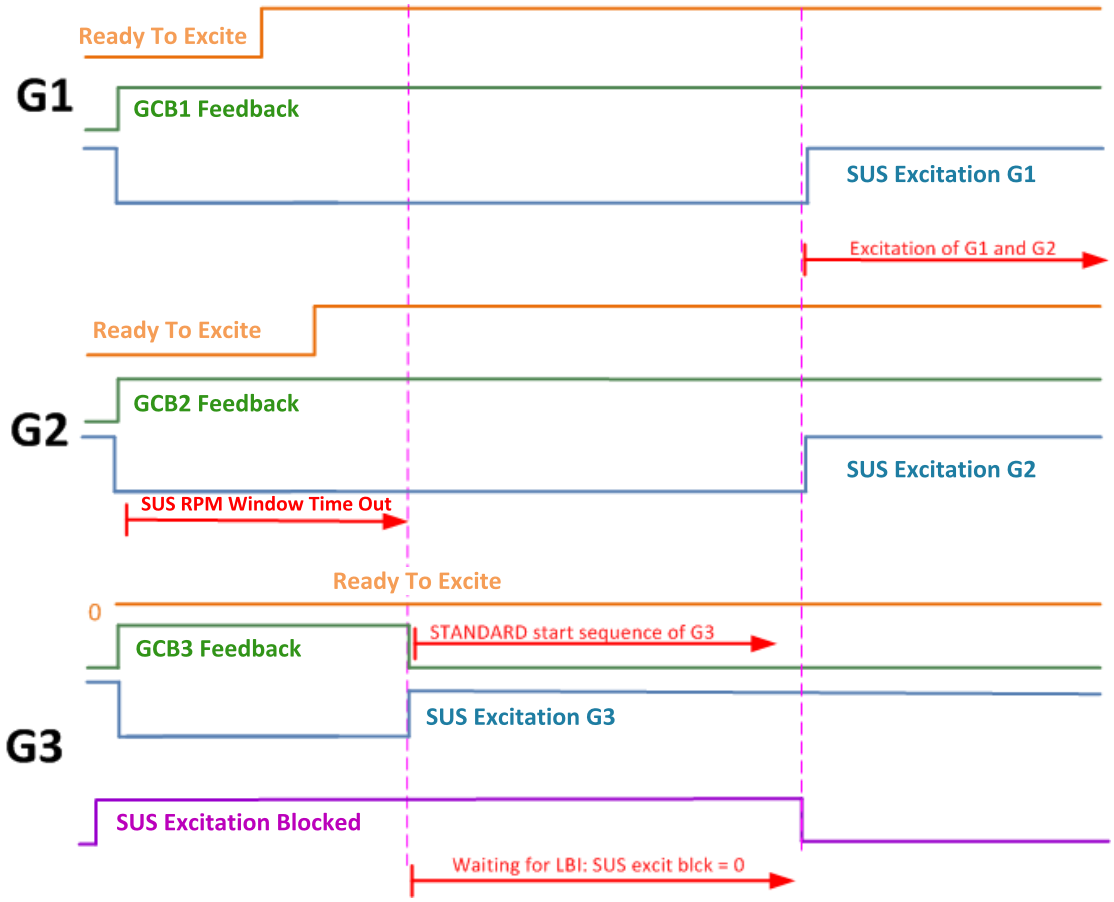


First two Gen-sets are in **SUS RPM Window (page 363)** and with active LBO **Ready To Excite (page 814)**. **#SUS Min Power 1 (page 360)** is equeal to the **Nominal Power (page 311)** of 3 Gen-sets, but G3 did not activate **Ready To Excite (page 814)** in time of **SUS RPM Window Time Out (page 363)** → G3 opens the GCB3 ad it is switched to standard start.

From opening of GCB3 the **#SUS Excitation Delay (page 364)** is counted. When the timer is up, G1 and G2 are excited, then G3 can be synchronised to the bus standard way.

Example 3

Active Application (page 674) = MINT, **Excitation Control (page 362)** = External, **#SUS Min Power 1 (page 360)** is ignored when excitation is external



In the case of **Excitation Control (page 362)** = External, all Gen-sets start in the SUS sequence (base od the Load reserves). Gen-sets which activate LBO **Ready To Excite (page 814)** in **SUS RPM Window Time Out (page 363)** will stay non-excited and will be waiting for deactivation of LBI **SUS Excitation Block (page 755)**. Then they are excited.

Gen-sets which do not activate LBO **Ready To Excite (page 814)** in **SUS RPM Window Time Out (page 363)** are switched to standard start and GCBs are opened. Then they wait for voltage on the bus, after there is healthy voltage, the will synchronize to the bus.

5.4.46 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 V based on setpoints **Speed Governor Low Limit (page 437)** and **Speed Governor High Limit (page 438)**. 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 direction of speed regulation required by Speed regulator of the engine is given by the setpoint **Speed Regulator Character (page 436)**. A full range change of the speed governor output (from **Speed Governor**

Low Limit (page 437) to **Speed Governor High Limit (page 438)**) should cause 5-10% change of the engine speed (**Speed Governor Low Limit (page 437)** ~ 95% **Nominal RPM (page 321)**, **Speed Governor Bias (page 437)** ~ 100% **Nominal RPM (page 321)**, **Speed Governor High Limit (page 438)** ~ 105% **Nominal RPM (page 321)**).

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

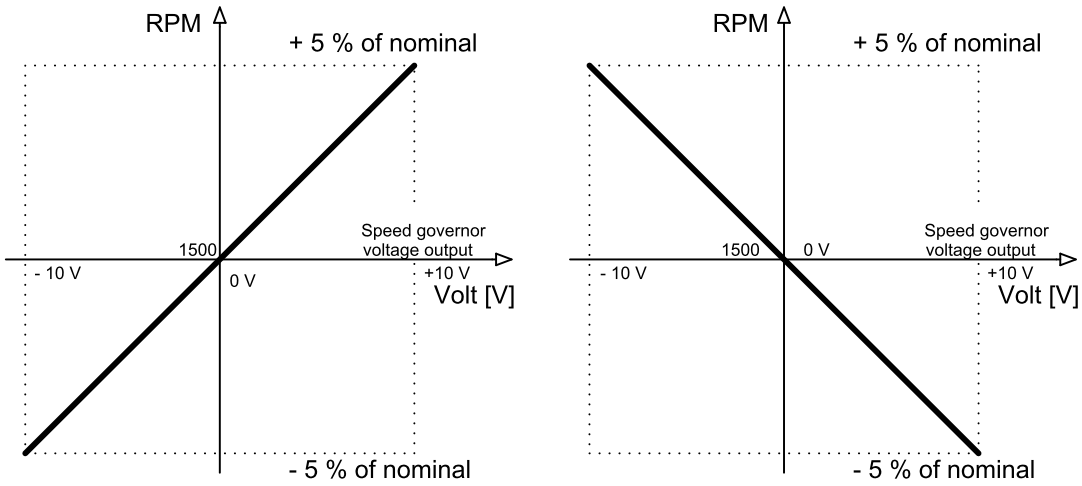


Image 5.125 Example of speed governor curve

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 817)** and **SPEED DOWN (PAGE 817)**. Length of pulses **SPEED UP (PAGE 817)** and **SPEED DOWN (PAGE 817)** 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 439)**. **Tau Speed Governor Actuator (page 439)** 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 437)**, **Speed Governor Low Limit (page 437)** and **Speed Governor High Limit (page 438)** to achieve frequency according to setpoint **Nominal Frequency (page 320)**.
- 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 440)** to unstable speed control and decrease value by 30 % to insure stable performance.

- Adjust **Frequency Int (page 440)** 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 441)** control is off).
- Set **Angle Gain (page 441)**. Synchroscope on the controller measure screen should move slowly and stop in "up" position. Set **Angle Gain (page 441)** 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 301)** setpoint to 30 % of one Gen-set.
2. Set **Load Gain (page 441)** to the same value as **Angle Gain (page 441)**. Set **Load Int (page 442)** 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 301)** value. Check that Gen-set power is positive (CT polarity).
5. Increase **Load Int (page 442)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 442)** factor is set to zero Gen-set load can differ from required **#System BaseLoad (page 301)**.
6. To adjust and optimize **Load Int (page 442)** change **#System BaseLoad (page 301)** several times between 30 and 70 % of **Nominal Power (page 311)**. Usually setting **Load Int (page 442)** 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 437)** or **Speed Governor High Limit (page 438)**)
   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 Mode (page 294)** = BASELOAD, set **Baseload (page 298)** setpoint to 30 % **Nominal Power (page 311)** of Gen-set.
2. Set **Load Gain (page 441)** to the same value as **Angle Gain (page 441)**. Set **Load Int (page 442)** 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 298)** value. Check that Gen-set power is positive (CT polarity).
5. Increase **Load Gain (page 441)** to unstable load control and decrease value by 30 % to insure stable performance. When **Load Int (page 442)** factor is set to zero Gen-set load can differ from required **Baseload (page 298)**.

6. To adjust and optimize **Load Int (page 442)** change **Baseload (page 298)** several times between 30 and 70 % of **Nominal Power (page 311)**. Usually setting **Load Int (page 442)** 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 437)** or **Speed Governor High Limit (page 438)**)
   b. Speed governor actuator is not mechanically limited or operates in a small section of the throttle range.

5.4.47 User Buttons

The User button is a binary signal. Its value can be set by its setpoint or by remote connection (WebSupervisor or by third party device such as Modbus).

States of user buttons signals are visible in the Values group User Buttons. There are 16 user buttons available.

Each setpoint has these options

Option	Description
COMMAND	The LBO User Button X is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button X is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button X is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

Commands

Commands can be sent from third party device via Modbus or remote connection (WebSupervisor). Following types are available:

Command	Description
ON/OFF	When a command ON is received, User Button is activated. Subsequent commands ON when User Button is active have no effect. If a command OFF is received, User Button is deactivated. Subsequent commands OFF when User Button is inactive have no effect.
TOGGLE	When a command TOGGLE is received, User Button is activated. Next command TOGGLE when User Button is active deactivates User Button and so on.
PULSE	When a command PULSE is received, User Button is activated for the set duration. Pulse length is 200 ms (user can use this pulse in PLC to prolong it using e.g. block Delay) Consequent commands PULSE sent during duration of the pulse prolong the duration accordingly. When the setting of pulse duration is changed while the pulse is active, the current pulse

Command	Description
	will have the original duration and the new setting is applied for the next pulse. If the User Button is active (as a result of COMMAND ON or COMMAND TOGGLE) and COMMAND PULSE comes, User Button remains active for the duration of the pulse and then it deactivates. While a pulse is active (duration of the pulse) and COMMAND ON, COMMAND OFF or COMMAND TOGGLE comes, the pulse is canceled. Next state depends on the canceling command

Note:

- *COMMAND ON – User Button remains active until COMMAND OFF or COMMAND TOGGLE comes*
- *COMMAND OFF or COMMAND TOGGLE – User Button deactivates until COMMAND ON, COMMAND TOGGLE or COMMAND PULSE come*

User button MODBUS commands

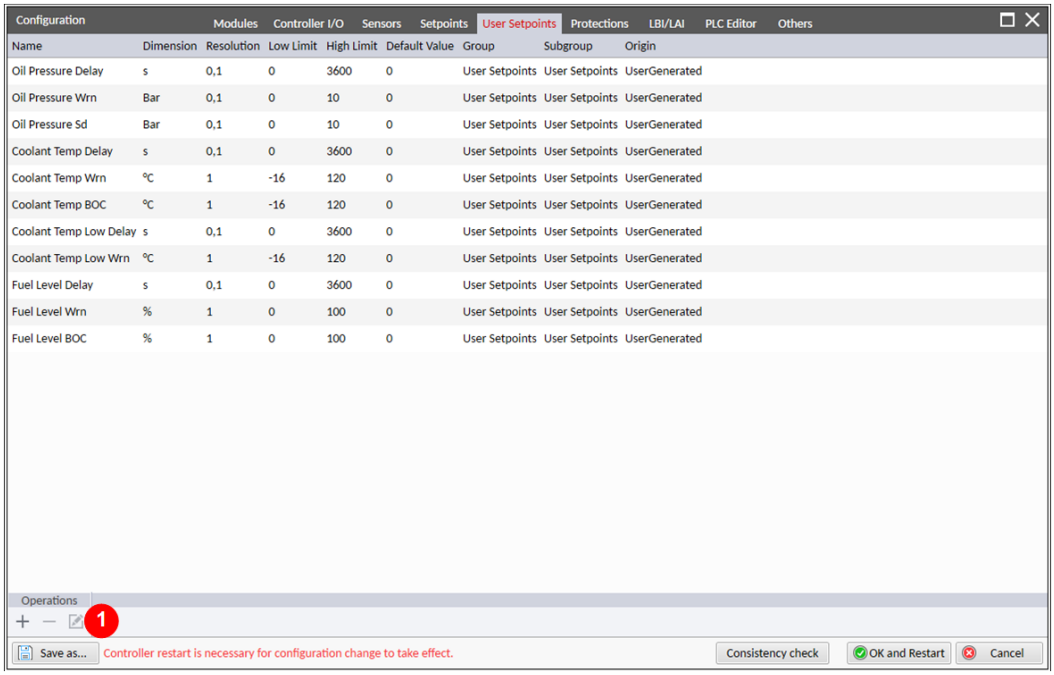
	User Button 1	User Button 2	User Button 3	User Button 4	User Button 5	User Button 6	User Button 7	User Button 8
PULSE	00 0A 00 00 00 47	00 14 00 00 00 47	00 1E 00 00 00 47	00 28 00 00 00 47	00 32 00 00 00 47	00 3C 00 00 00 47	00 46 00 00 00 47	00 50 00 00 00 47
TOGGLE	00 0B 00 00 00 47	00 15 00 00 00 47	00 1F 00 00 00 47	00 29 00 00 00 47	00 33 00 00 00 47	00 3D 00 00 00 47	00 47 00 00 00 47	00 51 00 00 00 47
ON	00 0C 00 00 00 47	00 16 00 00 00 47	00 20 00 00 00 47	00 2A 00 00 00 47	00 34 00 00 00 47	00 3E 00 00 00 47	00 48 00 00 00 47	00 52 00 00 00 47
OFF	00 0D 00 00 00 47	00 17 00 00 00 47	00 21 00 00 00 47	00 2B 00 00 00 47	00 35 00 00 00 47	00 3F 00 00 00 47	00 49 00 00 00 47	00 53 00 00 00 47
	User Button 9	**User Button 10**	**User Button 11**	**User Button 12**	**User Button 13**	**User Button 14**	**User Button 15**	**User Button 16**
PULSE	00 5A 00 00 00 48	00 64 00 00 00 48	00 6E 00 00 00 48	00 78 00 00 00 48	00 82 00 00 00 48	00 8C 00 00 00 48	00 96 00 00 00 48	00 A0 00 00 00 48
TOGGLE	00 5B 00 00 00 48	00 65 00 00 00 48	00 6F 00 00 00 48	00 79 00 00 00 48	00 83 00 00 00 48	00 8D 00 00 00 48	00 97 00 00 00 48	00 A1 00 00 00 48
ON	00 5C 00 00 00 48	00 66 00 00 00 48	00 70 00 00 00 48	00 7A 00 00 00 48	00 84 00 00 00 48	00 8E 00 00 00 48	00 98 00 00 00 48	00 A2 00 00 00 48
OFF	00 5D 00 00 00 48	00 67 00 00 00 48	00 71 00 00 00 48	00 7B 00 00 00 48	00 85 00 00 00 48	00 8F 00 00 00 48	00 99 00 00 00 48	00 A3 00 00 00 48

Note: *Table provides data which has to be written into MODBUS registers 4207-4209 (count 3) using function 16 for specific user button and command type.*

MODBUS Register: 44208(4207), Function 16, Count 3

5.4.48 User setpoints

Controller allows user to create their own setpoints, as well as edit and delete created setpoints. The number of setpoints created by the user is limited to 256. All setpoints created by user are located in a group selected by a user. The Comm. object number (**CO**) can be found via InteliConfig (Tools tab → Generate Cfg image (COM)). User setpoints can be used to manage User protections and PLC.



1	**Add** User setpoint	+
	Delete selected User setpoint	×
	Edit selected User setpoint	✎

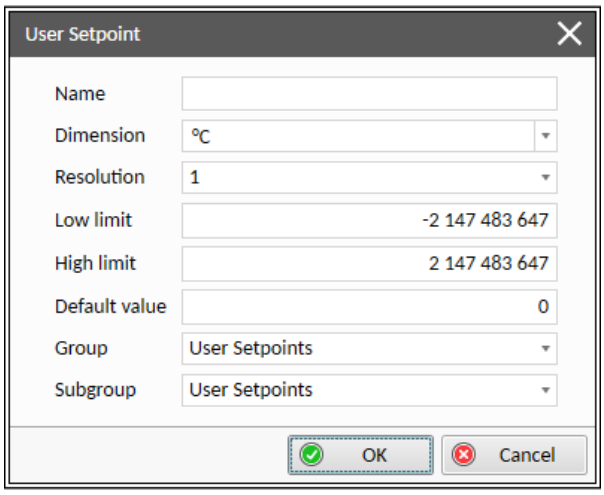


Image 5.126 Setting parameters of a user setpoint

Contents of the user setpoint

Name	Max. 32 characters ***Note:*** *Does not consider duplicities (It is possible to have setpoints with the same name, but it is not recommended.)*
Dimension	Can be chosen from a list or User can create their own with a limit of 32 characters.
Resolution	Max. 4 decimal place
Low Limit	Range of the data type INT32 (restricted by resolution). Value is set as a constant (can not be set as setpoint). Max. value cannot exceed High Limit.
High Limit	Range of the data type INT32 (restricted by resolution). Value is set as a constant (can not be set as setpoint). Min. value cannot be lower than Low Limit.
Default value	Must be in range between Low and High Limit (restricted by resolution).
Group	Group in which setpoint will be shown. Position of a setpoint in a list.
Subgroup	Subgroup in which setpoint will be shown.

5.4.49 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 449)** limit and **Voltage Regulator High Limit (page 449)**. 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 direction of speed regulation required by Speed regulator of the engine is given by the setpoint **Voltage Regulator Character (page 448)**. A full range change of the AVR output (from **Voltage Regulator Low Limit (page 449)** to **Voltage Regulator High Limit (page 449)**) should cause 5-10% change of the voltage (**Voltage Regulator Low Limit (page 449)** ~ 95% **Generator Nominal Voltage Ph-N (page 316)**, **Voltage Regulator Bias (page 448)** ~ 100% **Generator Nominal Voltage Ph-N (page 316)**, **Voltage Regulator High Limit (page 449)** ~ 105% **Generator Nominal Voltage Ph-N (page 316)**).

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 775)** and **AVR Down (page 775)**. Length of pulses **AVR Up (page 775)** and **AVR Down (page 775)** 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 Regulator Actuator (page 449). **Tau Voltage Regulator Actuator (page 449)** defines the pulse duration which is needed for the voltage controller to travel from minimal position to the maximal position. The Maximum length of pulses is limited to 5 s, the minimal length of pulses is limited to 150 ms and minimal length between the pulses is 200 ms.

Voltage/PF control adjustment

Voltage adjustment

- Set **Voltage Gain (page 450)**, **Voltage Int (page 450)** to zero and **Voltage Regulator Bias (page 448)** to 50 %.
- Start the Gen-set in MAN Mode to without load.
- Adjust generator voltage to **Generator Nominal Voltage Ph-N (page 316)** by change of **Voltage Regulator Bias (page 448)**.
- Change **Voltage Regulator Bias (page 448)** to 0 % and 100 % to check generator voltage control range (typically ±10 % of **Generator Nominal Voltage Ph-N (page 316)**).
- Set **Voltage Regulator Bias (page 448)** to again reach **Generator Nominal Voltage Ph-N (page 316)** on the generator.
- When Gen-set is running unloaded increase carefully **Voltage Gain (page 450)** to unstable point and then decrease value by 30 % to insure stable performance.
- Adjust **Voltage Int (page 450)** (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 451)** and **PF Int (page 451)** as in the chapter **Voltage adjustment (page 244)** for parameters **Voltage Gain (page 450)** and **Voltage Int (page 450)**.
- Set **#System BaseLoad (page 301)** = 30 % of **Nominal Power (page 311)** and **#System Power Factor (page 301)** = 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 451)** to unstable point and then decrease the value by 30 % to insure stable performance.
- Adjust **PF Int (page 451)** (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 448)** change or by **#System BaseLoad (page 301)** 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 451)** and **PF Int (page 451)** as in the chapter **Voltage adjustment (page 244)** for parameters **Voltage Gain (page 450)** and **Voltage Int (page 450)**.
- Set **Baseload (page 298)** = 30 % of **Nominal Power (page 311)** and **BasePower Factor (page 299)** = 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 451)** to unstable point and then decrease the value by 30 % to insure stable performance.
- Adjust **PF Int (page 451)** (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 448)** change or by **Baseload (page 298)** change.*

5.4.50 Voltage phase sequence detection

The controller detects phase sequence 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 326)**. When the phases are connected in different order (e.g. L1,L3,L2 or L2,L1,L3) the following alarms are detected:

- **ALI Gen Ph Rotation Opposite (page 880)**
- **ALI Mains Ph Rotation Opposite (page 885)**

5.4.51 Warming

This function sets maximal allowed load if Gen-Set synchronizes GCB to bus/mains and coolant temperature is bellow limit.

The function is Enabled/Disabled via setpoint **Warming Procedure (page 343)** and the behavior is adjusted via setpoints **Warming Load (page 343)**, **Warming Temperature Limit (page 343)** and **Maximum Warming Time (page 344)**.

Principle of Warming

Warming is activated if setpoint **Warming Procedure (page 343)** = Enabled and Gen-set synchronizes GCB to bus/mains with LAI **COOLANT TEMP (PAGE 719)** (or value from ECU) lower than **Warming Temperature Limit (page 343)**.

Alarm **AHI Warming (page 903)** is activated and Load is limited to **Warming Load (page 343)**. **Warming Load (page 343)** is related to **Nominal Power (page 311)**

Warming Load (page 343) set maximal allowed load, i.e. if **Baseload (page 298)** will be lower, Gen-set will be limited by **Baseload (page 298)**.

The warming will last until LAI **COOLANT TEMP (PAGE 719)** – (or value from ECU) reaches **Warming Temperature Limit (page 343)** or period given by **Maximum Warming Time (page 344)** elapses.

If LAI **COOLANT TEMP (PAGE 832)** (or value from ECU) reaches **Warming Temperature Limit (page 343)**, warming is considered as done. This means that even if LAI **COOLANT TEMP (PAGE 832)** (or value from ECU) drops bellow **Warming Temperature Limit (page 343)** again, warming is not reactivated.

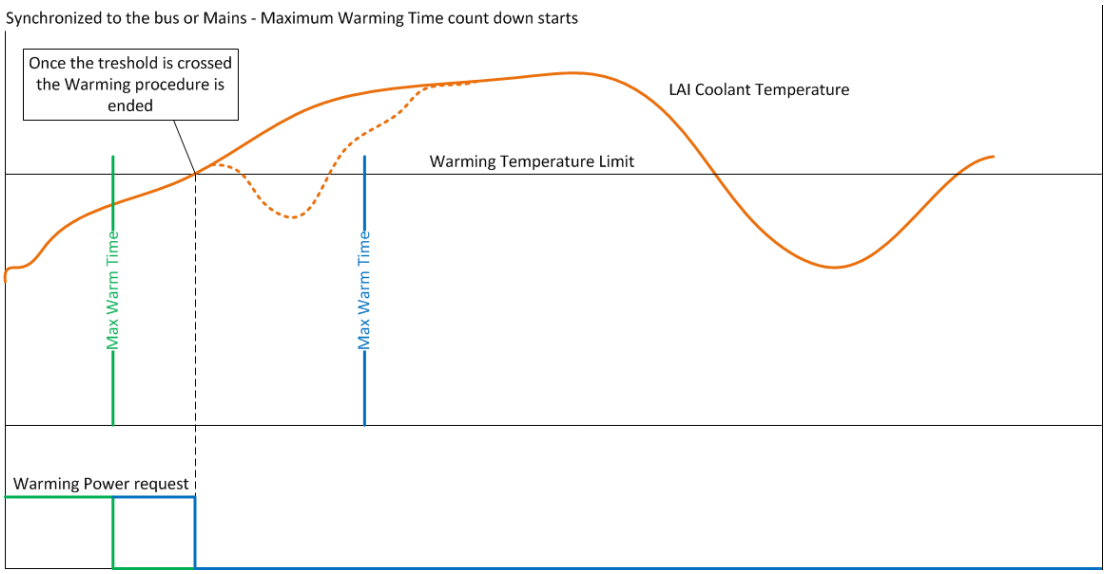


Image 5.127 Principle of Warming

back to Functions

5.5 User management and data access control

- Accessing, monitoring or controlling the device via any communication interface requires a user to be logged-in.
- When a task (read data, write data , control) is to be performed the access level of the user who is currently logged-in must be higher or equal to the access level required for the particular task.
- User must have their user account defined by the administrator of the controller before the user can log-in into the controller and perform monitoring, control or configuration tasks.

Note: *For trusted interfaces there is an "implicit user"(**see Implicit account on page 247**) automatically logged in always while no other explicit user is logged in.*

5.5.1 Types of interfaces

The controller communication interfaces are split into two categories according to what kind of environment the interface is exposed to.

- **Trusted**
  - Trusted interfaces are operated locally inside a closed environment/ infrastructure where additional measures against misuse or attack take place (e.g. physical access limitation). Due to the nature of this interface less strict cybersecurity rules may be applied.
  - Trusted interfaces provide **Implicit account (page 247)** function which allows the performance of certain operations without requiring an explicit user to log in.
  - Trusted interfaces are USB, RS232, RS485.
- **Untrusted**
  - General-purpose interfaces, which may be exposed to public networks, such as the Internet, are untrusted. The communication is running through networks which are not under control of the entity who operates the controller. Thus, strict cybersecurity rules must apply for this type of interface.
  - Untrusted interface are Ethernet and cellular module.

5.5.2 User accounts

User account must be created in the controller by an administrator before the particular user can login to the controller.

Note: *If there is a need to create the same accounts on several controllers use cloning.*

User account must have the following properties

Username	Consists of 6-15 alphanumeric characters, must contain at least 1 letter. This is the main identifier of the particular user account.
Password	Consists of 6-15 alphanumeric characters, must contain at least 1 letter and 1 digit. This is the password that is used together with user name to authenticate (log-in).
User identifier (UID)	Optional 4-digit identification string which can be used for simplified login at trusted interfaces (e.g. from InteliVision display when connected via Ethernet.
PIN	4-digit “password” to be used together with UID.
Access level	Determines **Access to controller data (page 255)**

Implicit account

At trusted interfaces there is an *implicit user* automatically logged-in at any time if no other explicit user is logged-in at the respective interface. This allows terminal devices (e.g. internal display) to show controller values even without the need for a specific person to be logged-in.

- The implicit account is fixedly defined in the firmware.
- The implicit account has fixed access level 0, unless production mode is activated (**see Production mode on page 248**).
- Implicit user is logged in any time no other user is logged in at the respective interface.

User login

To login to the controller the **username and password must be provided into the login form** of the application (**InteliConfig (page 15)**, **WebSupervisor (page 15)**.

Alternatively, at **trusted interfaces**, it is possible to **login using UID and PIN** instead of username and password. This method of login is designed to simplify the login procedure at devices without alphanumeric keyboard (e.g. InteliVision).

Note: *The controller is featured with a protection against brute force attack to user account credentials. For details* ***see Account break protection on page 254****.*

Changing password and PIN

The password and/or PIN for currently logged user can be changed. The user must be logged with username and password even if PIN has to be changed.

Production mode

Production mode is used to simplify working with the controller while manufacturing, putting into operation or service works.

In production mode the **Implicit account (page 247)** has access level adjusted to **administrator level**. Thus, in production mode at trusted interfaces (like USB) the operator is allowed to perform any operation which normally requires administrator to log in without the need of logging in.

> **IMPORTANT: Production mode is intended only for the manufacturing and/or service purposes while the controller is in the respective facility and must be turned off before the controller is put into regular operation.**

There is active alarm **Wrn Production Mode (page 895)** in the alarm list any time production mode is active. To turn off the Production mode go to User management and uncheck the checkbox Production mode or go to Production Mode display screen and select disable.

Factory default accounts

Each controller comes from the production with one factory default administrator account having following credentials:

Username: "administrator"

Password: <serial number of the controller>

> **Example:** 12345678

User ID: "0001"

User PIN: "0000"

When the controller is being configured for operation the desired user accounts including the administrator account should be created and then the factory default account can be deleted.

> **IMPORTANT: Adjust the backup e-mail address before you delete the default administrator account. This address is used as second authentication factor in password reset request and the password reset action code will be sent to this and only this e-mail address.**

Note: *There must always remain at least one administrator account in the system. The controller will not allow deleting last administrator account.*

Wrn Default Password appears in Alarm list when the default administrator password is set and communication module is plugged in the controller. The purpose of alarm is to inform that the controller might be or is connected to an untrusted interface and cybersecurity rules are not fulfilled because there is default administrator password.

Reset accounts to factory default

If credentials (username and/or password) for administrator account are lost, it is possible to reset all user accounts to the factory default state. For more information **see Resetting the administrator password on page 256**.

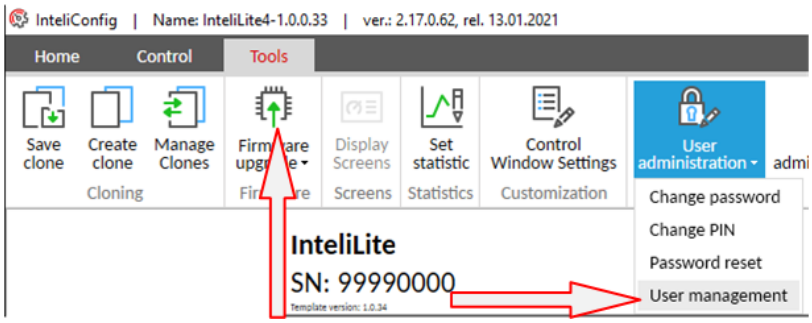
After reset procedure user accounts are in factory default state.

Wrn Default Password appears in Alarm list when the default administrator password is set and communication module is plugged in the controller. The purpose of the alarm is to inform that the controller might be or is connected to an untrusted interface and cybersecurity rules are not fulfilled because there is default administrator password.

5.5.3 Managing accounts

User accounts can be managed from InteliConfig while an online connection to the controller is established. A user with administrator level must be logged with username/password and is prompted to re-enter accounts password before the user management dialog is opened.

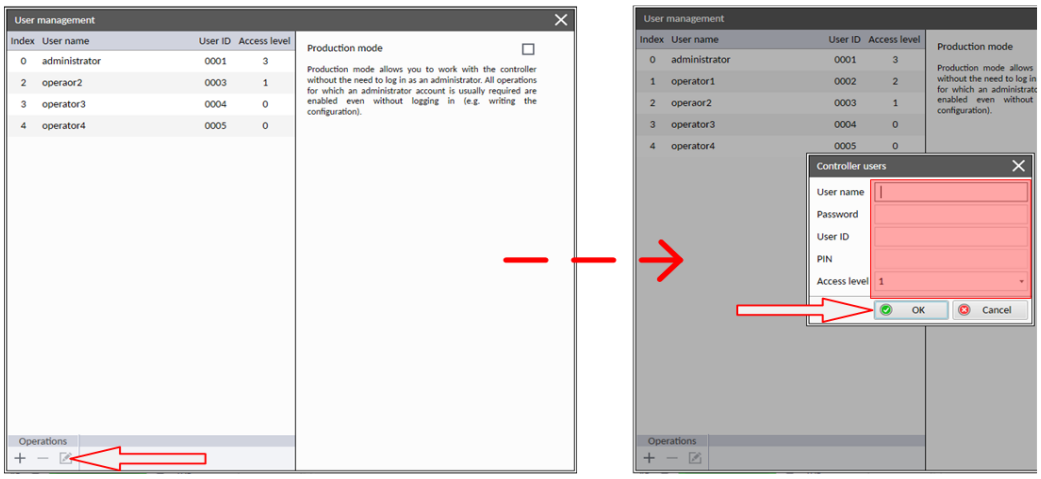
IMPORTANT: The total available number of accounts in the controller is 10.



Adding an account

Click on the "**+**" button in the lower left corner of the user management window, then provide the account properties as described in **User accounts (page 247)**.

Note: *Rules for the* ***User accounts (page 247)*** *credentials apply and some items are optional*



Deleting an account

Select the account that has to be deleted and click on the "**-**" button in the lower left part of the user management window.

Note: *You can not delete your own administrator account unless there is another administrator account present in the controller.*

Cloning accounts

Cloning feature allows user to clone user accounts together with controller firmware and configuration.

Note: *If the archive where the save of the clone is made is configured with the plug-in module, it's firmware can also be a part of the clone.*

Save the clone

To prepare the clone you need to click on the Save Icon. The following window appears.

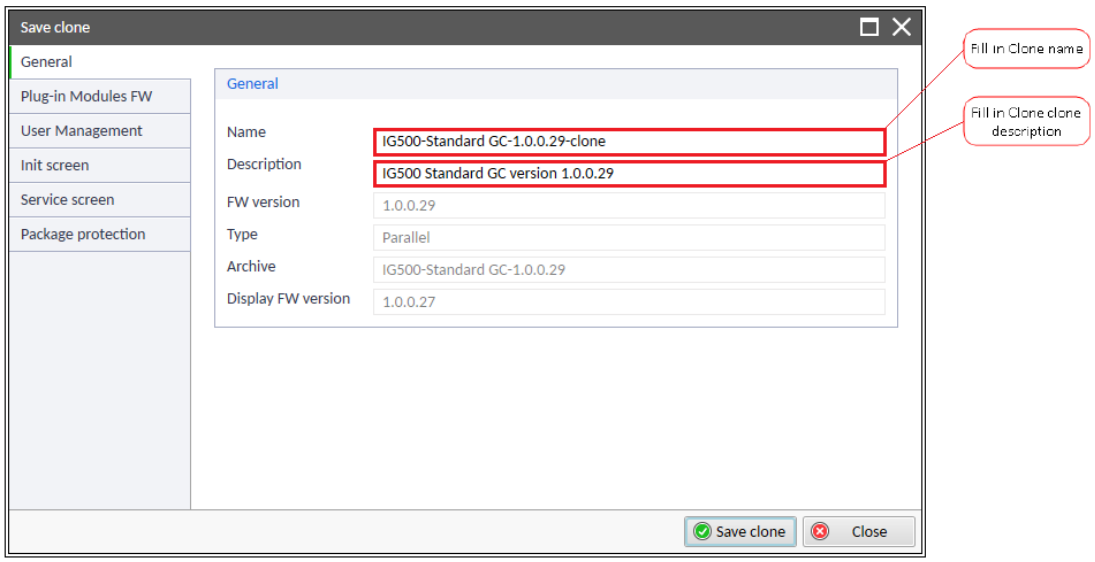


Image 5.128 Save the clone

- Plug-in Module FW bookmark
  - If is required to clone firmware of connected plug-in modules, click to checkbox "Include Plug-in Modules FW"
- User Management bookmark
  - User has to create accounts in this section. These newly created accounts are stored in the clone
  - At least one user with administrator rights (level 3) must be defined. Recovery Email address has to be set.
  - AirGateKey is not mandatory but recommended when the AirGate connection is used to access the controller

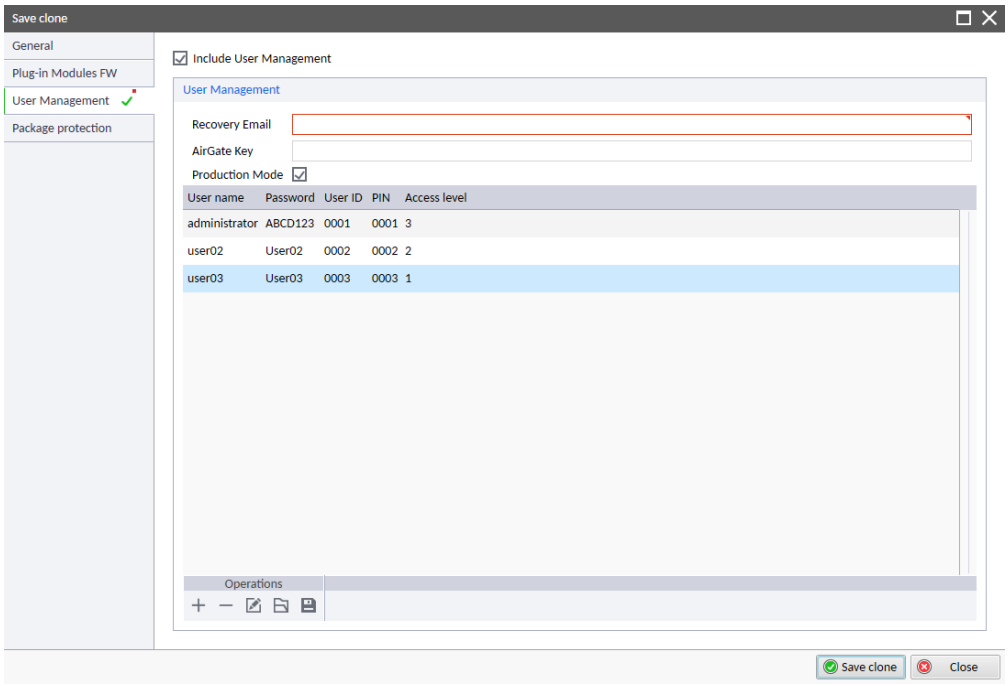


Image 5.129 Create accounts

- Package protection
  - Set up password for clone file

Create clone

To load the clone to the controller click on the Create Clone icon.

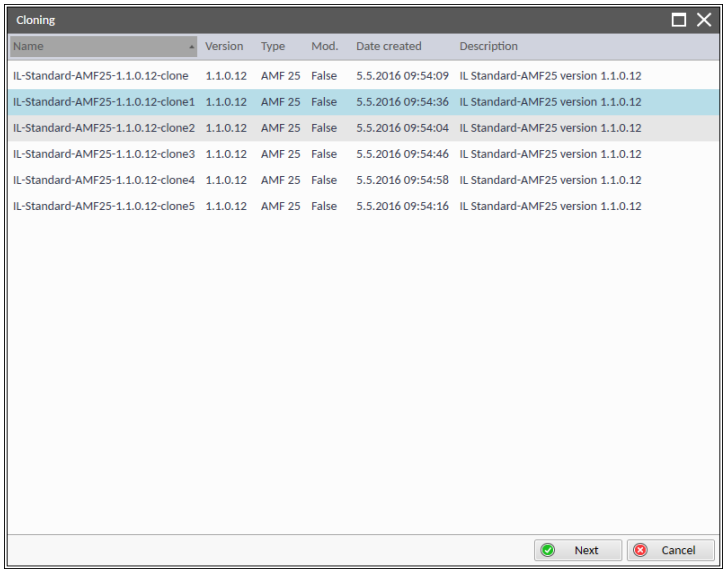


Image 5.130 Create clone

1. Select required clone and click on Next button
2. Following window appears

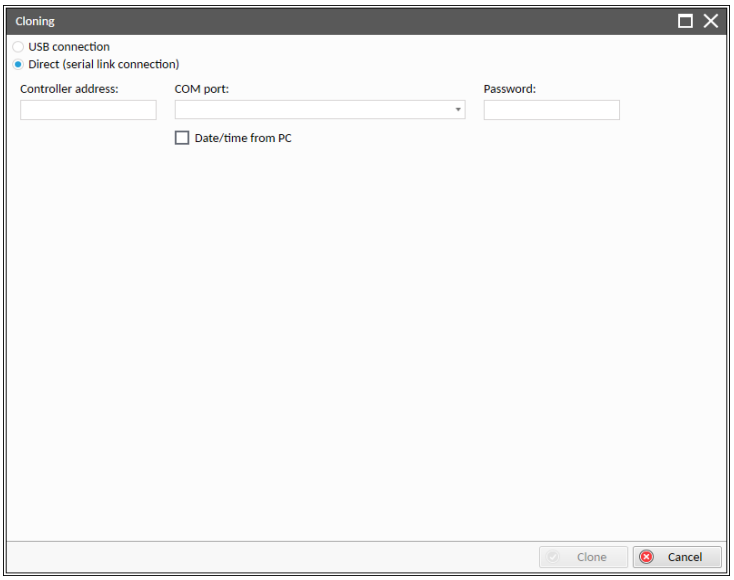


Image 5.131 Create clone

3. Select required connection type
4. Fill in the password in case the clone was saved by selected Package protection option
5. Click on Clone button

Manage clones

Click on the ImEx clone icon for managing clones. Following window appears.

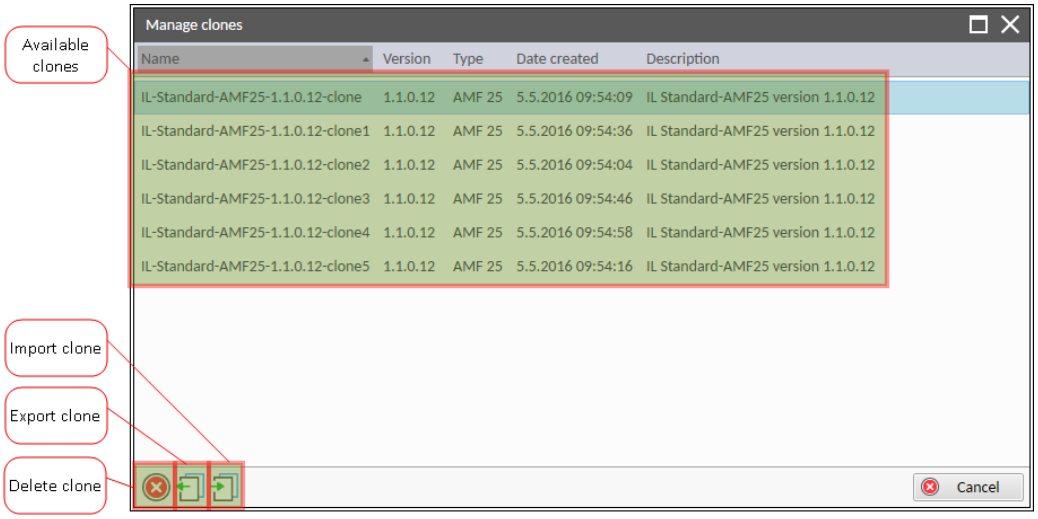


Image 5.132 ImEx Clone

Exporting clone

It is possible to export clone from InteliConfig software into any location. To export the clone click on the Export clone icon. Following window appears.

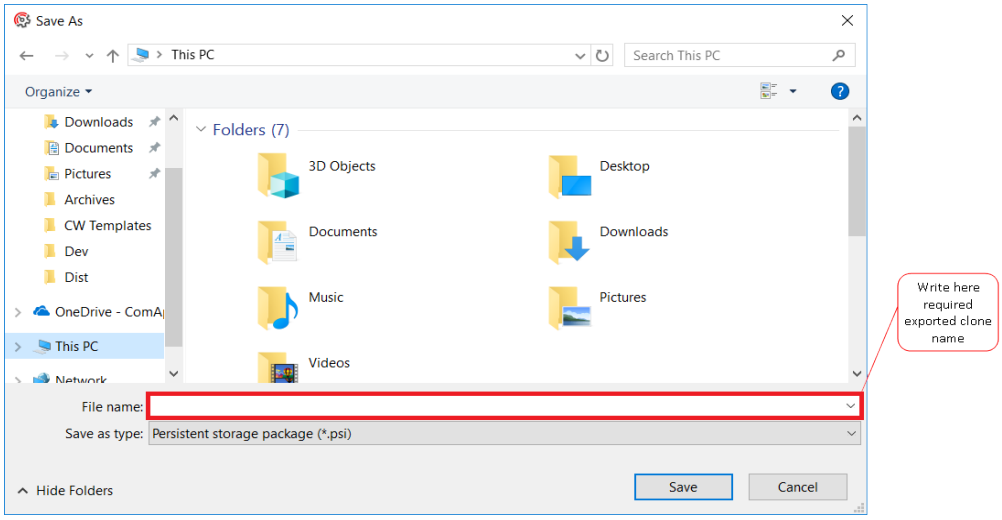


Image 5.133 Save as clone

1. Type required clone name into File name bar
2. Choose required folder
3. Click on Save button

Importing clone

It is possible to import clone from any location. For importing the clone click on the Import clone icon. Following window appears.

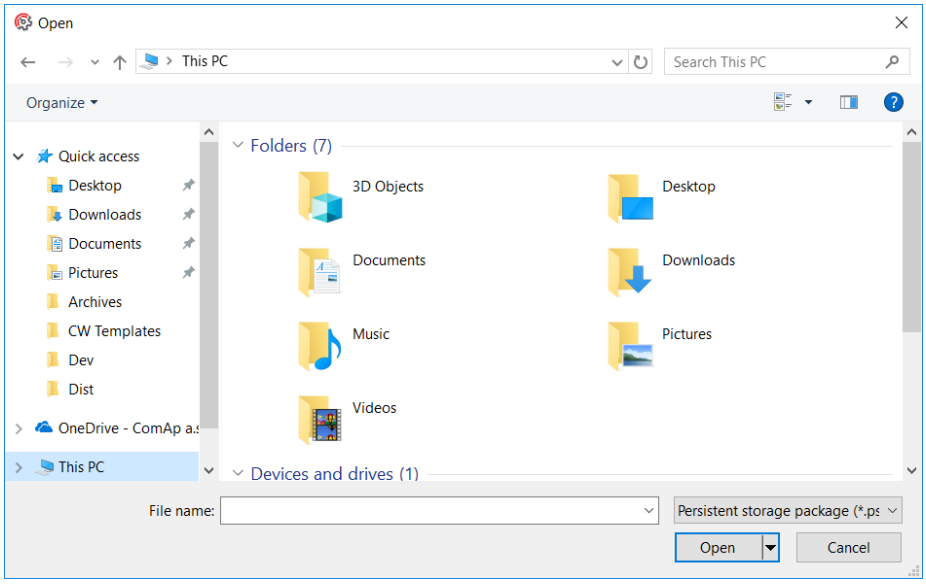
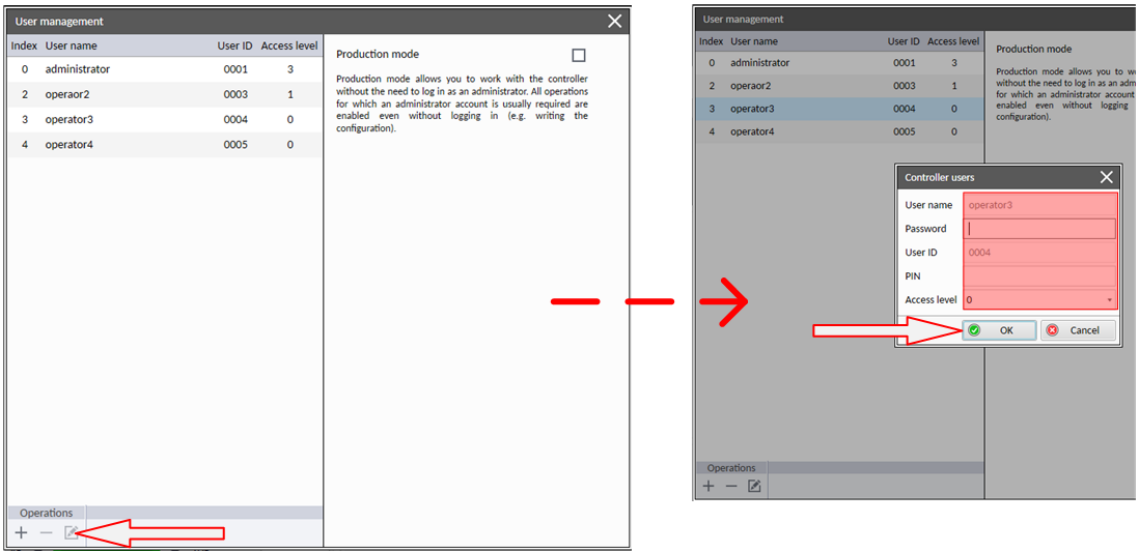


Image 5.134 Open clone

1. Go to location where is required clone saved
2. Select the clone
3. Click on Open button

Changing account properties

Select the account that needs to be deleted and click on the "pencil" button in the lower left part of the user management window. Then modify the desired property or properties. You can modify one or more properties at once.



Note: *It is not possible to change user name or UID. Instead of this create a new account with the required changes and delete the original one.*

5.5.4 Account break protection

The controller protects the user accounts against a brute-force attack, i.e against breaking into the controller by fast repeating attempts to login with credentials generated from the range of all possible combinations.

If the account break protection detects a possible attack and blocks an account or interface the alarm **Wrn Brute Force Protection Active (page 870)** is activated. The alarm can be used to send an active message (e.g. e-mail) to inform about that situation The exact behavior of the controller depends on the situation.

Password protection

1. If a user performs five consecutive attempts to login using username/password, providing correct username but incorrect password, the respective user account is blocked for a time period of 1 minute. The attempts count regardless of the interface from which it is performed.
2. During the blocking period it is not possible to login with the respective account (username) from any interface even if the correct password is provided.
3. After the blocking period elapses, another attempt to login with the respective account (username) is possible. If this attempt fails again the account is blocked again, now for period of 2 minutes.
4. The points repeats 1-3 times further, the duration of the blocking period is multiplied by 2 in each consequential cycle. However, the maximal blocking time is 20 minutes, the blocking time is never higher.

PIN protection

If a user performs **ten consecutive attempts** to login using UID/PIN, providing **correct UID** but **incorrect PIN**, the user account is permanently blocked for login using this UID/PIN. The user must login with username/password and change the PIN to unblock this login method again.

Interface protection

If anyone performs **twenty consecutive attempts** to login via one particular interface and does not provide either a valid username nor a valid uid the respective interface is blocked for 2 minutes.

During this period it is not possible to use that interface for any login. The blocking period is not progressive in this case.

5.5.5 Access to controller data

Every request for reading data from the controller or writing data into it requires a user to be logged. **This user must have an access level higher or equal to the access level defined for the particular object and operation.**

There are 4 access levels available (level 0 to level 3). **Level 3 is administrator level** and users who have this level have full control over the controller.

Reading data

The access level required for reading data from controller is fixedly adjusted to 0. That means **reading of data** (except some system objects) **is available for any user**.

Writing data

The access level required to **write** (modify) **application setpoints or invoke application commands is configurable** via InteliConfig.

Special situations

There are several operations that require administrator level:

- Programming firmware
- Programming configuration
- Managing user accounts

5.5.6 Cybernetic security

The cybernetic security is formed by:

- Protection against a brute-force attack to the password
- Secure method to reset the password
- A new technology of encryption of the remote communication
- Web interface can be disabled

Note: *Cybernetic security was designed according to ISA 62443, level 2.*

Protection against the brute force attack

Protection against a brute force attack will take place when an invalid password is entered repeatedly.

- If the invalid password is entered 5 times, the controller gets blocked from entering the password for a predetermined amount of time.
- Each further entering of the invalid password cause the consequent blocking time is to be increased.
- If the invalid password is entered repeatedly the controller gets blocked for entering the password permanently and the password must be reset to a default value as described below.

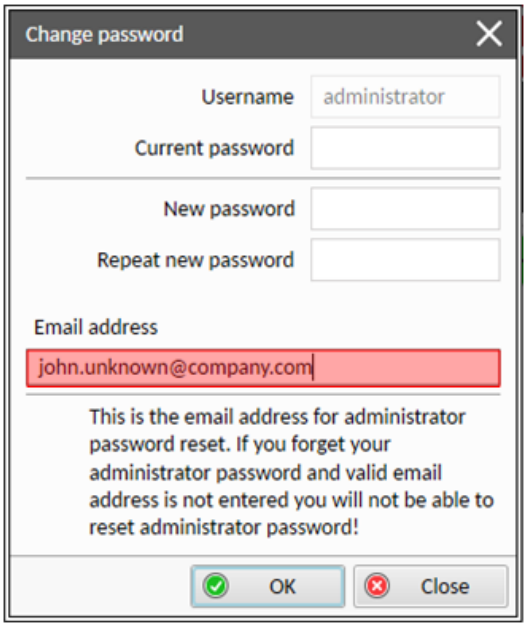
Note: *Blocking of the controller for entering the password has no influence on controller / Gen-set operation*

Note: *Permanent blocking cannot occur accidentally, just by user mistake. It can be practically triggered only by a focused activity.*

Resetting the administrator password

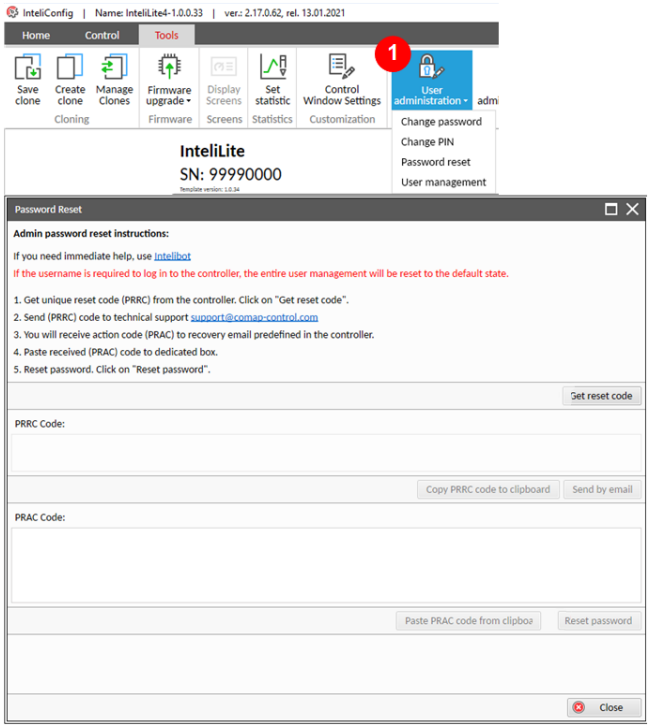
If **the administrator password is lost or controller is permanently locked** due to brute-force attack protection, proceed according to a procedure described below:

> **IMPORTANT: There is a backup e-mail address defined in the controller to which and only which ComAp will send the "password reset action code". Please be sure, that you have adjusted this e-mail address correctly. Use InteliConfig to adjust the backup e-mail address**



Reset password procedure

1. Connect InteliConfig.
2. Get the password reset request code and send it via e-mail to support@comap-control.com



3. Once you receive the reply from ComAp, copy the code from the e-mail (all characters inside the box as indicated below)



Dear customer,

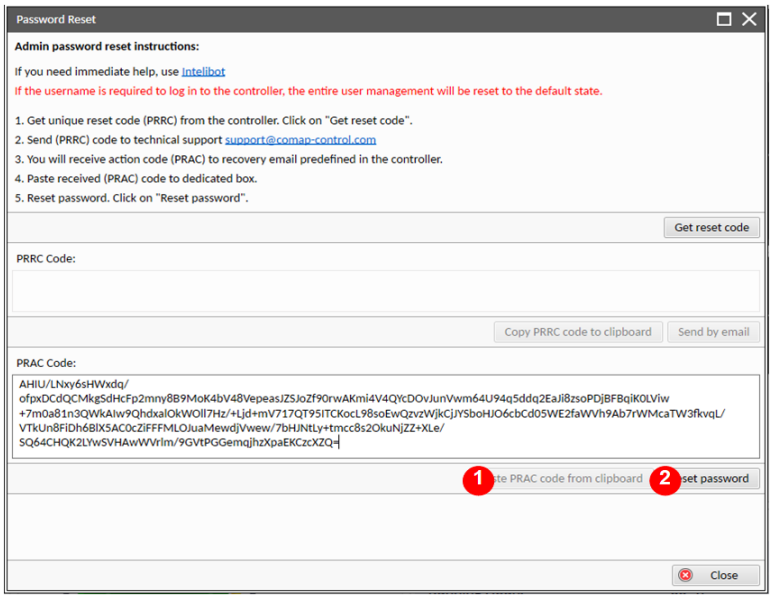
ComAp has received your request for resetting the password in the controller **N/A**, serial n umber **99990000**. Please perform following steps to finish the action.

1) Connect your PC application to the controller
2) Copy the action code stated below to the clipboard
3) Paste the clipboard content into the appropriate field in the PC application and press the "Reset" button. Password will be reset to the default value.
4) Adjust and remember new password

Code:

```
AHIU/LNxy6sHWxdq/ofpxDCdQCMkgSdHcFp2mny8B9MoK4bV48VepeasJZSJoZf90rwA
Kmi4V4QYcDOvJunVwm64U94q5ddq2EaJi8zsoPDjBFBqiK0LViw+7m0a81n3QWkAIw9Q
hdxalOkWOll7Hz/+Ljd+mV717QT95ITCKocL98soEwQzvzWjkCjJYSboHJO6cbCd05WE
2faWVh9Ab7rWMcaTW3fkvqL/VTkUn8FiDh6BlX5AC0cZiFFFMLOJuaMewdjVwew/7bHJ
NtLy+tmcc8s2OkuNjZZ+XLe/SQ64CHQK2LYwSVHAwWVrlm/9GVtPGGemqjhzXpaEKCzc
XZQ=
```

4. Paste the code into the password reset window



Encryption of the communication

New technology CCSv2 is used for an authentication and an encryption of the ComAp protocol via Internet/ethernet/AirGate. This technology is based on strong and proven cryptographic algorithms and has successfully passed penetration tests and cybersecurity audit.

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6 Communication

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6.2 Connection to 3rd party systems 267

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6.1 PC

6.1.1 Direct communication 260
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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 66**.

RS232 interface uses **COM1 Mode (page 559)** 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.*

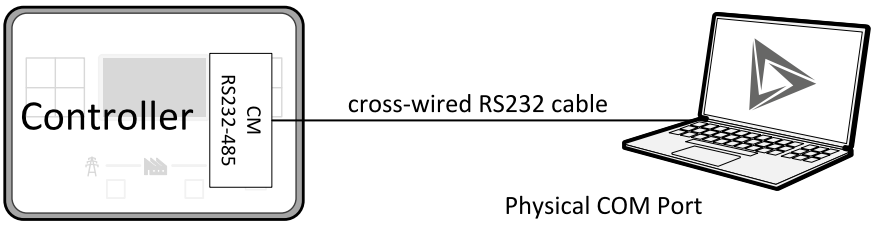


Image 6.1 Cross-wired RS232 cable is used

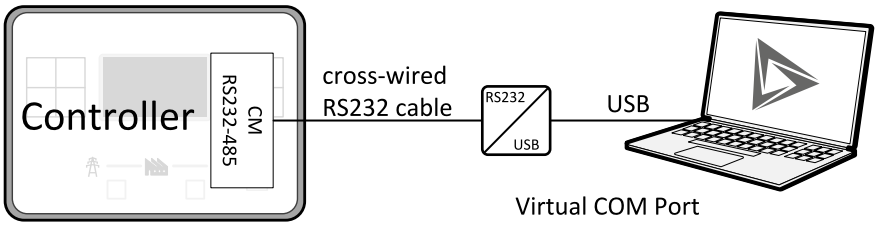


Image 6.2 Cross-wired RS232 cable and USB is used

Connection via RS485

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

If you use CM-RS232-485 module, make sure the module is correctly inserted and **COM2 Mode (page 561)** setpoint is set to the option Direct. To find more information about installation of the modules **see Plug-in module installation on page 66**.

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

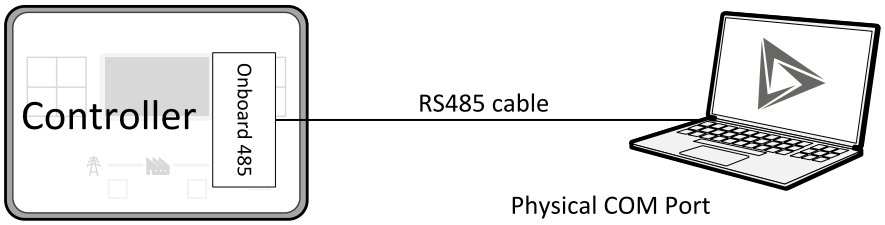


Image 6.3 Onboard RS485 is used

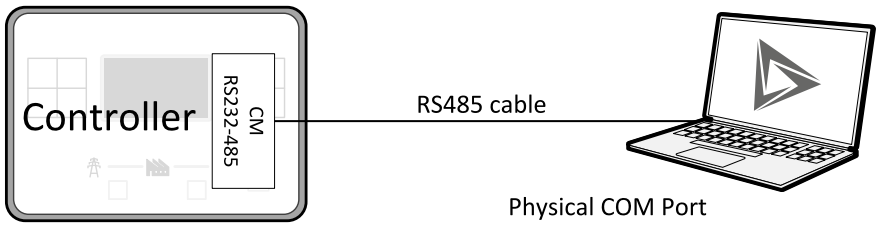


Image 6.4 Plug-in module CM RS232-485 is used

Connection via Ethernet

There are two options how to connect PC tool (InteliConfig, Winscope1000, etc.) to the controller via Ethernet.

- Onboard Ethernet interface
- Plugin communication module CM3-Ethernet interface (**see Plug-in module installation on page 66**)

Onboard Ethernet offers 8 clients to be connected at the same time by direct IP or AirGate.

CM3-Ethernet offers 5 clients to be connected at the same time by direct IP or AirGate.

The controller considers both interfaces as untrusted therefore correct userID and PIN or username and password has to be filled in.

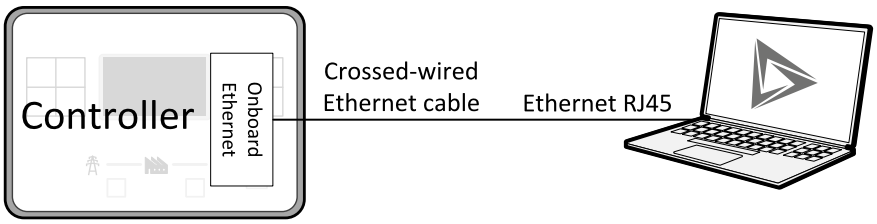


Image 6.5 Onboard Ethernet cable is used

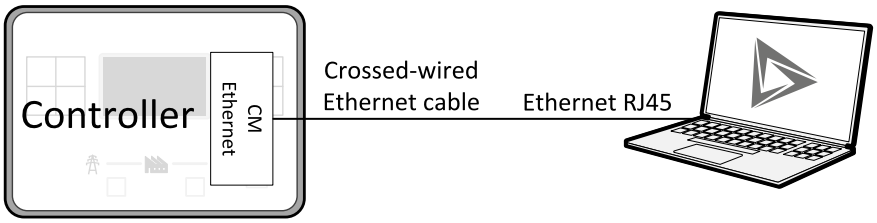


Image 6.6 Ethernet cable is used

Connection via USB

USB interface uses HID profile.

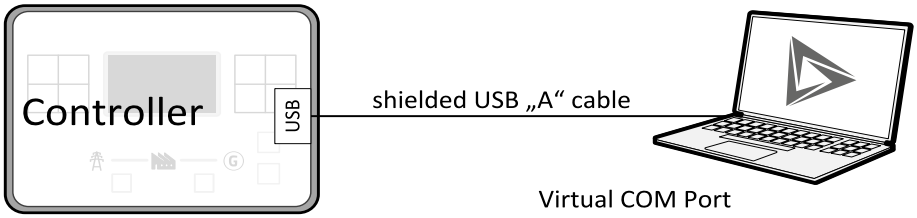


Image 6.7 Shielded USB type A cable is used

6.1.2 Remote communication

Ethernet LAN connection

Direct IP LAN connection is intended to be used if the onboard ethernet or CM3-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 onboard ethernet or CM3-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 try using AirGate connection instead.*

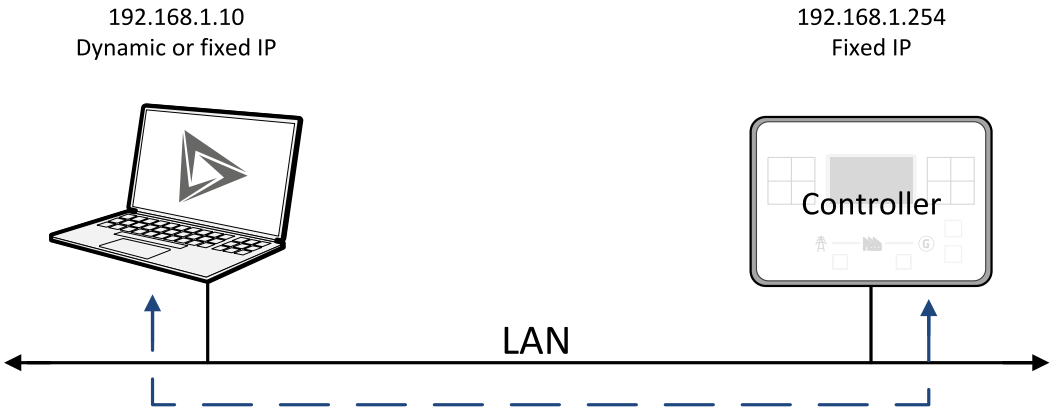


Image 6.8 Ethernet LAN connection

Note: *For information how to setup an AirGate connection,* ***see AirGate connection on page 73****.*

Onboard Ethernet setup

All settings related to the module are to be adjusted via the controller setpoints. The respective setpoints are located in the setpoint group Ethernet.

All actual operational values like actual IP address etc. are available in controller values in a group Ethernet.

CM3-Ethernet 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.

All actual operational values like actual IP address etc. are available in controller values in a group CM-Ethernet.

Setting-up static IP address

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

First way is to switch the onboard ethernet or CM3-Ethernet to manual IP address mode. Adjust the setpoint **IP Address Mode (page 605)** to Manual. In that case all setpoints of IP settings (**IP Address (page 606)**, **Subnet Mask (page 606)**, **Gateway IP (page 607)**, **DNS IP Address 1 (page 608)**, **DNS IP Address 2 (page 608)**) must be adjusted manually. If this method is used several basic rules should be kept avoiding conflicts with the remaining network infrastructure:

- The static IP used in the controller must be selected in accordance with the local network in which onboard ethernet or CM3-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.*

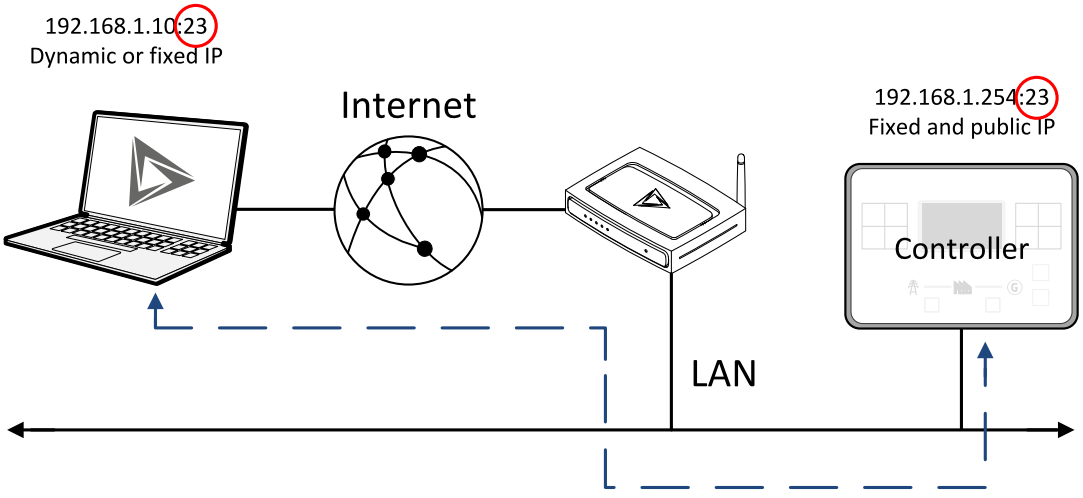
The second way to get the static IP address is to switch the onboard ethernet or CM3-Ethernet to automatic IP address mode. Adjust the setpoint**IP Address Mode (page 605)**to AUTOMATIC. In that case all IP settings are assigned by DHCP server. Then configure the DHCP server to assign always the same IP address (i.e. static IP address) to the particular onboard ethernet or CM3-Ethernet according to its 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 onboard ethernet or CM3-Ethernet is connected to the Internet via a local Ethernet network then in the most cases port forwarding must be created from the public IP address of the network gateway to the local IP address of onboard ethernet or CM3-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.

This connection type is active if AirGate connection is enabled. Setpoint **AirGate Address (page 610)** must contain AirGate server address. It can be entered in text form as well as numeric form. There is a public AirGate server available at the address "airgate.comap.czglobal.airgate.link".

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

In order to connect to InteliConfig following information have to be filled out:

- AirGate ID
- AirGate server
- Controller address
- User name and Password
- AirGate Key

> **IMPORTANT: AirGate Key has to be configured. User with administrator rights has a possibility to set up or change AirGate Key via InteliConfig using Tools -> Access Administration -> Change AirGate Key.**

SMS

Event SMS

The InteliGen 500 G2 controller equipped with the CM2-4G-GPS communication module is able to send Event SMS according to the setting of setpoint:

- **Event Message (page 622)**

> ***Note:*** *First, the setpoint **Telephone Number 1 (page 579)** must be adjusted to enable this function.*

The following events can be received by mobile phone:

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

Message structure:

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

Alarm SMS

The InteliGen 500 G2 controller equipped with the CM2-4G-GPS communication module is able to send Alarm SMS according to the setting of setpoints:

- **Wrn Message (page 603)**
- **Stp Message (page 623)**
- **Sd Message (page 623)**
- **BOC Message (page 622)**

Note: *First, the setpoint* ***Telephone Number 1 (page 579)*** *must be adjusted to enable this function.*

Message structure:

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

Note: *An asterisk means that alarm is unconfirmed and an exclamation mark means that alarm is active.*

Emails

Event Email

The InteliGen 500 G2 controller equipped with the CM3-Ethernet communication module is able to send an Event Email according to the setting of setpoint:

- **Event Message (page 622)**

Note: *Setpoints* ***Email Address 1 (page 619)*** *and* ***SMTP Sender Address (page 617)*** *or* ***SMTP Server Address (page 617)*** *must be adjusted to enable this function.*

Message structure:

Controller

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

Alarm 1

Alarm 2

Alarm 3

Events

---

hh:mm:ss Event 1

hh:mm:ss Event 2

hh:mm:ss Event 3

Alarm Email

The InteliGen 500 G2 controller is able to send Alarm Emails according to the setting of setpoints:

- **Wrn Message (page 603)**
- **Stp Message (page 623)**
- **Sd Message (page 623)**
- **BOC Message (page 622)**

Note: *Setpoints **Email Address 1 (page 619)** and **SMTP Sender Address (page 617)** or **SMTP Server Address (page 617)** must be adjusted to enable this function.*

Message structure:

Controller

Name: XXX

Serial number: XXX

SW branch: XXX

SW version: XXX

Application: XXX

Appl. version: XXX

Date: dd/mm/yyyy

Time: hh:mm:ss

Alarm list

Alarm 1

Alarm 2

Alarm 3

History events

---

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

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

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

Note: *An asterisk means that alarm is unconfirmed and an exclamation mark means that alarm is active.*

6.2 Connection to 3rd party systems

6.2.1 SNMP 267
6.2.2 MODBUS-RTU, MODBUS/TCP 269

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".

- Supported versions – SNMP v1, SNMP v2c and SNMP v3

The SNMP Agent function is to be enabled by the setpoint **SNMP Agent (page 613)** in the CM-Ethernet setpoint group. The setpoints **SNMP RD Community String (page 614)** and **SNMP WR Community String (page 615)** in the same group can be used to customize the "community strings" for the read and write operations which function like "passwords". All requests sent from the SNMP Manager must contain a community string which matches with the community string adjusted in the controller otherwise the controller will refuse the operation.

MIB table

The "MIB table" (Management Information Base) is a table which gives to the Manager a description of all objects provided by the Agent.

- The MIB table is specific for each controller type and configuration
- The MIB table is to be exported from the controller configuration using InteliConfig
- Controllers with identical firmware and configuration also share identical MIB table, however if the configuration and/or firmware is not identical the MIB table is different and must be exported separately for each controller.

The root OID of the InteliGen 500 G2 controller is 1.3.6.1.4.1.28634.40. Under this node can be found following sub-nodes:

- Notifications group (SMI v2 only) contains definitions of all notification-type objects that the Agent may send to the Manager.

- GroupRdFix contains read-only objects that exist in all controllers regardless of the firmware version/type and configuration.
- GroupRdCfg contains read-only objects that depend on the firmware version/type and configuration.
- GroupWrFix contains read-write objects that exist in all controllers regardless of the firmware version/type and configuration.
- GroupWrCfg contains read-write objects that depend on the firmware version/type and configuration.
- GroupW contains write-only objects.
- NotificationData group contains objects that are accessible only as bindings of the notification messages.

SMI version

In InteliConfig the MIB table may be exported in two different formats – SMI v1 and SMI v2. The format which shall be used for export depends on the SNMP Manager and the SMI version that it supports.

Typically, SMI v1 is used for SNMP v1 and vice versa, but it is not a rule. SMI v2 may also be used for SNMP v1.

SNMP notifications

Except for the request-response communication model, in which the communication is controlled by the Manager, there are also messages that the Agent sends without any requests. These messages are called "Notifications" and inform the Manager about significant events which occurred in the Agent.

The controller can send notifications to two different SNMP Managers (two different IP addresses). The addresses are to be adjusted in the Ethernet setpoint group. If the Manager address is not adjusted the particular notification channel is off. The controller will send the notifications in the format adjusted by the setpoint SNMP Trap Format.

- Each notification (kind of event) is identified by a unique identifier (Trap ID in SNMPv1 or Notification OID in SNMPv2). This unique identifier gives the specific meaning to the notification message, e.g. Protection 1st level – Fuel Level – alarm activated.
- All possible notifications and their identifiers are listed in the MIB table.
- The notification message also contains controller name, serial number and textual description of the event.

SMI version

In InteliConfig the MIB table may be exported in two different formats – SMI v1 and SMI v2. The format which shall be used for export depends on the SNMP Manager and the SMI version that it supports. Typically, SMI v1 is used for SNMP v1 and vice versa, but it is not a rule and SMI v2 may also be used for SNMP v1.

SNMP v3 is supported for request-response operations. Security levels supported: auth-nopriv, auth-priv. All common protocols supported, up to AES256/SHA256 v3 is not supported for notifications, these are sent in v1/v2 format according to selected format.

SNMP reserved objects

Name	OID	Access	Data type	Meaning
pfActionArgument	groupWrFix.24550	read,write	Gauge32	Writing: command argument Reading: command return value
pfActionCommand	groupW.24551	write	Integer32	Command code *)
pControllerMode	groupWrCfg.8315	read, write	Integer32	Writing: changing controller mode Reading: checking controller mode

Note: **)*
For list of commands, arguments and description of the procedure of invoking commands see the description of the Modbus protocol.

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 559)** or **COM2 Mode (page 561)** or **RS485 Mode (page 329)** into the Modbus position. The serial speed for MODBUS-RTU communication is adjusted by the setpoint **COM1 MODBUS Communication Speed (page 560)** or **COM2 MODBUS Communication Speed (page 562)** or **RS485 Modbus Speed (page 330)**.
- MODBUS/TCP can be used on the Ethernet interface. Up to 2 clients can be connected simultaneously. The MODBUS/TCP server must be activated by the setpoint **MODBUS Server (page 591)**.

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

> **IMPORTANT: Do not use setpoints for regulation purposes. Avoid fast periodical re-writing of any setpoint. Use remote control registers instead.**

Note: *Modbus-RTU serial communication mode is 8-N-1 – startbit 1, 8 data bits, no parity and 1 stopbit.*

Address space

The object address space is separated into several areas as described in the table below. The actual mapping of specific controller data objects to specific Modbus addresses, which depends on configuration, can be exported into a text file from the appropriate controller archive using InteliConfig. There are several special registers with fixed meaning (reserved registers) which are listed in a separate table in this chapter.

MODBUS address	Meaning	Access	MODICON object type	MODBUS function
0000 .. 0999	Binary objects	Read only	Discrete Inputs	Read: 01, 02
1000 .. 2999	Values	Read only	Input Registers	Read: 03, 04
3000 .. 3999	Setpoints	Read/Write	Holding Registers	Read: 03, 04 Write: 06, 16
4200 .. 7167	Reserved registers	Read/Write, depends on each specific register	Input Registers Holding Registers	Read: 03, 04 Write: 06, 16

Mapping data types to registers

As there are multiple data types in the controller but only one data type in MODBUS (the register, which is 2 byte long), a mapping table is necessary to compose and decompose the MODBUS messages correctly.

Data type	Meaning	Number of registers	Data maping
Integer8	1-byte signed integer	1	MSB = sign extension LSB = value
Unsigned8	1-byte unsigned integer	1	MSB = 0 LSB = value
Integer16	2-byte signed integer	1	MSB = value, MSB LSB = value, LSB
Unsigned16	2-byte unsigned integer	1	MSB = value, MSB LSB = value, LSB
Integer32	4-byte signed integer	2	MSB1 = value, byte 3 (MSB) LSB1 = value, byte 2 MSB2 = value, byte 1 LSB2 = value, byte 0 (LSB)
Unsigned32	4-byte unsigned integer	2	MSB1 = value, byte 3 (MSB) LSB1 = value, byte 2 MSB2 = value, byte 1 LSB2 = value, byte 0 (LSB)
Binary8	8-bit binary value	1	MSB = 0 LSB = value, bits 0-7
Binary16	16-bit binary value	1	MSB = value, bits 8-15 LSB = value, bits 0-7
Binary32	32-bit binary value	2	MSB1 = value, bits 24-31 LSB1 = value, bits 16-23 MSB2 = value, bits 8-15

Data type	Meaning	Number of registers	Data maping
			LSB2 = value, bits 0-7
Char	1-byte ASCII character	1	MSB = 0 LSB = ASCII value of the character
StrList	Index into a list of strings	1	MSB = 0 LSB = index into the list
ShortStr	Zero-terminated string of max 15 ASCII characters.	8	MSB1 = ASCII value of the 1. character LSB1 = ASCII value of the 2. character MSB2 = ASCII value of the 3. character LSB2 = ASCII value of the 4. character …
LongStr	Zero-terminated string of max 31 ASCII characters.	16	MSB1 = ASCII value of the 1. character LSB1 = ASCII value of the 2. character MSB2 = ASCII value of the 3. character LSB2 = ASCII value of the 4. character …
Date	Date (dd-mm-yy)	2	MSB1 = BCD (dd) LSB1 = BCD (mm) MSB2 = BCD (yy) LSB2 = 0
Time	Time (hh-mm-ss)	2	MSB1 = BCD (hh) LSB1 = BCD (mm) MSB2 = BCD (ss) LSB2 = 0
Alarm	An item of the Alarmlist	27	MSB1 = reserved for future use LSB1 = reserved for future use MSB2 = Alarm level *) LSB2 = Alarm status **) MSB3 = alarm string ***) LSB3 = alarm string MSB4 = alarm string LSB5 = alarm string …

Note:
**) 1 .. level 1 (yellow), 2 .. level 2 (red), 3 .. sensor fail*
***) Bit0 – alarm is active, Bit1 – alarm is confirmed*
****) String encoding is UTF-8*

Error codes (exception codes)

An exception code is returned by the controller (server) if the query sent from the client could not be completed successfully.

The controller responds with the error codes in as follows:

- 01 – Illegal function is returned if an incompatible type of operation is applied for a specific object, e.g. if function 03 is applied to a binary object.
- 02 – illegal address is returned if the client tries to perform an operation with an object address that is not related to any existing object or that is located inside an object which is composed by multiple addresses (registers).
- 04 – device error is returned in all other erroneous situations. More detailed specification of the problem can be obtained by reading the registers 4205 – 4206.

Reserved registers

There are several registers with specific meanings. These registers are available in all controllers regardless of the configuration.

Register addresses	Number of registers	Access	Data type	Meaning
4200 - 4201	2	read/write	Time	RTC Time in BCD code
4202 - 4203	2	read/write	Date	RTC Date in BCD code
4204	1	read/write	Unsigned8	Index of the language that is used for text data provided by MODBUS (e.g. alarmlist messages).
4205 - 4206	2	read	Unsigned32	Last application error. To be read after the device returns the exception code 04. It contains specific information about the error.
4207 - 4208	2	read/write	Unsigned32	Writing:command argument Reading: command return value
4209	1	write	Unsigned16	Command code
4010	1	-	-	Not implemented
4211	1	write	Unsigned16	Password
4212 - 4213	2	read	Unsigned32	Communication status
4214	1	read	Unsigned8	Number of items in the Alarmlist
4215 - 4241	27	read	Alarm	1. record in alarm list
4242 - 4268	27	read	Alarm	2. record in alarm list
4269 - 4295	27	read	Alarm	3. record in alarm list
4296 - 4322	27	read	Alarm	4. record in alarm list
4323 - 4349	27	read	Alarm	5. record in alarm list
4350 - 4376	27	read	Alarm	6. record in alarm list
4377 - 4403	27	read	Alarm	7. record in alarm list

Register addresses	Number of registers	Access	Data type	Meaning
4404 - 4430	27	read	Alarm	8. record in alarm list
4431 - 4457	27	read	Alarm	9. record in alarm list
4458 - 4484	27	read	Alarm	10. record in alarm list
4485 - 4511	27	read	Alarm	11. record in alarm list
4512 - 4538	27	read	Alarm	12. record in alarm list
4539 - 4565	27	read	Alarm	13. record in alarm list
4566 - 4592	27	read	Alarm	14. record in alarm list
4593 - 4619	27	read	Alarm	15. record in alarm list
4620 - 4646	27	read	Alarm	16. record in alarm list

List of commands and arguments

"Commands" are used to invoke a specific action in the controller via the communication channel. The list of available actions is in the table below. The general procedure of writing a command via Modbus is as follows:

1. (Optional) Write required level of password into the register 44212 (register address 4211). Use function 6. If the password is required or not depends on configuration of access rules. It can be adjusted/modified by InteliConfig.
2. Write the command argument into the registers 44208-44209 (register addresses 4207-4208). Use function 16.
3. Write the command code into the register 44210 (register address 4209). Use function 6.
4. (Optional) Read the command return value from the registers 44208-44209 (register addresses 4207-4208). Use function 3.
5. If the command was executed the return value is as listed in the table. If the command was accepted but there was an error during execution the return value indicates the reason:
    a. 0x00000001 – invalid argument
    b. 0x00000002 – command refused (e.g. controller not in MAN, breaker cannot be closed in the specific situation etc.)

Action	Command code	Argument	Return value
Engine start *)	0x01	0x01FE0000	0x000001FF
Engine stop *)	0x01	0x02FD0000	0x000002FE
Fault reset *)	0x01	0x08F70000	0x000008F8
Horn reset *)	0x01	0x04FB0000	0x000004FC
GCB toggle *)	0x02	0x11EE0000	0x000011EF
GCB on	0x02	0x11EF0000	0x000011F0
GCB off	0x02	0x11F00000	0x000011F1
MCB toggle *)	0x02	0x12ED0000	0x000012EE
MCB on	0x02	0x12EE0000	0x000012EF
MCB off	0x02	0x12EF0000	0x000012F0

***Note:** *)*
This action is an equivalent of pressing the front panel button

Modbus Remote Start/Stop

There is possibility when the controller is in AUTO mode to activate functionality remote start/stop by writing data FF00 into register 4700 applying function 5. The message Modbus Remote Start is written into history. To deactivate Modbus remote start/stop write data 0000.

MODBUS examples

Modbus RTU examples

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

Table: Values									
Allowed Modbus functions: 03, 04									
Register address	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 a value 240 from register 01053. From the table of Modbus registers we get the dimension of read value and "Dec". Dec=1 means shift one decimal place to the right. So the battery voltage is **24.0 V**.

- Reading Nominal power
  - Configure free MODBUS register for setpoint to be read. (InteliConfig -> ControllerConfiguration -> Others -> MODBUS).
  - It is possible to export table of used MODBUS registers from InteliConfig.

Table: Values									
Allowed MODBUS functions: 03, 04									
Register address	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
03000	8276	**Nominal Power**	**kW**	Unsigned	2	**0**	0	5000	Basic settings

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 address	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
01089	8235	**Binary Inputs**		Binary#2	2	**0**	-	-	Controller I/O

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

Response: (Numbers in Hex)						
01	03	02	00	12	38	49
Controller address	Modbus function	Length of data 02_{hex} = 2 bytes read	Data 0012_{hex} = **00010010**$_{bin}$		CRC	

Binary inputs is 00010010. This means Binary input 2 and binary input 5 are active.

Note: *You can use Modbus function 4 instead of 3, the rest of the data remains the same (CRC differs).*

› Reading binary inputs as coil status.

Table: Binaries						
Allowed Modbus functions: 01, 02						
Addresses Modbus Addr. Prot. Addr.	Source = Value = State	C.O.# State #	Name of Value Name of State	Bit #	Bit Name Activated by protection (s):	Group
00000	Value	8235	Binary Inputs	1	GCB Feedback	Controller I/O
00001	Value	8235	Binary Inputs	2	MCB Feedback	Controller I/O
00002	Value	8235	Binary Inputs	3	Emergency Stop	Controller I/O

We will read state of MCB Feedback binary input.

Request: (Numbers in Hex)							
01	01	00	01	00	01	AC	0A
Controller address	Modbus function	Register address 0001_{hex} = **0001**$_{dec}$		Number of registers		CRC	

Response: (Numbers in Hex)					
01	01	01	01	90	48
Controller address	Modbus function	Length of data 01_{hex} = 1 byte read	Data 01_{hex} = active	CRC	

The read data is 01. This means this binary input is active.

Note: *You can use Modbus function 2 instead of 1, the rest of the data remains the same (CRC differs).*

› Starting the engine

Before starting engine you may need to write password depending on the settings in controller.

Table **Reserved registers (page 272)**

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

Table **List of commands and arguments (page 273)**

Action	Command code	Argument	Return value
Engine start	0x01	0x01FE0000	0x000001FF
Engine stop	0x01	0x02FD0000	0x000002FE

Request 1/2: (Numbers in Hex)						
01	10	10	6F	00	03	06
Controller address	Modbus function $10_{hex} = 16_{dec}$	Register address $106F_{hex} = \mathbf{4207}_{dec}$		Number of registers		Data length in bytes

Request 2/2: (Numbers in Hex)							
01	FE	00	00	00	01	68	0B
Argument				Command code		CRC	

Note: *Command and argument may be written as one "packet" (function 16) or you can split it and write argument (function 16) and then the command code (function 6).*

› Nominal Power – writing

» Configure free MODBUS register for setpoint to be written. (InteliConfig -> ControllerConfiguration -> Others -> MODBUS).

Table: Setpoints									
Allowed Modbus functions: 03, 04, 06, 16									
Register address	Com.Obj.	Name	Dimension	Type	Len	Dec	Min	Max	Group
03000	8276	**Nominal Power**	**kW**	Unsigned	2	**0**	1	5000	Basic Settings

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

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

Written setpoint nominal power is 100 kW.

› CRC calculation

The check field allows the receiver to check the validity of the message. The check field value is the Cyclical Redundancy Check (CRC) based on the polynomial $x^{16}+x^{15}+x^2+1$. CRC is counted from all message bytes preceding the check field.

Online CRC calculator: http://www.lammertbies.nl/comm/info/crc-calculation.html Use CRC-16 (Modbus)

Write LSB first.

For writing nominal power 100 kW the CRC is calculated from this data: $01060BC00064_{hex}$

Modbus TCP examples

› Reading of Battery voltage

» Export table of values from InteliConfig

Table: Values									
Allowed Modbus functions: 03, 04									
Register address	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	

Response: (Numbers in Hex)										
00	00	00	00	00	05	01	03	02	00	F0
transaction identifier (usually 0)		protocol identifier (usually 0)		Length of data bytes following		Controller address	Modbus function	Length of data 02_{hex} = 2 bytes read	Data $00F0_{hex}$ = **240_{dec}**	

We read a value of 240 from register 01053. From the table of Modbus registers we get the dimension of read value and "Dec". Dec=1 means shift one decimal place to the right. So the battery voltage is **24.0 V**.

back to Communication

7 Technical data

Power supply

Power supply range	8-36 VDC
Power consumption (without modules)	6 W
RTC battery	Replaceable (3 V)
Fusing power	5 A / 6 × 0.5 A BOUT
E-Stop fusing	2 A
Max. Power Dissipation	10 W

Operating conditions

Protection degree (front panel)	IP 65
Operating temperature	-30 ˚C to +70 ˚C (-40 °C to +70 ˚C)*
Storage temperature	-30 ˚C to +80 ˚C
Operating humidity	95 % non-condensing (EN 60068-2-30)
Vibration	5-25 Hz, ± 1.6 mm 25-100 Hz, a = 4 g
Shocks	a = 500 m/s^2
Surrounding air temperature rating 70 °C Suitable for pollution degree 2	

D+

Max. output current	250 mA
Charging fail threshold	Adjustable

Voltage measurement

Measurement inputs	3ph-n Gen voltage , 3ph-n Mains
Measurement range	10-277 V AC / 10-480 V AC (EU) 10-346 V AC / 10-600 V AC (US/Canada)
Linear measurement and protection range	350 V AC Ph-N 660 V AC Ph-Ph
Accuracy	1 %
Frequency range	30-70 Hz (accuracy 0.1 Hz)
Input impedance	0.72 MΩ ph-ph , 0.36 MΩ ph-n

Voltage regulator output

Isolation	Isolated
Type	max ±10 V DC

Speed governor output

Isolation	Non-isolated
Output Type	±10 V DC or 5 V @ 500 Hz, PWM selectable by jumper

Display

Type	Build-in colour TFT 5"
Resolution	800 × 480 px

Communications

USB Device	Non-isolated type B connector
USB Host	Non-isolated type A connector
RS485	Isolated
Ethernet	10/100 Mbit
CAN 1 + CAN 2	Isolated, 250 / 50 kbps, Terminator impedance 120 Ω

Current measurement

Measurement inputs	3ph Gen current, 1ph Mains current
Measurement range	5 A
Max. allowed current	10 A
Accuracy	±20 mA for 0-2 A; 1 % of value for 2-5 A
Input impedance	<0.1 Ω

E-Stop

Dedicated terminal for safe E-Stop input.
Physical supply for binary outputs 1 & 2.

Binary inputs

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

Binary outputs

Number	8, non-isolated
Max. current	BO 1-8 = 0.5 A
Switching to	positive supply terminal

Analog inputs

Number	4, switchable (R/U/I)
Range	R = 0-2500 Ω; U = 0-10 V; I = 0-20 mA
Accuracy	R: ±2 % from value ±5 Ω in range 0-250 Ω R: ±4 % from value in range 250 Ω-2500 Ω U: 1 % from value ±100 mV I: 1 % from value ±0.2 mA

+5 V Power supply output

Max. current	100 mA

Magnetic pickup

Voltage input range	4 Vpk-pk to 50 Vpk-pk in range 4 Hz to 1 kHz 6 Vpk-pk to 50 Vpk-pk in range 1 to 5 kHz 10 Vpk-pk to 50 Vpk-pk in range 5 to 10 kHz
Frequency input range	4 Hz to 10 kHz
Frequency measurement tolerance	0.2 % from measured value

Note: **) If the device is powered on above -30 °C.*

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8.1.2 Setpoints

What setpoints are:

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

All setpoints can be protected by a password against unauthorized changes. Password protection can be assigned to the setpoints during the configuration procedure.

> **IMPORTANT: Do not write setpoints repeatedly (e.g. power control from a PLC by repeated writing of baseload setpoint via Modbus). The setpoints are stored in EEPROM memory, which can be overwritten up to 10^5 times without risk of damage or data loss, but it may become damaged, when the allowed number of writing cycles is exceeded.**

For full list of setpoints go to the chapter **List of setpoints (page 284)**.

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Group: Process Control

Subgroup: Application Selector

Default Application Select

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	SPtM / MINT [-]		
Default value	SPtM	**Force value**	NO
Step	[-]		
Comm object	12157	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		

Description

This setpoint defines the controller application.

SPtM	Single parallel to mains application. The controller controls two breakers – a mains breaker and a generator breaker. Feedback from both breakers is required.
MINT	Multiple island-parallel application without mains and multiple parallel application with mains. The controller controls one breaker only, the generator breaker. Feedback from the generator breaker is required. For parallel to mains operation also mains breaker feedback is required.

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Subgroup: Load Control

Load Control PTM Mode

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	Baseload / Import/Export [-]		
Default value	Baseload	**Force value**	YES*
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 298)**. The rest of power is supplied from the mains or exported to the mains (depends on proportions of load and **Baseload (page 298)** setpoint). Even in baseload control mode can be the Import/Export limited. This function can be activated by setpoint **Import/Export Limitation (page 300)** = 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 299)**. **Example:** Baseload = 1000 kW, load = 700 kW, Import load = 100. Then the Baseload request will be limited to 600 kW to prevent the Import power go below 100 kW **Example:** Baseload = 1000 kW, load = 700 kW, Import load = -100. Then the Baseload request will be limited to 800 kW to prevent the Import power go below -100 kW (actually it is limitation of the export). The load of the Gen-set group is controlled to keep constant level of base load of the whole system. The level is adjusted by the setpoint **#System BaseLoad (page 301)**.
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 299)**. 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 372)**. 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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Load Request Source*

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	Setpoint / Analog External Value [-]		
Default value	Setpoint	**Force value**	YES*
Step	[-]		
Comm object	20727	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint selects which source will be used as input value for the selected mode in **Load Control PTM Mode (page 294)**.

Setpoint	The load is sourced either from setpoint Baseload (Load Control PTM=Baseload) or from **Import Load (page 299)** (Load Control PTM=IMP/EXP).
Analog External Value	The load is source from LAI **Load Control: ANEXT Baseload* (page 833)** (Load Control PTM=Baseload) or from LAI **Load Control: ANEXT Imp/Exp Load* (page 833)** (Load Control PTM=IMP/EXP).

Note: *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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PF Control PTM Mode

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	Base PF/ PF Import/Export [-]		
Default value	Base PF	**Force value**	YES*
Step	[-]		
Comm object	10120	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjust the type of power factor control.

Base PF	The power factor on the Gen-set is kept on the level given by the setpoint **BasePower Factor (page 299)** regardless the load demand. The rest of demanded reactive power is supplied from the mains. Values >1 means that capacitive reactive power is supposed to be imported from mains, values <1 means that inductive reactive power is imported from the mains. Gen-sets are controlled to keep the constant level of the power factor. The level is adjusted by setpoint **#System Power Factor (page 301)**.
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 Power Factor (page 300)**. 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**	2.1.0
Range [units]	Baseload / Loadsharing [-]		
Default value	Baseload	**Force value**	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 301)**. 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 301)** 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 301)**) 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 controller is present in the system. In systems without InteliMains 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 298)** in parallel to mains operation and does not depend on active load control mode.*

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#System PF Control PTM

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	Base PF / Var Sharing [-]		
Default value	Base PF	**Force value**	NO
Step	[-]		
Comm object	8779	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

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

Base PF	Gen-sets PF is controlled by their PF control loops to provide constant power factor adjusted by setpoint **#System Power Factor (page 301)**. InteliMains doesn't play active role in PF control in parallel to mains operation.
Var Sharing	Gen-sets PF is controlled by InteliMains through the VAr sharing line.

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Baseload

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	0 .. **Nominal Power (page 311)** [kW]		
Default value	100 kW	**Force value**	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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BasePower Factor

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	0.60 .. 1.20 [-]		
Default value	1.00 [-]	**Force value**	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**	2.1.0
Range [units]	-32 000 .. 32 000 [kW]		
Default value	0 kW	**Force value**	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 Mode (page 294)**.

Baseload	Setpoint adjust the maximal value of import/export. Also **Import/Export Limitation (page 300)** 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 Power Factor

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	0.60 .. 1.20 [-]		
Default value	1.00 [-]	**Force value**	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 Mode (page 296)**.

Baseload	Setpoint adjust the maximal value of import. Also **Import/Export Limitation (page 300)** 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**	2.1.0
Range [units]	ENABLED / DISABLED [-]		
Default value	Disabled	**Force value**	YES*
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 299)** and **Import Power Factor (page 300)**.

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

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

Note: *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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#System BaseLoad

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	0 .. 32 000 [kW]		
Default value	1000 kW	**Force value**	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 297)** = Baseload).			

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Local Baseload*

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	OFF; 1 .. **Nominal Power (page 311)** [kW]		
Default value	OFF	**Force value**	YES*
Step	[-]		
Comm object	10118	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Setpoint is used to set the Local Baseload. When set to 0 (OFF), the function is disabled. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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#System Power Factor

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	0.60 .. 1.20 [-]		
Default value	1.00 [-]	**Force value**	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**	2.1.0
Range [units]	Each / Common [-]		
Default value	Each	**Force value**	NO
Step	[-]		
Comm object	9890	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

Setpoint changes behavior of binary output **NCB CLOSE/OPEN (PAGE 809)**which is used for neutral contactor control.

Each	The EACH option should be used if each Gen-set has it's own neutral contactor. Four-pole GCB must be used in this case. › The output is always opened while the Gen-set is not running › The output is always opened while the MCB is closed › While the Gen-set is running and GCB is open, the output closes when generator voltage in at least one phase exceeds 85 % of the nominal voltage. It opens when the generator voltage in all phases drops below 50 % of the nominal voltage › While the Gen-set is running, MCB is open and GCB is closed, then the position of the output is given by an internal algorithm, which ensures, that always exactly one Gen-set connected to the bus has the neutral contactor closed. It is always the Gen-set with lowest CAN address
Common	The COMMON option should be used if there is one common neutral contactor for the whole site. The **NCB CLOSE/OPEN (PAGE 809)** outputs from all controllers are combined together and the combined signal is used to control the breaker. Three-pole GCB must be used in this case. › The output is always opened while the Gen-set is not running › The output is always opened while the MCB is closed › While the Gen-set is running the output closes when generator voltage in at least one phase exceeds 85 % of the nominal voltage. It opens when the generator voltage in all phases drops below 50 % of the nominal voltage. That means if at least one Gen-set in the site is running and having proper voltage, the neutral contactor is closed

Note: *Logical binary input **NCB FEEDBACK (PAGE 744)** has to be configured for proper functionality.*

Note: *For the SPtM application there is only 1 Gen-set so the setpoint #Neutral contactor control is hidden and the NCB behave like it is setup to COMMON option.*

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Subgroup: Process Limitation

CB Control In MAN Mode

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	Full Ctrl / Aut Trans / Islnd Disl [-]		
Default value	Full Ctrl	**Force value**	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 MGCB 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 445)** and **Transfer Mains To Gen (page 444)**). Controller performs synchronization across MCB, ifMGCB is closed and MCB button is pushed. Load transfer is done after synchronization andMGCB is opened automatically. Controller performs synchronization acrossMGCB, if MCB is closed andMGCB button is pushed. Load transfer is done after synchronization and MCB is opened automatically. It is also possible to open currently closed breaker and keep the load non-energized. Then it is possible to close MCB orMGCB to energize the load from a healthy source. ***Note:*** *Parallel operation with mains continues, if system already operates in parallel with mains and setting is changed to Aut Trans. It is necessary to push MCB or MGCB button to open a breaker.* ***Note:*** *Open transfer is performed, if the Open option is selected with **Transfer Gen To Mains (page 445)** or **Transfer Mains To Gen (page 444)**.*
Islnd Disl	Behaves like the full manual control but the Island operation is disabled. **Example:** When MCB opened and MGCB is pressed, controller doesn't go to island. **Example:** In parallel operation when MCB button pressed, MCB is not opened.

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Subgroup: Mains Import Measurement

Mains Measurement P

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	None / Mains CT / Analog Input [-]		
Default value	None	**Force value**	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 P (page 653)** measurement.

None	The Mains Import Power is not measured and the duration of the load transfer in direction Mains to Generator is given exactly by the setpoint **Close Transfer Max Duration (page 443)**.
Mains CT	The **Mains Import P (page 653)** 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 P (page 653)** value is measured via analog input, accordingly LAI: **MAINS IMPORT MEASUREMENT P (PAGE 833)**. 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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Mains Measurement Q

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	None / Mains CT / Analog Input [-]		
Default value	None	**Force value**	NO
Step	[-]		
Comm object	10598	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only in SPtM mode		
Description			

Defines source value of the **Mains kVArh (page 668)**.

None	The value **Mains Import Q (page 653)** is not measured.
Mains CT	The value **Mains kVArh (page 668)** is measured via Mains CTs which are located on phase L1, L2 and L3.
Analog Input	The value **Mains kVArh (page 668)** is measured via analog input, accordingly LAI: **MAINS MEASUREMENT Q (PAGE 834)**.

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Subgroup: Peak Shaving

Peak Shaving

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	Enabled / Disabled [-]		
Default value	Disable	**Force value**	YES*
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**	2.1.0
Range [units]	**Peak Shaving Stop Level (page 306)** .. 32000 [kW]		
Default value	1000 kW	**Force value**	YES*
Step	1 [kW]		
Comm object	8643	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Peak Shaving (page 305)** = enabled		
Description			
This setpoint starts Gen-set, when the value of the load consumption Load kW exceeds the value given by this setpoint for the time of **Peak Shaving Start/Stop Delay (page 307)**. The gen-set is synchronized to the Mains (kept in the parallel to the Mains) and the Gen-set power is controlled according to the settings in the Group Process Control/Load Control. The Gen-set stays running until the conditions for Peak Shaving run are active. Conditions of deactivation are given by the setpoint **Peak Shaving Stop Level (page 306)** and **Peak Shaving Start/Stop Delay (page 307)**.			

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Peak Shaving Stop Level

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	0 .. **Peak Shaving Start Level (page 306)** [kW]		
Default value	900 kW	**Force value**	YES*
Step	1 [kW]		
Comm object	8644	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Peak Shaving (page 305)** = 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 307)**.			

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Peak Shaving Start/Stop Delay

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	600 s	**Force value**	YES*
Step	1 s		
Comm object	9989	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Peak Shaving (page 305)** = 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 306)**.
- The value of the load consumption Load kW decreases under the value given by the setpoint **Peak Shaving Stop Level (page 306)**

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Subgroup: Breaker Control Mode

MCB Control Mode

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	Internal / External [-]		
Default value	Internal	**Force value**	YES*
Step	[-]		
Comm object	9873	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Only if **Controller Mode (page 322)** = SPTM		
Description			

This setpoint adjusts control mode of MCB.

Internal	The MCB breaker is controlled by controller. The controller accepts the opening of MCB from the external device (mains relay). When the MCB is opened externally then: › The event "MCB opened Externally" is recorded in history log › Controller starts to count down the MCB Close Delay and is going to be closed to the MCB once it elapses. Incorrect reaction of the **MCB FEEDBACK (PAGE 741)** to internal MCB Close/Open command causes **Wrn MCB Fail (page 888)**
External	Controller does not control the MCB at all. The MCB is controlled externally, when the **MCB FEEDBACK (PAGE 741)** gets changed, then the event "MCB Opened" or "MCB Closed" is recorded to the history log. Controller always accepts the **MCB FEEDBACK (PAGE 741)** without of issuing any

	alarm. The controller informs the superordinate system about the status of the breaker automat using the signals › LBO FORWARD SYNCHRONIZATION (PAGE 786) › LBO REVERSE SYNCHRONIZATION (PAGE 815)

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GCB Control Mode

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	Internal / Follow / External [-]		
Default value	Internal	**Force value**	YES*
Step	[-]		
Comm object	11771	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if **Controller Mode (page 322)** = GCB		
Description			

This setpoint adjusts control mode of GCB.

Internal	The breaker is controlled only from controller. Any unexpected change of **GCB FEEDBACK (PAGE 735)** causes **Stp GCB Fail (page 918)** immediately. Incorrect reaction of the **GCB FEEDBACK (PAGE 735)** on internal GCB Close/Open command causes **Stp GCB Fail (page 918)** Anytime when the controller is synchronizing via GCB the External GCB closing is being accepted in all GCB control modes.
Follow	GCB Openning **GCB FEEDBACK (PAGE 735)** = 0 is accepted from external devices with history record "GCB Opened Externally". Incorrect reaction of the **GCB FEEDBACK (PAGE 735)** to internal GCB Close/Open command causes **Stp GCB Fail (page 918)**
External	Controller does not control the GCB at all. The GCB is controlled externally, when the **GCB FEEDBACK (PAGE 735)** get changed, then the event "GCB Opened" or "GCB Closed" is recorded to the history log. Controller always accept the **GCB FEEDBACK (PAGE 735)** without of issuing any alarm. When the Sd protection shuts down the engine, the GCB stays closed. The BOC protection does not open the GCB, controller goes to cooling when the BOC protection is tripped (GCB stays closed until opened externally). **IMPORTANT: Gen-set with closed GCB is not blocked against starting.**

IMPORTANT: Anytime when the controller is synchronizing via GCB the External GCB closing is being accepted in all GCB control modes.

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Attempts To Close Breaker

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	1 .. 5 [-]		
Default value	2 [-]	**Force value**	YES
Step	1 [-]		
Comm object	19885	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the amount of attempts the controller performs when a breaker is requested to be closed.

> **Example:** If the breaker feedback is not received at the end of the attempt, an alarm is not issued, unless it was the last attempt to close the breaker.

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Delay Between Closing Attempts

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	2 .. 60 [s]		
Default value	2 [s]	**Force value**	YES
Step	1 [s]		
Comm object	19883	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the delay between breaker closing attempts the controller performs when a breaker is requested to be closed. Delay is one second longer than you set here due breaker's safety.

> **Example:** If this setpoint is set to 10 seconds, the delay between another attempt to close the breaker will be 11 seconds.

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Waiting For Breaker Feedback

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	1 .. 60 [s]		
Default value	2 [s]	**Force value**	YES
Step	1 [s]		
Comm object	19884	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the length of breaker closing attempt.

Example: When set to 10 s, the LBO **GCB ON COIL (PAGE 791)** is set for 10 s.

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Subgroup: Controller Redundancy*

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

Watched Controller*

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	0 .. 32 [-]		
Default value	0 (OFF) [-]	**Force value**	NO
Step	1 [-]		
Comm object	11719	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint is used for controller redundancy function.

- Set this setpoint to 0/OFF to disable reading of messages from CAN2 line.
- Set this setpoint to Master's CAN2 bus address to start controller redundancy function.

Gen-set is reading the Heartbeat messages of selected CAN address on CAN2 line. That is used by LBO **CONTROLLER HEARTBEAT FAIL DETECT* (PAGE 778)**.

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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Group: Basic settings

Subgroup: Name

Gen-Set Name

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	0 .. 15 characters [-]		
Default value	InteliGen500 G2	**Force value**	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 applications with remote connection (e.g. InteliConfig, SCADA, WinScope 1000). 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**	2.1.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Force value**	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 371)** protection is based on this setpoint.

Note: *This setpoint is used when setpoint **Connection type (page 314)** is adjusted to Monophase or SplitphaseL1L2 and SplithphaseL1L3 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 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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Nominal Power Split Phase

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	1 .. 5 000 [kW]		
Default value	200 kW	**Force value**	YES*
Step	1 kW		
Comm object	9977	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 314)**		
Description			
Nominal power of the Gen-set for detected split-phase or mono phase connection. Generator **Overload BOC (page 371)** protection is based on this setpoint. ***Note:*** *This setpoint is used when setpoint* ***Connection type (page 314)*** *is adjusted to Autodetect and Autodetect detects connection type as Monophase or Splitphase.*			

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Subgroup: Current settings

Nominal Current

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	1 .. 65 000 [A]		
Default value	350 A	**Force value**	YES*
Step	1 A		
Comm object	8275	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
It is current limit for Gen-set current protections and means maximal continuous Gen-set current. Nominal Current can be different from Gen-set rated current value.			

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Gen CT Ratio Prim

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	1 .. 10000 [A]		
Default value	500 A	**Force value**	NO
Step	1 A		
Comm object	8274	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Current transformers ratio of Gen-set Mains import. The CT is usually described by this definition: CT Ratio Prim / CT Ratio Sec: Example:100/5, 500/5, 1000/1 ***Note:*** *See also* ***Gen CT Ratio Sec (page 313)****.*			

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Gen CT Ratio Sec

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	- [/1A / /5A]		
Default value	/5A	**Force value**	NO
Step	-		
Comm object	10556	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Current transformers ratio of Gen-set Mains import.			

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Mains/EFC CT Ratio Prim

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	1 .. 10000 [A]		
Default value	500 A	**Force value**	NO
Step	1 A		
Comm object	8566	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Current transformers ratio of Mains import.			

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Mains/EFC CT Ratio Sec

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	/5A .. /1A [-]		
Default value	/5A [-]	**Force value**	NO
Step	1 A/5A [-]		
Comm object	10557	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Current transformers ratio of Mains import.			

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Subgroup: Voltage settings

Connection type

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	Mono Phase / SplPhL1L2 / SplPhL1L3 / 3Ph3Wire / 3Ph4Wire / High Leg D / Autodetect [-]		
Default value	3Ph4Wire	**Force value**	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 1x CT (Current Transformer)
SplPhL1L2	Double Delta connection Split Phase Two phase voltage measurement L1,L2 with 180° phase shift 2x CT (Current Transformer)
SplPhL1L3	Double Delta connection Split Phase Two phase voltage measurement L1,L3 with 180° phase shift 2x CT (Current Transformer)
3Ph3Wire	Ungrounded Delta connection Open Delta Ungrounded Wye Corner-Grounded Delta

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L2 <= 20 V
L3 <= 20 V</td></tr>
<tr><td colspan="2">Voltage Autodetect shutdown</td></tr>
</table>
</td></tr>
</table>

back to List of setpoints

Generator Nominal Voltage Ph-N

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	10 .. 34 641 [V]		
Default value	231 V	**Force value**	YES*
Step	1 V		
Comm object	8277	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal voltage (phase to neutral).			

back to List of setpoints

Generator Nominal Voltage Ph-Ph

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	10 .. 60 000 [V]		
Default value	400 V	**Force value**	YES*
Step	1 V		
Comm object	11657	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system voltage (phase to phase).			

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Mains/Bus Nominal Voltage Ph-N

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	10 .. 34641 [V]		
Default value	231 V	**Force value**	YES*
Step	1 V		
Comm object	9888	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **Connection type (page 314)** is not High Leg D or **Connection type (page 314)** nor MonoPhase		
Description			
Nominal Mains/Bus voltage (phase to neutral).			

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Mains/Bus Nominal Voltage Ph-Ph

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	10 .. 60000 [V]		
Default value	400 V	**Force value**	YES*
Step	1 V		
Comm object	9907	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal Mains/Bus voltage (phase to phase).			

back to List of setpoints

Nominal Voltage 3Ph Low Y

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	10 .. 34 641 [V]		
Default value	120 V	**Force value**	YES*
Step	1 V		
Comm object	20811	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 314)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Generator Nominal Voltage Ph-N (page 316)** by the voltage autodetect function, if detected **Connection type (page 314)** is 3Ph Low Y (controller can not distinguish between the 4 wire and 3 wire connection), detected phase-phase voltage is lower than 300 V in all three phases and phase-neutral voltage is lower than or equal to 160 V in all three phases.			

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Nominal Voltage 3Ph High Y

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	10 .. 34 641 [V]		
Default value	277 V	**Force value**	YES*
Step	1 V		
Comm object	20812	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 314)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Generator Nominal Voltage Ph-N (page 316)** by the voltage autodetect function, if detected **Connection type (page 314)** is 3Ph High Y, detected phase-phase voltage is higher than or equal to 300 V in all three phases and phase-neutral voltage is higher than 160 V in all three phases.			

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Nominal Voltage High Leg D

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	10 .. 34 641 [V]		
Default value	120 V	**Force value**	YES*
Step	1 V		
Comm object	20813	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 314)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Generator Nominal Voltage Ph-N (page 316)** by the voltage autodetect function, if detected **Connection type (page 314)** is High Leg D. Set this setpoint to 120 V with high leg delta system, which works with the high leg voltage 208 V (L2-N).			

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Nominal Voltage SplitPhase

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	10 .. 34 641 [V]		
Default value	120 V	**Force value**	YES*
Step	1 V		
Comm object	20814	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 314)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Generator Nominal Voltage Ph-N (page 316)** by the voltage autodetect function, if detected **Connection type (page 314)** is SplPhL1L2 or SplPhL1L3.			

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Nominal Voltage MonoPhase

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	10 .. 34 641 [V]		
Default value	120 V	**Force value**	YES*
Step	1 V		
Comm object	20815	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible if one of the three **Connection type (page 314)** Setpoints is set to Autodetect.		
Description			
This setting is used as phase-neutral **Generator Nominal Voltage Ph-N (page 316)** by the voltage autodetect function, if detected **Connection type (page 314)** is MonoPhase.			

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Gen VT Ratio

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	0.1 .. 500.0 [V/V]		
Default value	1.0 V/V	**Force value**	NO
Step	0.1 V/V		
Comm object	9579	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Generator voltage potential transformers ratio. If no VTs are used, adjust this setpoint to 1.			

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Mains/Bus VT Ratio

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	0.1 .. 500.0 [V/V]		
Default value	1.0 V/V	**Force value**	NO
Step	0.1 V/V		
Comm object	9580	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Mains voltage potential transformers ratio. If no VTs are used, adjust the setpoint to 1.			

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Subgroup: Frequency settings

Nominal Frequency

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	30,0 .. 65,0 [Hz]		
Default value	50,0 Hz	**Force value**	YES*
Step	0,1 Hz		
Comm object	8278	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Nominal system frequency (usually 50 or 60 Hz).			

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Gear Teeth

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	FGen->RPM / 1 .. 500 [-]		
Default value	FGen->RPM	**Force value**	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**	2.1.0
Range [units]	100 .. 4 000 [RPM]		
Default value	1 500 RPM	**Force value**	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).			

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Frequency Protection Reference

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	SetpNomFreq / 50Hz / 60 [Hz]		
Default value	SetpNomFreq	**Force value**	YES
Step	-		
Comm object	13220	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Setpoint is used as reference for frequency protections. Frequency protections are counted from setpoint Nominal Frequency or from fix value 50 Hz or 60 Hz.			

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Subgroup: Controller settings

Controller Mode

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	OFF / MAN / AUTO / TEST [-]		
Default value	OFF	**Force value**	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**	2.1.0
Range [units]	Previous / OFF [-]		
Default value	Previous	**Force value**	NO
Step	[-]		
Comm object	13000	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts controller mode after power on of controller.

Previous	When controller is power on, controller is switched to last mode before power off.
OFF	When controller is power on, controller is switched to OFF Mode.

Note: *Remote modes – In case that some LBI remote mode is activated during power on of controller than this LBI has higher priority than this setpoint – controller mode is forced into mode selected via LBI. After deactivation of LBI, controller is switched into value selected via setpoint Power On Mode*

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Fault Reset To Manual

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	**Force value**	YES*
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.

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Horn Timeout

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	Disabled / 1 .. 600 s / Horn Reset [-]		
Default value	10 s	**Force value**	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 .. 600 [s]	Timeout for **HORN (PAGE 797)** binary output. The **HORN (PAGE 797)** output is active when this timeout elapsed.
Horn reset	LBO **HORN (PAGE 797)** is deactivated by Fault reset button or by Horn reset button.

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

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Fail Safe Binary State

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	Log0 / Log1 / Last valid state [-]		
Default value	Last valid state	**Force value**	YES*
Step	-		
Comm object	21215	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjusts behavior of the controller when the received binary input values from CAN Extension Module, EFCP Module and ECU modules are invalid due to the loss of communication with peripherals.

Log0	All invalid values are replaced by logical zero.
Log1	All invalid values are replaced by logical one.
Last Valid State	All invalid values are replaced by the last valid state.

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Run Hours Source

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	AUTO / ECU / INTERNAL [-]		
Default value	AUTO	**Force value**	NO
Step	[-]		
Comm object	13345	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint selects source of running hours.

AUTO	If there is some ECU which send valid running hours, then this value is used. Otherwise value from internal counter is used.
ECU	Running hours are taken from ECU if ECU send valid data. It is not possible to set and reset this value in statistics.
INTERNAL	Running hours are taken from internal counter. It is possible to set and reset this value in statistics.

Note: *It is not necessary to restart controller when this setpoint is changed. Change of this setpoint is applied immediately.*

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User Logging Record

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Force value**	NO
Step	[-]		
Comm object	23885	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoints enables / disables history records when user is log in.

Enabled	Every time user login/logout to the controller, there is a message: *User with user index (n) logged in/out …* written in the history.
Disabled	Login/logout message is not written into history.

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SW Key*

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	[-]		
Default value	-	**Force value**	NO
Step	-		
Comm object	24258	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to fill SW Key to the controller to activate **Extended features (page 157)**. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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Subgroup: Phase Rotation

Phase Rotation

Setpoint group	Basic settings	**Related FW**	2.1.0
Range [units]	Clockwise / Counterclockwise / Disabled [-]		
Default value	Clockwise	**Force value**	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 Address

Controller Address

Setpoint group	Communication Settings	**Related FW**	2.1.0
Range [units]	1 .. 32 [-]		
Default value	1	**Force value**	NO
Step	1		
Comm object	24537	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Controller identification number. It is possible to set controller address different from the default value (1) so that more controllers can be interconnected (via RS485) and accessed e.g. from Modbus terminal.

> ***Note:*** *When opening connection to the controller it's address has to correspond with the setting in PC tool.*

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Subgroup: Intercontroller communication

CAN Intercontroller Comm Mode

Setpoint group	Communication Settings	**Related FW**	2.1.0
Range [units]	32C / 16C / 8C [-]		
Default value	32C	**Force value**	NO
Step	[-]		
Comm object	24499	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint selects the mode of intercontroller communication.

Mode	Arbitration Bit-Rate	Data Bit-Rate	Maximal Bus Length	Max Bus Length With Repeater
32C	250 kbit	250 kbit	200 m	800 m
16C	125 kbit	125 kbit	400 m	1600 m
8C	50 kbit	50 kbit	900 m	3600 m

> **IMPORTANT: All controllers communicating on common CAN have to use the same mode of this setpoint.**

> **IMPORTANT: All changes made to the setpoint takes effect after the restart of the controller.**

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#Number Of Units On CAN2 Check

Setpoint group	Communication Settings	**Related FW**	2.1.0
Range [units]	Enable / Disabled [-]		
Default value	Disabled [-]	**Force value**	NO
Step	[-]		
Comm object	17463	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoints enabled/disabled protection which checks number of units on CAN2 communication line. When number of detected unit is lower than value adjusted by setpoint **#Number Of Units On CAN2 (page 329)**, alarm **Wrn CAN 2 Units Missing (page 867)** or **Sd CAN 2 Units Missing (page 912)** is activated. Type of alarm is adjusted via setpoint **#CAN2 Units Missing Protection (page 328)**.			

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#CAN2 Units Missing Protection

Setpoint group	Communication Settings	**Related FW**	2.1.0
Range [units]	HistRecOnly / Wrn / Sd / BOC [-]		
Default value	HistRecOnly [-]	**Force value**	NO
Step	[-]		
Comm object	17503	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts type of protection for alarm **Wrn CAN 2 Units Missing (page 867)**.			

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#Number Of Units On CAN2

Setpoint group	Communication Settings	**Related FW**	2.1.0
Range [units]	Enable / Disabled [-]		
Default value	Disabled [-]	**Force value**	NO
Step	[-]		
Comm object	13953	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Description			

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Subgroup: RS485 Settings

RS485 Mode

Setpoint group	Communication Settings	**Related FW**	2.1.0
Range [units]	Direct / MODBUS [-]		
Default value	Direct	**Force value**	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**	2.1.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	57600 bps	**Force value**	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.			

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RS485 Modbus Speed

Setpoint group	Communication Settings	**Related FW**	2.1.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Force value**	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 559)**		
Description			
If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here.			

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RS485 Modbus Mode

Setpoint group	Communication Settings	**Related FW**	2.1.0
Range [units]	8N1 / 8N2 / 8E1 [-]		
Default value	8N1	**Force value**	NO
Step	[-]		
Comm object	24020	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjusts communication mode of Modbus-RTU.

Possible options

8N1	8 data bits, 1 stop bit, no parity
8N2	8 data bits, 2 stop bits, no parity
8E1	8 data bits, 1 stop bit, even parity

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Group: Engine settings

Subgroup: Starting

Fuel Solenoid

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	Diesel / Gas [-]		
Default value	Diesel	**Force value**	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 786)**

Diesel:	Output is activated before binary output **STARTER 1 (PAGE 818)**. Lead of output is adjusted via setpoint **Fuel Solenoid Lead (page 336)**. The output is deactivated if Emergency Stop comes or Gen-set is stopped and in pause between repeated starts.
Gas: (Gaseous)	Output is activated together with binary output **IGNITION (PAGE 798)** if RPM is over the 30 RPM (fixed value). Output is deactivated after stop command or in pause between repeated start.

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Dual Starter Sequence

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	Disabled / 1-2 / 11-22 / 111-222 [-]		
Default value	Disabled	**Force value**	NO
Step	-		
Comm object	16644	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Setpoint is used to enable LBO **STARTER 2 (PAGE 819)** by choosing the predefined sequence.

Dual Starter Sequence options:

- Disabled (Default)
- 1-2 – Controller in cranking phase will activate **STARTER 1 (PAGE 818)** then **STARTER 2 (PAGE 819)** according to the order of option pattern 1-2.
- 11-22 – Controller in cranking phase will activate **STARTER 1 (PAGE 818)** then Starter 1 then **STARTER 2 (PAGE 819)** then **STARTER 2 (PAGE 819)** according to the order of option pattern 11-22.
- 111-222 – Controller in cranking phase will activate **STARTER 1 (PAGE 818)** then Starter 1 then Starter 1 then **STARTER 2 (PAGE 819)** then Starter 2 and then Starter 2 according to the order of option pattern 111-222.

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Cranking Attempts

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	1 .. 10 [-]		
Default value	3	**Force value**	YES*
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**	2.1.0
Range [units]	1 .. 255 [s]		
Default value	5 s	**Force value**	YES*
Step	1 s		
Comm object	8256	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Maximum time limit of cranking time.			

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Cranking Fail Pause

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	5 .. 60 [s]		
DefaultFixed value	8 s	**Force value**	YES*
Step	1 s		
Comm object	8257	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Pause between **Cranking Attempts (page 332)**. **PRESTART (PAGE 812)** output is active in this pause until Cranking Fail Pause elapses.			

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Prestart Time

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. 3600 [s]		
Default value	2 s	**Force value**	YES*
Step	1 s		
Comm object	8394	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Time of closing of the **PRESTART (PAGE 812)** output prior to the engine start. Set to zero if you want to leave the output **PRESTART (PAGE 812)** open.			

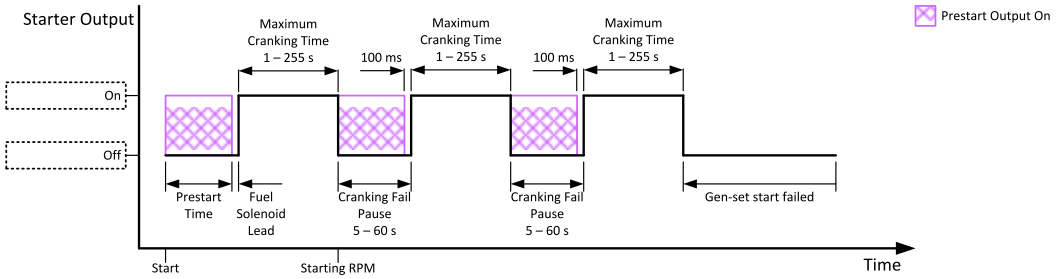


Image 8.1 Prestart Time

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Starting RPM

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	5 .. 50 [%]		
Default value	25%	**Force value**	YES*
Step	1 % of **Nominal RPM (page 321)**		
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 321)**. If this level is exceeded the engine is considered as started.			

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Starting Oil Pressure

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	Disabled / 0,1 .. 10,0 [bar]		
Default value	4,5 bar	**Force value**	YES*
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 1 (PAGE 818)** 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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Glow Plugs Time

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0.0 .. **Prestart Time (page 334)** [s]		
Default value	0.0 s	**Force value**	YES*
Step	1.0 s		
Comm object	14412	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint defines the time before starting when logical binary output **GLOW PLUGS (PAGE 794)** will be active.

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Idle RPM

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	100 .. 4000 [RPM]		
Default value	900 RPM	**Force value**	YES*
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**	2.1.0
Range [units]	0,0 .. 25,0 [s]		
Default value	0,5 s	**Force value**	YES*
Step	0,1 s		
Comm object	10525	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

Delay between **FUEL SOLENOID (PAGE 786)** and **STARTER 1 (PAGE 818)** logical binary outputs.**FUEL SOLENOID (PAGE 786)** is active before **STARTER 1 (PAGE 818)**. Lead time is adjusted via this setpoint.

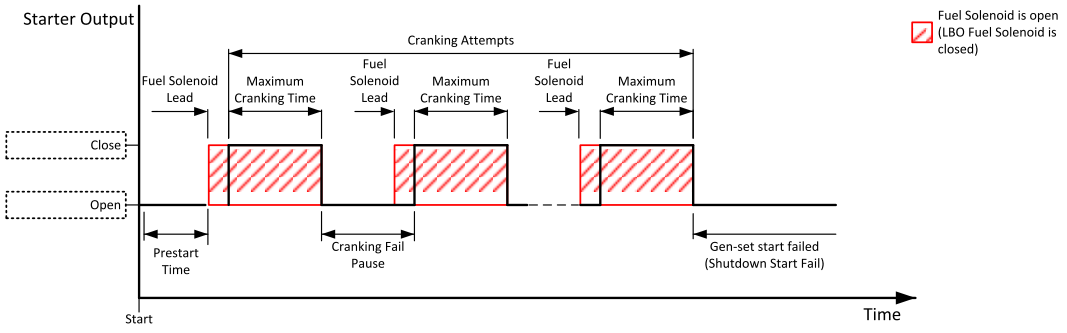


Image 8.2 Fuel Solenoid Lead

Note: *LBO **PRESTART (PAGE 812)** goes to logical zero when Fuel Solenoid Lead goes to logical one.*

Note: *This setpoint is used only for diesel **Fuel Solenoid (page 331)**.*

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Idle Time

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	12 s	**Force value**	YES*
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 334)**. Start fail is detected when during Idle state RPM decreases below 2 RPM.
The output **IDLE/NOMINAL (PAGE 798)** remains inactive during the idle period. Binary output Idle/Nominal opens during Cooling period again. This output can be used for switching the governor between idle and nominal speed.

Note: *When controller is in the MAN mode, it is possible to finish the Idle Time count down by pushing the Start button.*

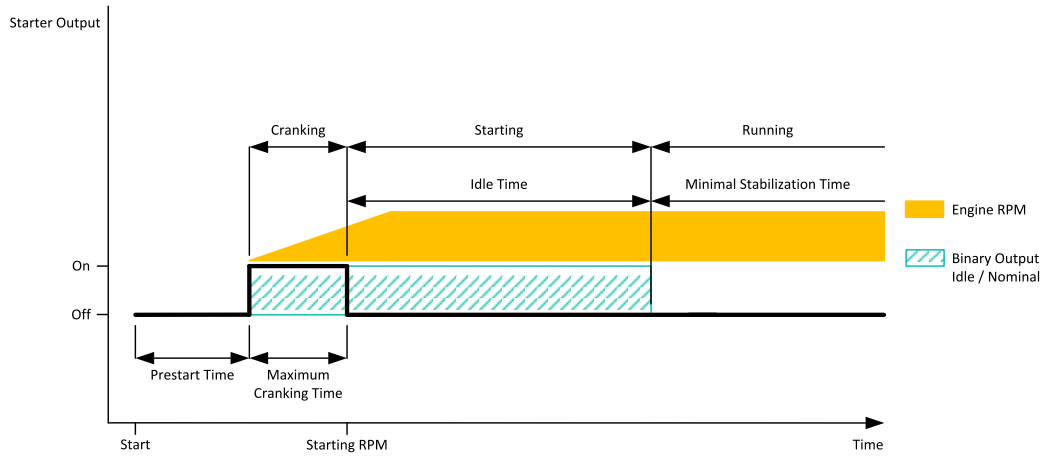


Image 8.3 Idle Time 1

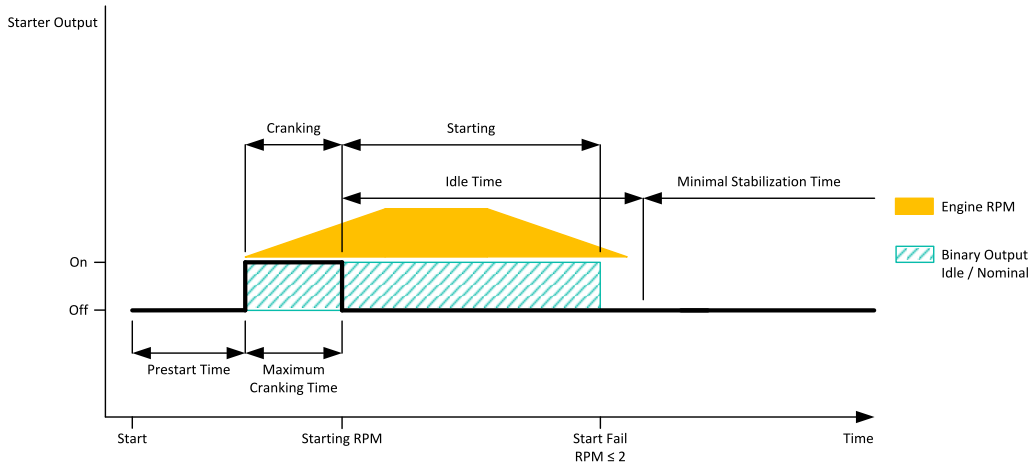


Image 8.4 Idle Time 2

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Minimal Stabilization Time

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	1 .. **Maximal Stabilization Time (page 340)** [s]		
Default value	2 s	**Force value**	YES*
Step	1 s		
Comm object	8259	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

When the Gen-set has been started and the idle timer has elapsed, the controller will wait for a period adjusted by this setpoint before closing GCB, even if the generator voltage and frequency are already in limits.

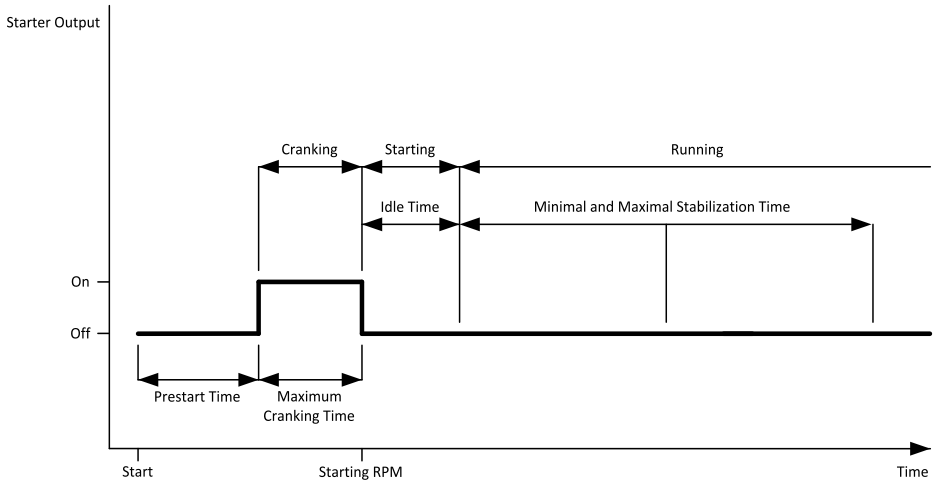


Image 8.5 Minimal Stabilization Time

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Maximal Stabilization Time

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	**Minimal Stabilization Time (page 339)** .. 3600 [s]		
Default value	10 s	**Force value**	YES*
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.

Note: *When starting the engine, setpoint should be set >300 s.*

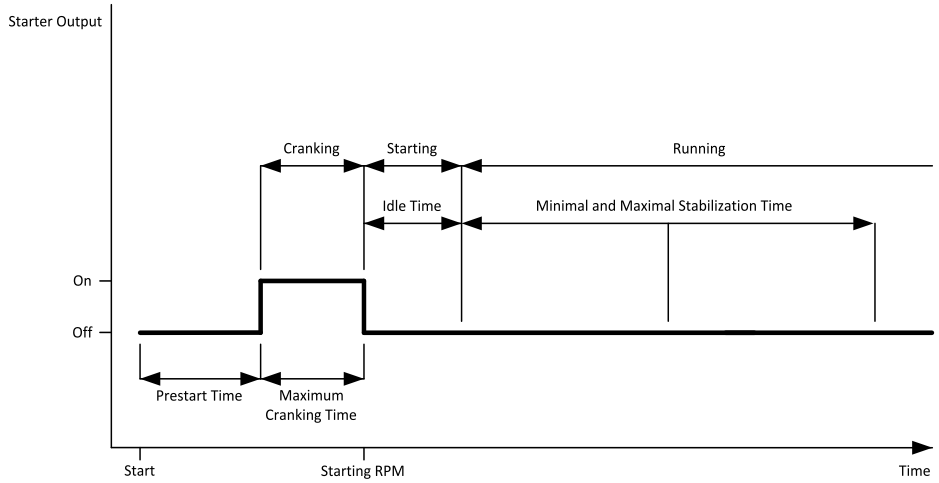


Image 8.6 Maximal Stabilization Time

back to List of setpoints

GCB Delay

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	1 .. 600 [s]		
Default value	2 s	**Force value**	YES*
Step	1 s		
Comm object	20816	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
GCB Delay count down is used with the voltage autodetection function. Controller regulates generator voltage to selected nominal voltage during the GCB Delay count down and GCB closing is possible only when it is over.			

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Run Only Block Delay

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	**Force value**	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. The protection blocking is based on the operating state of the engine automat. Once the engine automat reaches the state "Running" the protection with this blocking condition gets unblocked after delay Run Only Block Delay.			

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Sd Ventilation Time

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. 60 [s]		
Default value	5 s	**Force value**	YES*
Step	1 s		
Comm object	9695	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
In case **Fuel Solenoid (page 331)** 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: Prelubrication

Prelubrication Time

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	OFF / 1 .. 3600 [s]		
Default value	OFF	**Force value**	YES*
Step	1 s		
Comm object	8780	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint is used for adjusting of duration of the Prelubrication cycle.			

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Prelubrication Pause

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	1 .. 3000 [min]		
Default value	1 min	**Force value**	YES*
Step	1 min		
Comm object	8781	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if **Prelubrication Time (page 342)** != OFF		
Description			
This setpoint is used to adjust the pause between two consequent Prelubrication cycle.			

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Subgroup: Warming

Warming Procedure

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	Disabled / Enabled		
Default value	Disabled	**Force value**	YES*
Step	[-]		
Comm object	13956	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint enables/disables Warming function.			

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Warming Load

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. 100 [%] of **Nominal Power (page 311)**		
Default value	20 % of **Nominal Power (page 311)**	**Force value**	YES*
Step	1 % of **Nominal Power (page 311)**		
Comm object	9243	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **Warming Procedure (page 343)** = Enabled		
Description			
This setpoint adjusts maximal load during Warming function.			

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Warming Temperature Limit

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. 200 [°C] (depends on the selected **Power formats and units (page 203)**)		
Default value	0 °C (depends on the selected **Power formats and units (page 203)**)	**Force value**	YES*
Step	1 °C (depends on the selected **Power formats and units (page 203)**)		
Comm object	9258	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **Warming Procedure (page 343)** = Enabled		
Description			
This setpoint adjusts required temperature of Coolant Temperature (obtained from LAI **COOLANT TEMP (PAGE 832)** or ECU) for Warming function.			

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Maximum Warming Time

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. 3600 [s]		
Default value	0 s	**Force value**	YES*
Step	1 s		
Comm object	8562	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **Warming Procedure (page 343)** = Enabled		
Description			
This setpoint adjusts maximum time for Warming function. Warming ends latest after this timer expires.			

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Subgroup: Stopping

Cooling Speed

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	Idle / Nominal [-]		
Default value	Nominal	**Force value**	YES*
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 798)** 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 798)** 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**	2.1.0
Range [units]	0 .. 3 600 [s]		
Default value	30 s	**Force value**	YES*
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**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Force value**	YES*
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 786)** has been de-energized and the **STOP SOLENOID (PAGE 821)** energized. The Stop Solenoid output is deactivated 12 s after last running engine indication went off.

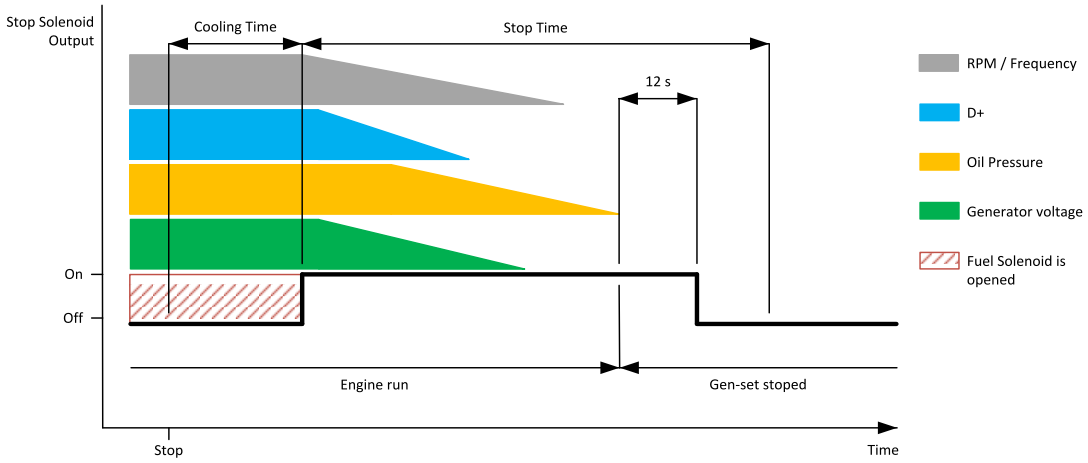


Image 8.7 Stop Time 1

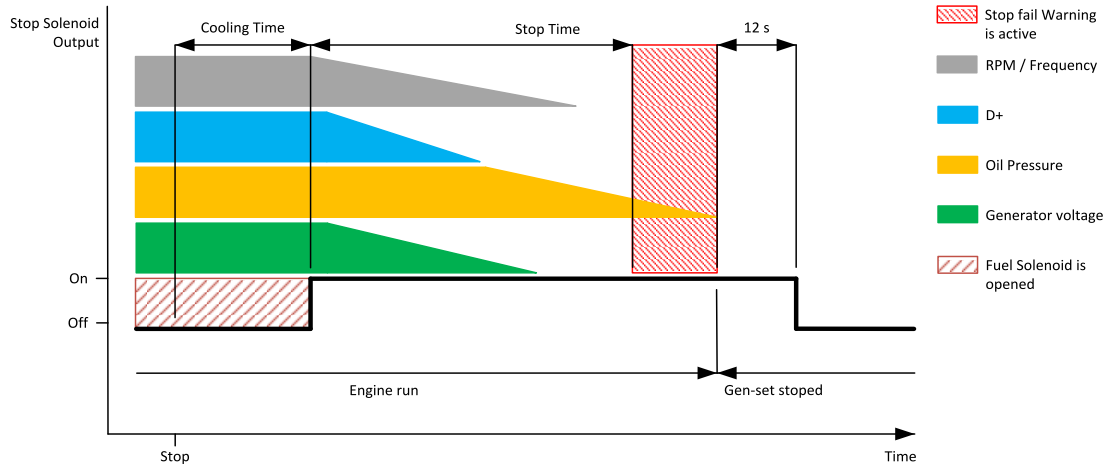


Image 8.8 Stop Time 2

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After Cooling Time

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. 3 600 [s]		
Default value	180 s	**Force value**	YES*
Step	1 s		
Comm object	8662	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Runtime of engine after cooling pump. Binary output **COOLING PUMP (PAGE 777)** is active when the engine starts deactivates after timer set in this setpoint elapses (timer starts counting down as soon as engine switches to stop phase).			

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Subgroup: D+ Function

D+ Function

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	Enabled / ChargeFail / Disabled [-]		
Default value	Disabled	**Force value**	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.

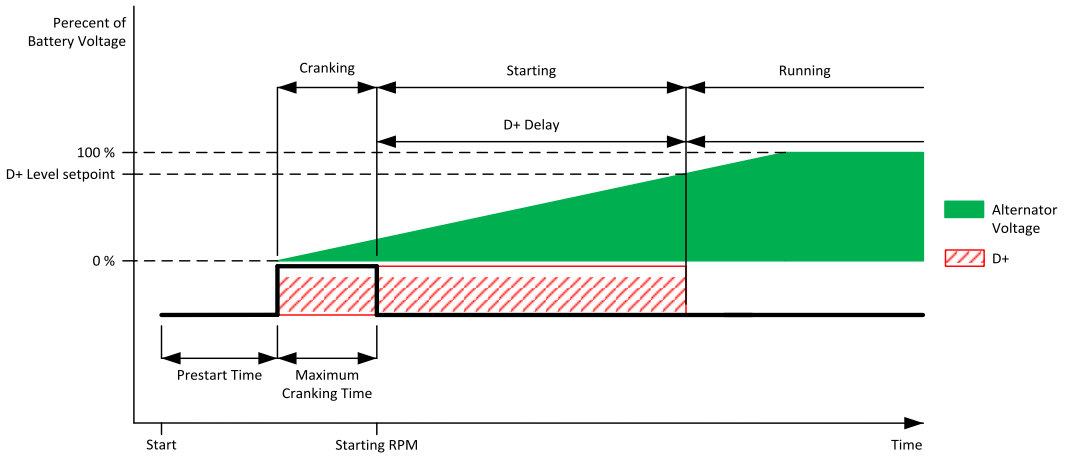


Image 8.9 D+ Function 1

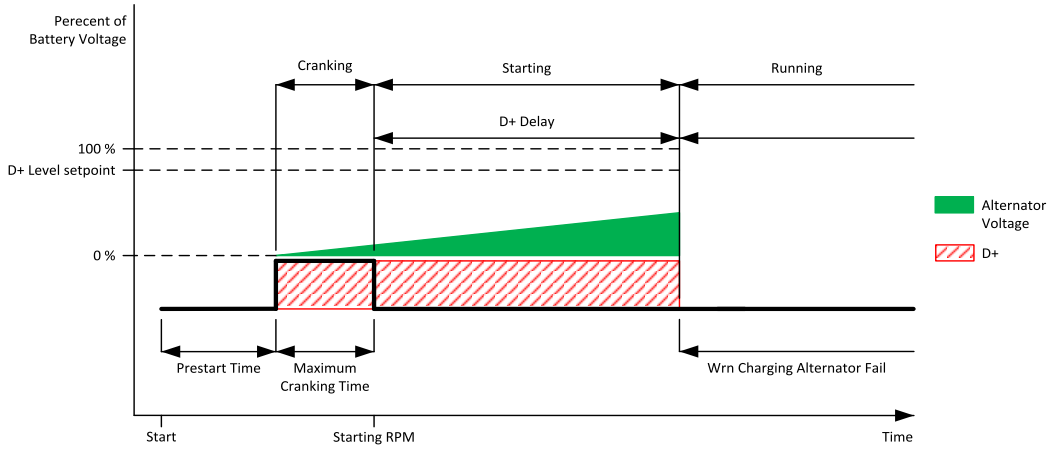


Image 8.10 D+ Function 2

***Note:** Delay of this function is adjusted via **D+ Delay (page 348)** setpoint, threshold of this function is adjusted via D+ Level setpoint.*

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D+ Threshold

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0..100 [%]		
Default value	80 %	**Force value**	NO
Step	1 %		
Comm object	14959	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 346)** is not set to *Disabled* value.		
Description			
This setpoint adjusts threshold level for **D+ Function (page 346)**.			

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D+ Delay

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	1..255 [s]		
Default value	1 s	**Force value**	NO
Step	1 s		
Comm object	14960	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 346)** is not set to *Disabled* value.		
Description			
This setpoint adjusts delay for **D+ Function (page 346)**. This delay is used for: › Alarm **Wrn Charging Alternator Fail (page 884)**. › For engine running condition – disengagement of starter			

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D+ Alarm Type

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	No Protec/Wrn/Sd [-]		
Default value	Wrn	**Force value**	NO
Step	[-]		
Comm object	15751	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if setpoint **D+ Function (page 346)** is not set to *Disabled* value.		
Description			
This setpoint adjusts type of alarm **Wrn Charging Alternator Fail (page 884)**.			

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Subgroup: Engine Protections

Overspeed Sd

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	**Underspeed Sd (page 349)** .. 200 [%]		
Default value	115%	**Force value**	NO
Step	1 % of **Nominal RPM (page 321)**		
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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Underspeed Sd

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. **Overspeed Sd (page 349)** [%]		
Default value	25%	**Force value**	NO
Step	1 % of **Nominal RPM (page 321)**		
Comm object	8260	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for underspeed protection. Relative to the nominal speed.			

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Starting Overspeed Sd

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	100 ..200 [%]		
Default value	115%	**Force value**	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 350)**. This period starts to be counted once the RPM exceeds the value **Starting RPM (page 334)**. The threshold **Overspeed Sd (page 349)** starts to be valid once this period elapsed. The type of reaction of the overspeed protection within the **Starting Overspeed Time (page 350)** is defined by the setpoint **Starting Overspeed Protection (page 351)**, 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.

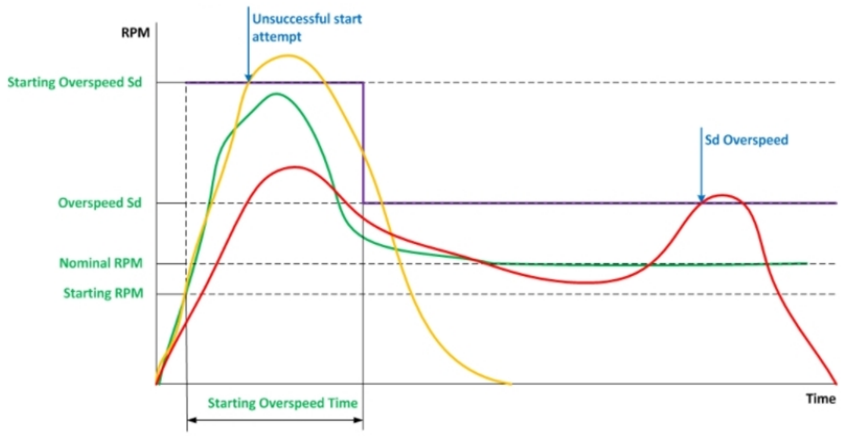


Image 8.11 Staring speed overshoot › Ovespeed Sd

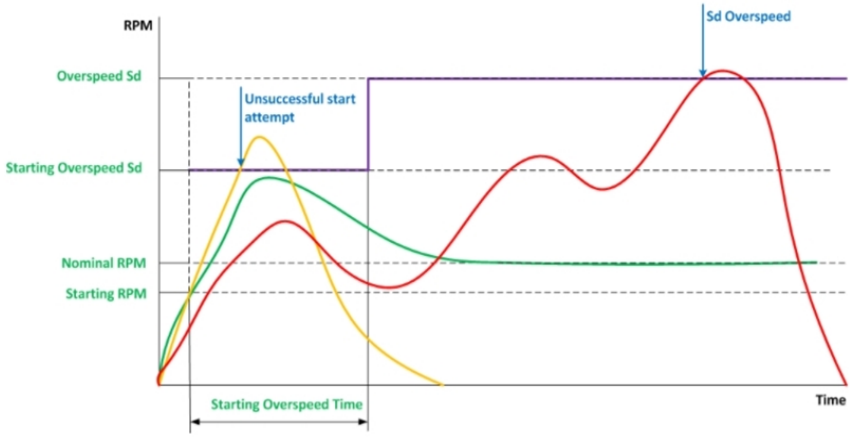


Image 8.12 Staring speed overshoot ‹ Ovespeed Sd

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Starting Overspeed Time

Setpoint group	Engine protection	**Related FW**	2.1.0
Range [units]	0 .. 255 [s]		
Default value	5 s	**Force value**	NO
Step	1 s		
Comm object	14108	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Time when **Starting Overspeed Sd (page 349)** level is used for overspeed protection. This time starts countdown when starting RPM are reached.

Upper limit of **Starting Overspeed Protection (page 351)** is used during Starting Overspeed Time or

until generator goes to **loaded state**.

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Starting Overspeed Protection

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	OverSpd Sd / NextStartAt [-]		
Default value	OverSpd Sd	**Force value**	NO
Step	[-]		
Comm object	15808	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
The setpoint allows user to chose which kind of protection will be triggered if speed limit is reached during **Starting Overspeed Time (page 350)**. Sd overspeed option will result in controller shutting down the engine and displaying Sd Starting Overspeed alarm and NextStartAt option will result in controller stopping the engine and trying to start again. The number of attempts is defined by **Cranking Attempts (page 332)**.			

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Subgroup: Fuel Theft Protection

Fuel Tank Volume

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. 10 000 [l]		
Default value	200 l	**Force value**	NO
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 832)** 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**	2.1.0
Range [units]	Disabled / 1 .. 50 [%/h]		
Default value	25 %/h	**Force value**	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**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	5 s	**Force value**	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 352)** this delay starts count down. After count down of this delay alarm **Wrn Fuel Theft (page 879)** is activated.			

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Subgroup: Fuel Pump

Fuel Pump On

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. **Fuel Pump Off (page 354)** [%]		
Default value	20 %	**Force value**	NO
Step	1 %		
Comm object	10100	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	All the time		
Description			

Threshold level for switching the binary output **FUEL PUMP (PAGE 786)** on.

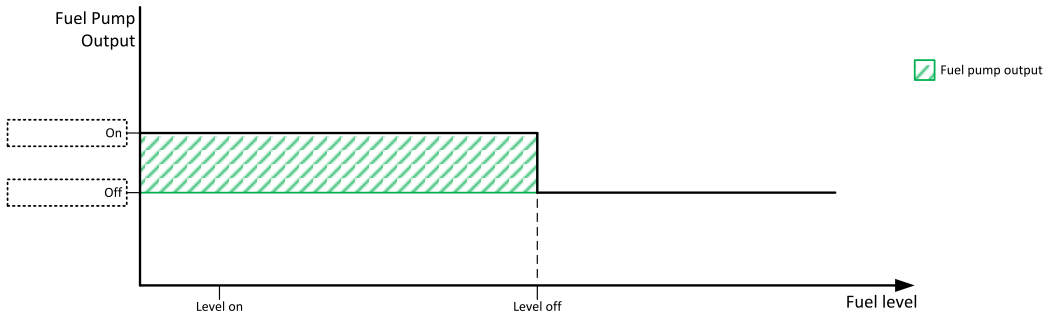


Image 8.13 Fuel Pump On

> **IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 733) is configured then binary output FUEL PUMP (PAGE 786) is control by this binary input. Setpoints Fuel Pump On and Fuel Pump Off (page 354) are not evaluated!**

Note: *Value from analog input has higher priority than ECU.*

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Fuel Pump Off

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	**Fuel Pump On (page 353)** .. 100 [%]		
Default value	90 %	**Force value**	NO
Step	1 %		
Comm object	10101	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	All the time		
Description			

Threshold level for switching the binary output **FUEL PUMP (PAGE 786)** off.

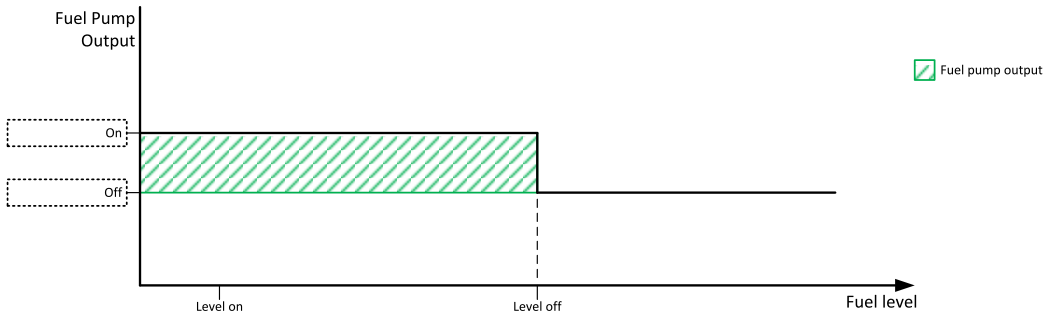


Image 8.14 Fuel Pump Off

> **IMPORTANT: When binary input FUEL PUMP ON/OFF (PAGE 733) is configured then binary output FUEL PUMP (PAGE 786) is control by this binary input. Setpoints Fuel Pump On (page 353) and Fuel Pump Off are not evaluated!**

Note: *Value from analog input has higher priority than ECU.*

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Transfer Wrn Delay

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	Disabled / 1 .. 600 [s]		
Default value	30 s	**Force value**	NO
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 786)** is configured		
Description			
If the controller does not see the fuel increase during fuel transfer within this time alarm **WrnAL Fuel Transfer Failed (page 904)** will be displayed and the **FUEL PUMP (PAGE 786)** will be turned off. Alarm **WrnAL Fuel Transfer Failed (page 904)** 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**	2.1.0
Range [units]	8.0 V .. **Battery Overvoltage (page 356)** [V]		
Default value	18.0 V	**Force value**	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**	2.1.0
Range [units]	**Battery Undervoltage (page 355)** .. 40.0 [V]		
Default value	36.0 V	**Force value**	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**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	5 s	**Force value**	NO
Step	1 s		
Comm object	8383	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **Battery Undervoltage (page 355)** and **Battery Overvoltage (page 356)** protection. **IMPORTANT: This is a fixed parameter, it isn't possible to adjust it in any manner. This parameter isn't visible either in controller or in PC tools.**			

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Battery Charger Fail Delay

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. 15 [min]		
Default value	5 min	**Force value**	NO
Step	1 min		
Comm object	11374	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned with LBI **BATTERY CHARGER (PAGE 719)**		
Description			
Delay for LBI **BATTERY CHARGER (PAGE 719)**.			

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Subgroup: Pulse Counters

Conversion Coefficient Pulse 1

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 ... 999 999 [-]		
Default value	1	**Force value**	NO
Step	1		
Comm object	10994	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if LBI **PULSE COUNTER 1 (PAGE 747)** is configured		
Description			
This setpoint adjusts the rate of increasing of the Pulse Counter 1 function. The module counts pulses at the input **PULSE COUNTER 1 (PAGE 747)** and if the input pulses counter reaches value given by this setpoint, the counter value **Pulse Counter 1 (page 673)** is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

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Conversion Coefficient Pulse 2

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 ... 999 999 [-]		
Default value	1	**Force value**	NO
Step	1		
Comm object	10995	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only if LBI **PULSE COUNTER 2 (PAGE 748)** is configured		
Description			
This setpoint adjusts the rate of increasing of the Pulse Counter 2 function. The module counts pulses at the input **PULSE COUNTER 2 (PAGE 748)** and if the input pulses counter reaches value given by this setpoint, the counter value **Pulse Counter 2 (page 673)** is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.			

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Subgroup: Ventilation

Ventilation Pulse Time

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0–3600 [s]		
Default value	30 s	**Force value**	NO
Step	1 s		
Comm object	15767	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Only when logical binary output **VENTILATION ON PULSE (PAGE 826)** or **VENTILATION OFF PULSE (PAGE 826)** is configured.		
Description			
This setpoint defines duration of pulse generated on logical binary outputs **VENTILATION ON PULSE (PAGE 826)** or **VENTILATION OFF PULSE (PAGE 826)** at the moment when logical binary output **VENTILATION (PAGE 825)** is activated or deactivated respectively.			

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Subgroup: ECU Settings

Open Param Governor Speed Adjust

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0.000 .. 10.000 [%]		
Default value	5.000	**Force value**	NO
Step	0.001 %		
Comm object	16617	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if ECU is configured		
Description			
This parameter will adjust engine control characteristics to suit special requirements for stability or transient response. Lower values will result in smaller control gains that offer improved steady state stability but decreased transient response. Higher values will provide better transient response but will result in decreased steady state stability. Nominal value of 5 provides a good balance for most applications.			

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Manual ECU Activation Timeout

Setpoint group	Engine settings	**Related FW**	2.1.0
Range [units]	0 .. 300 [min]		
Default value	60 [min]	**Force value**	NO
Step	1 [min]		
Comm object	19707	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if ECU is configured		
Description			
The setpoint allows user to set length of ECU manual activation in OFF mode by pressing Start button. LBO ECU Power Relay is active until this timeout elapses or until stop button is pressed or until controller mode is changed.			

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Group: SUS Control

Subgroup: SUS Control

SUS Sequence

Setpoint group	SUS Control	**Related FW**	2.1.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	**Force value**	YES*
Step	[-]		
Comm object	10110	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint enables/disables **Start Up Synchronization (SUS) (page 229)** function.

Disabled	Function is disabled.
Enabled	Function is enabled. Behavior of the function is adjusted via setpoints **Dead Bus Limit (page 360)**, **#SUS Min Power 1 (page 360)**,**#SUS Min Power 2 (page 361)**, **#SUS Min Power 3 (page 362)**, **Excitation Control (page 362)**, **SUS RPM Window (page 363)**, **SUS RPM Window Time Out (page 363)** and **#SUS Excitation Delay (page 364)**.

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Dead Bus Limit

Setpoint group	SUS Control	**Related FW**	2.1.0
Range [units]	0 .. 70 [%] of **Mains/Bus Nominal Voltage Ph-N (page 316)**		
Default value	30 % of **Mains/Bus Nominal Voltage Ph-N (page 316)**	**Force value**	NO
Step	1 % of **Mains/Bus Nominal Voltage Ph-N (page 316)**		
Comm object	16390	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Only if **SUS Sequence (page 359)** = Enabled		
Description			
This setpoint adjusts the maximal value of **Mains Voltage L1-N (page 650)**, **Mains Voltage L2-N (page 651)** and **Mains Voltage L3-N (page 651)** related to **Mains/Bus Nominal Voltage Ph-N (page 316)**. GCB is immediately opened if one of mentioned values is over this limit during SUS Starting Sequence and Standard Starting is initiated.			

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#SUS Min Power 1

Setpoint group	SUS Control	**Related FW**	2.1.0
Range [units]	1 .. 65000 [kW]		
Default value	100 kW	**Force value**	NO
Step	1 kW		
Comm object	14013	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 359)** = Enabled		
Description			
This setpoint indicates required minimal **Nominal Power (page 311)** of gen-sets needed to activate the LBO **Ready To Excite (page 814)**. Every Gen-set in SUS sequence which activates LBO **Ready To Excite (page 814)** is counted. When sum of **Nominal Power (page 311)** of these Gen-sets achieves this condition, rest of Gen-sets (without of activated LBO **Ready To Excite (page 814)** are switched to STANDARD sequence (GCBs are opened) and Gen-sets with active LBO **Ready To Excite (page 814)** are excited. If this condition is not met, and on the bus all Gen-sets have LBO **Ready To Excite (page 814)** activated, timer **#SUS Excitation Delay (page 364)** is started. After it expires, all Gen-sets with active LBO **Ready To Excite (page 814)** are excited. ***Note:*** *This setpoint is considered only if LBI **SUS Min Power 2 (page 756)** and LBI **SUS Min Power 3 (page 756)** are either not configured or opened.*			

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#SUS Min Power 2

Setpoint group	SUS Control	**Related FW**	2.1.0
Range [units]	1 .. 65000 [kW]		
Default value	100 kW	**Force value**	NO
Step	1 kW		
Comm object	16414	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 359)** = Enabled		
Description			

This setpoint indicates required minimal **Nominal Power (page 311)** of gen-sets needed to activate the LBO **READY TO EXCITE (PAGE 814)**.

Every Gen-set in SUS sequence which activates LBO **READY TO EXCITE (PAGE 814)** is counted. When sum of **Nominal Power (page 311)** of these Gen-sets achieves this condition, rest of Gen-sets (without of activated LBO **READY TO EXCITE (PAGE 814)** are switched to STANDARD sequence (GCBs are opened) and Gen-sets with active LBO **READY TO EXCITE (PAGE 814)** are excited.

If this condition is not met, and on the bus all Gen-sets have LBO **READY TO EXCITE (PAGE 814)** activated, timer **#SUS Excitation Delay (page 364)** is started. After it expires, all Gen-sets with active LBO **READY TO EXCITE (PAGE 814)** are excited.

> ***Note:*** *This setpoint is considered only if LBI **SUS MIN POWER 2 (PAGE 756)** is closed and LBI **SUS MIN POWER 3 (PAGE 756)** is either not configured or opened.*

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#SUS Min Power 3

Setpoint group	SUS Control	**Related FW**	2.1.0
Range [units]	1 .. 65000 [kW]		
Default value	100 kW	**Force value**	NO
Step	1 kW		
Comm object	16415	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 359)** = Enabled		
Description			

This setpoint indicates required minimal **Nominal Power (page 311)** of gen-sets needed to activate the LBO **READY TO EXCITE (PAGE 814)**.

Every Gen-set in SUS sequence which activates LBO **READY TO EXCITE (PAGE 814)** is counted. When sum of **Nominal Power (page 311)** of these Gen-sets achieves this condition, rest of Gen-sets (without of activated LBO **READY TO EXCITE (PAGE 814)** are switched to STANDARD sequence (GCBs are opened) and Gen-sets with active LBO **READY TO EXCITE (PAGE 814)** are excited.

If this condition is not met, and on the bus all Gen-sets have LBO **READY TO EXCITE (PAGE 814)** activated, timer **#SUS Excitation Delay (page 364)** is started. After it expires, all Gen-sets with active LBO **READY TO EXCITE (PAGE 814)** are excited.

> ***Note:*** *This setpoint is considered only if LBI **SUS MIN POWER 3 (PAGE 756)** is closed and LBI **SUS MIN POWER 2 (PAGE 756)** is either not configured or opened.*

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Excitation Control

Setpoint group	SUS Control	**Related FW**	2.1.0
Range [units]	Internal / External [-]		
Default value	Internal	**Force value**	YES*
Step	[-]		
Comm object	10056	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 359)** = Enabled		
Description			

This setpoint influences the behavior of the SUS starting sequence. See **Start Up Synchronization (SUS) (page 229)** for more information.

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SUS RPM Window

Setpoint group	SUS Control	**Related FW**	2.1.0
Range [units]	0.0 .. 100.0 [%] of **Nominal RPM (page 321)**		
Default value	30.0 % of **Nominal RPM (page 321)**	**Force value**	NO
Step	0.1 % of **Nominal RPM (page 321)**		
Comm object	10193	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 359)** = Enabled		
Description			
This setpoint adjusts the RPM Window in which gen-set is **READY TO EXCITE (PAGE 814)** during SUS Start Sequence.			

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SUS RPM Window Time Out

Setpoint group	SUS Control	**Related FW**	2.1.0
Range [units]	2.0 .. 6000.0 [s]		
Default value	30 s	**Force value**	NO
Step	0.1 s		
Comm object	10194	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 359)** = Enabled		
Description			
This setpoint adjusts the delay in which Gen-set has to reach **SUS RPM Window (page 363)** during SUS Start Sequence.			

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#SUS Excitation Delay

Setpoint group	SUS Control	**Related FW**	2.1.0
Range [units]	0 .. 600 [s] / No Timeout		
Default value	10 s	**Force value**	NO
Step	1 s		
Comm object	14104	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 359)** = Enabled		
Description			
This setpoint adjusts the delay before excitation which starts to be counted down after › all active Gen-sets **RPM (page 632)** reach the **SUS RPM Window (page 363)** › **SUS RPM Window Time Out (page 363)** elapses			

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SUS Deexcitation Time Out

Setpoint group	SUS Control	**Related FW**	2.1.0
Range [units]	0.1 .. 600.0 [s] / OFF		
Default value	10 s	**Force value**	NO
Step	0.1 s		
Comm object	17010	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SUS Sequence (page 359)** = Enabled		
Description			
Time out for SUS deexcitation used when start request is received in cooling phase. ***Note:*** *The timer countdown "Deexcitation " is visible on main screen.*			

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Group: Maintenance Timers

Subgroup: Maintenance Timer 1

Maintenance Timer 1 RunHours

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	0 ... 9 999 [h] / Disabled		
Default value	Disabled	**Force value**	NO
Step	1 h		
Comm object	13853	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down when engine is running. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 10 000 (Disabled) is set, the Maintenance function is disabled and the counter value disappears from controllers statistics. Reset of the timer can be done by adjusting this setpoint again.			

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Maintenance Timer 1 Interval

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	Disabled	**Force value**	NO
Step	1 month		
Comm object	20583	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down all the time, setting is done in months, but actual **Maintenance Timer 1 Interval (page 669)** value is displayed and counted in days. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 37 (Disabled) is set, then the maintenance function is disabled and counter does not count and the counter value disappears from controllers statistics. Reset of the timer can be done by adjusting this setpoint again. Setting of the setpoint does not change when the reset is done, only the **Maintenance Timer 1 Interval (page 669)** value changes to reflect reset of the maintenance timer.			

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Maintenance Timer 1 Protection

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	Warning / Slow Stop[-]		
Default value	Warning	**Force value**	NO
Step	[-]		
Comm object	20586	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 1 RunHours (page 365)** and **Maintenance Timer 1 Interval (page 365)**.			

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Subgroup: Maintenance Timer 2

Maintenance Timer 2 RunHours

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	0 ... 9 999 [h] / Disabled		
Default value	Disabled	**Force value**	NO
Step	1 h		
Comm object	13854	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down when engine is running. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 10 000 (Disabled) is set, the Maintenance function is disabled and the counter value disappears from controllers statistics. Reset of the timer can be done by adjusting this setpoint again.			

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Maintenance Timer 2 Interval

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	Disabled	**Force value**	NO
Step	1 month		
Comm object	20584	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down all the time, setting is done in months, but actual **Maintenance Timer 2 Interval (page 669)** value is displayed and counted in days. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 37 (Disabled) is set, then the maintenance function is disabled and counter does not count and the counter value disappears from controllers statistics. Reset of the timer can be done by adjusting this setpoint again. Setting of the setpoint does not change when the reset is done, only the **Maintenance Timer 2 Interval (page 669)** value changes to reflect reset of the maintenance timer.			

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Maintenance Timer 2 Protection

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	Warning / Slow Stop[-]		
Default value	Warning	**Force value**	NO
Step	[-]		
Comm object	20587	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 2 RunHours (page 366)** and **Maintenance Timer 2 Interval (page 367)**.			

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Subgroup: Maintenance Timer 3

Maintenance Timer 3 RunHours

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	0 ... 9 999 [h] / Disabled		
Default value	Disabled	**Force value**	NO
Step	1 h		
Comm object	13855	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down when engine is running. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 10 000 (Disabled) is set, the Maintenance function is disabled and the counter value disappears from controllers statistics. Reset of the timer can be done by adjusting this setpoint again.			

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Maintenance Timer 3 Interval

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	Disabled	**Force value**	NO
Step	1 month		
Comm object	20585	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down all the time, setting is done in months, but actual **Maintenance Timer 3 Interval (page 670)** value is displayed and counted in days. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 37 (Disabled) is set, then the maintenance function is disabled and counter does not count and the counter value disappears from controllers statistics. Reset of the timer can be done by adjusting this setpoint again. Setting of the setpoint does not change when the reset is done, only the **Maintenance Timer 3 Interval (page 670)** value changes to reflect reset of the maintenance timer.			

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Maintenance Timer 3 Protection

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	Warning / Slow Stop[-]		
Default value	Warning	**Force value**	NO
Step	[-]		
Comm object	20588	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 3 RunHours (page 368)** and **Maintenance Timer 3 Interval (page 368)**.			

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Subgroup: Maintenance Timer 4

Maintenance Timer 4 RunHours

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	0 ... 9 999 [h] / Disabled		
Default value	Disabled	**Force value**	NO
Step	1 h		
Comm object	13856	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down when engine is running. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 10 000 (Disabled) is set, the Maintenance function is disabled and the counter value disappears from controllers statistics. Reset of the timer can be done by adjusting this setpoint again.			

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Maintenance Timer 4 Interval

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	1 .. 36 [month] / Disabled		
Default value	Disabled	**Force value**	NO
Step	1 month		
Comm object	20291	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Maintenance timer counts down all the time, setting is done in months, but actual **Maintenance Timer 1 Interval (page 669)** value is displayed and counted in days. If it reaches zero, an alarm appears, but the timer still counts down to negative values. When the value 37 (Disabled) is set, then the maintenance function is disabled and counter does not count and the counter value disappears from controllers statistics. Reset of the timer can be done by adjusting this setpoint again. Setting of the setpoint does not change when the reset is done, only the **Maintenance Timer 1 Interval (page 669)** value changes to reflect reset of the maintenance timer.			

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Maintenance Timer 4 Protection

Setpoint group	Maintenance Timers	**Related FW**	2.1.0
Range [units]	Warning / Slow Stop[-]		
Default value	Warning	**Force value**	NO
Step	[-]		
Comm object	20290	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Type of the maintenance alarm of both **Maintenance Timer 4 RunHours (page 369)** and **Maintenance Timer 4 Interval (page 370)**.			

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Group: Generator settings

Subgroup: Overload Protection

Overload BOC

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	**Overload Wrn (page 371)** .. 200 [%]		
Default value	120 %	**Force value**	NO
Step	1 % of **Nominal Power (page 311)**		
Comm object	8280	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for overload of generator (in % of Nominal power) protection. Protection is BOC (Breaker Open and Gen-set Cooldown). ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

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Overload Wrn

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0 .. **Overload BOC (page 371)**200 [%]		
Default value	120 %	**Force value**	NO
Step	1 % of **Nominal Power (page 311)**		
Comm object	9685	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for overload of generator (in % of **Nominal Power (page 311)**) protection. This is only warning.			

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Overload Delay

Setpoint group	Generator settings Mains	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	**Force value**	NO
Step	0.1 s		
Comm object	8281	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for protections **Overload BOC (page 371)****Overload BOC (page 371)** and **Overload Wrn (page 371)**.			

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Subgroup: Underload Protection

Minimal Power PTM

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0 .. 100 [%]		
Default value	5 %	**Force value**	NO
Step	1 % of **Nominal Power (page 311)**		
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 Mode (page 294)**.			

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Subgroup: Current Protection

Short Circuit

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	100 .. 500 [%]		
Default value	250 %	**Force value**	NO
Step	1 % of **Nominal Current (page 312)**		
Comm object	8282	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Protection occurs when generator current reaches this preset threshold. Type of the protection is BOC. ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

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Short Circuit Delay

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0.00 .. 10.00 [s]		
Default value	0.04 s	**Force value**	NO
Step	0.01 s		
Comm object	9991	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Delay for **Short Circuit (page 373)** protection.			

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IDMT Generator >A Delay

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	1.0 .. 600.0 [s]		
Default value	4.0 s	**Force value**	NO
Step	0.1 s		
Comm object	8283	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
IDMT curve shape selection. IDMT is "very inverse" over current protection. Reaction time is not constant but depends on over current level according to the following formula: $$\text{Reaction time} = \frac{Overcurrent\ IDMT\ Delay^{*}\ Nominal\ Current}{I_{gen} - Nominal\ Current}$$			

Note: *Reaction time is limited to 3600 s = 60 minutes. IDMT protection is not active for Reaction time values longer than 60 minutes.*

I_{gen} is maximal value of all measured phases of generator current.

Table 8.1 EXAMPLE of Reaction time for different over current levels

	Overcurrent IDMT Delay	Overcurrent		
		≤ 100 %	101 %	110 %
Reaction time	0.2 s	No action	20 s	2 s
	2 s	No action	200 s	20 s
	20 s	No action	2000 s	200 s

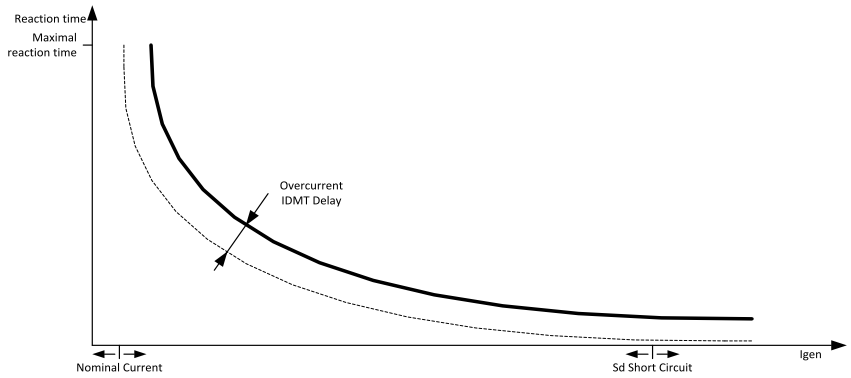


Image 8.15 IDMT Overcurrent Delay

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Generator Current Unbalance

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	1 .. 200 [%] of **Nominal Current (page 312)**		
Default value	50 %	**Force value**	NO
Step	1 % of **Nominal Current (page 312)**		
Comm object	8284	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 314)**		
Description			

Threshold for generator current asymmetry (unbalance).

Protection is BOC (Breaker Open and Gen-set Cooldown).

Note: *When there is no control of breakers, the type of protection is Sd not BOC.*

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Generator Current Unbalance Delay

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 s	**Force value**	NO
Step	0.1 s		
Comm object	8285	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 314)**		
Description			
Delay for **Generator Current Unbalance (page 374)** protection.			

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Subgroup: Earth Fault Current Protection

IDMT Earth Fault Current Sd

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	0 .. 10000 [A]		
Default value	10 [A]	**Force value**	NO
Step	1 [A]		
Comm object	20791	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Level for earth fault current Sd protection. This protection is evaluated on 4th current measurement on controller.			

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IDMT Earth Fault Current Delay

Setpoint group	Process Control	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	5.0 [s]	**Force value**	NO
Step	0.1 [s]		
Comm object	20792	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
Delay for earth fault current Sd protection. This protection is evaluated on 4th current measurement on controller.			

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Subgroup: Voltage Protection

Generator Overvoltage Sd

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	**Generator Overvoltage Wrn (page 376)** .. 200 [%]		
Default value	110 %	**Force value**	NO
Step	1 % of **Generator Nominal Voltage Ph-N (page 316)** or **Generator Nominal Voltage Ph-Ph (page 316)**		
Comm object	8291	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator overvoltage protection. All three phases are checked. Maximum out of three is used. ***Note:*** *Phase to phase and phase to neutral voltages are used for this protection.*			

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Generator Overvoltage Wrn

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	**Generator Undervoltage Wrn (page 377)** .. **Generator Overvoltage Sd (page 376)** [%]		
Default value	110 %	**Force value**	NO
Step	1 % of **Generator Nominal Voltage Ph-N (page 316)** or **Generator Nominal Voltage Ph-Ph (page 316)**		
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 Wrn

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	**Generator Undervoltage BOC (page 377)** .. **Generator Overvoltage Wrn (page 376)** [%]		
Default value	70 %	**Force value**	NO
Step	1 % of **Generator Nominal Voltage Ph-N (page 316)** or **Generator Nominal Voltage Ph-Ph (page 316)**		
Comm object	9687	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator undervoltage protection. All three phases are checked. Minimum out of three is used. ***Note:*** *Phase to phase and phase to neutral voltages are used for this protection.*			

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Generator Undervoltage BOC

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0 .. **Generator Undervoltage Wrn (page 377)** [%]		
Default value	70 %	**Force value**	NO
Step	1 % of **Generator Nominal Voltage Ph-N (page 316)** or **Generator Nominal Voltage Ph-Ph (page 316)**		
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 <> Voltage Delay

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0,0 .. 600,0 [s]		
Default value	3,0 s	**Force value**	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 376)**, **Generator Overvoltage Wrn (page 376)**, **Generator Undervoltage BOC (page 377)** and **Generator Undervoltage Wrn (page 377)** protection.			

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Generator V Unbalance

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	1 .. 200 [%] of **Generator Nominal Voltage Ph-Ph (page 316)** or **Generator Nominal Voltage Ph-N (page 316)**		
Default value	10 %	**Force value**	NO
Step	1 %		
Comm object	8288	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 314)**		
Description			
Threshold for generator voltage unbalance alarm. ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

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Generator V Unbalance Delay

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	3.0 s	**Force value**	NO
Step	0.1 s		
Comm object	8289	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Connection type (page 314)**		
Description			
Delay for **Generator V Unbalance (page 378)** protection.			

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Subgroup: Frequency Protection

Generator Overfrequency BOC

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	**Generator Overfrequency Wrn (page 379)** .. 200,0 [%]		
Default value	110,0 %	**Force value**	YES*
Step	0,1 % of **Nominal Frequency (page 320)**		
Comm object	8296	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator phase L1 overfrequency. ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

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Generator Overfrequency Wrn

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	**Generator Underfrequency Wrn (page 380)** .. **Generator Overfrequency BOC (page 379)** [%]		
Default value	110,0 %	**Force value**	YES*
Step	0,1 % of **Nominal Frequency (page 320)**		
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 Wrn

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	**Generator Underfrequency BOC (page 380)** .. **Generator Overfrequency Wrn (page 379)** [%]		
Default value	85,0 %	**Force value**	YES*
Step	0,1 % of **Nominal Frequency (page 320)**		
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 Underfrequency BOC

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0,0 .. **Generator Underfrequency Wrn (page 380)** [%]		
Default value	85,0 %	**Force value**	YES*
Step	0,1 % of **Nominal Frequency (page 320)**		
Comm object	8298	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold for generator phase L1 underfrequency. ***Note:*** *When there is no control of breakers, the type of protection is Sd not BOC.*			

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Generator <> Frequency Delay

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0,0 .. 600,0 [s]		
Default value	3,0 s	**Force value**	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 379)**, **Generator Overfrequency Wrn (page 379)**, **Generator Underfrequency Wrn (page 380)** and **Generator Underfrequency BOC (page 380)** protection.			

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Subgroup: Reverse Power Protection

Reverse Power Level

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0 .. 50 [%]		
Default value	10 %	**Force value**	NO
Step	1 % of **Nominal Power (page 311)**		
Comm object	8486	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Reverse Power Protection (page 390)**All the time		
Description			
Level for generator **Reverse Power Protection (page 390)Reverse Power Protection**.			

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Reverse Power Delay

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0.0 .. 600 [s]		
Default value	5.0 s	**Force value**	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 390)**All the time		
Description			
Delay for generator **Reverse Power Protection (page 390)Reverse Power Protection**.			

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Subgroup: Excitation Loss Protection

Excitation Loss Level

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0 .. 150 [%]		
Default value	30 %	**Force value**	NO
Step	1 % of **Nominal Power (page 311)**		
Comm object	12486	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Excitation Loss Protection (page 391)**.		
Description			
Level for generator **Excitation Loss Protection (page 391)**			

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Excitation Loss Delay

Setpoint group	Generator settings	**Related FW**	2.1.0
Range [units]	0,0 .. 600,0 [s]		
Default value	5,0 s	**Force value**	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 391)**.		
Description			
Delay for generator **Excitation Loss Protection (page 391)**.			

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Group: Protections

Subgroup: Overload Protection

Overload Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Force value**	YES*
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 371)**, **Overload Wrn (page 371)** and **Overload Delay (page 372)**.
Disabled	Protection is disabled.
ExtDisable	Protection is enabled or disabled by the state of LBI **Protection Force Disable 1 (page 745)** **Protection Force Disable 2* (page 746)** and **Protection Force Disable 3* (page 747)** ar available in AGC archive.

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Subgroup: Current Protection

IDMT Generator >A Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable[-]		
Default value	Enabled	**Force value**	YES*
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 Generator >A Delay (page 373)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

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Generator Current Unbalance Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable[-]		
Default value	Enabled	**Force value**	YES*
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 **Generator Current Unbalance (page 374)** and **Generator Current Unbalance Delay (page 375)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

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Subgroup: Earth Fault Current Protection

IDMT Earth Fault Current Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Disabled	**Force value**	YES*
Step	[-]		
Comm object	20793	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		

Description

This setpoint adjusts the behavior of Generator IDMT Earth Fault Current protection.

Enabled	Protection is enabled. Behavior of protection is adjusted via setpoints **IDMT Earth Fault Current Sd (page 375)** and **IDMT Earth Fault Current Delay (page 375)**.
Disabled	Protection is disabled.
ExtDisable	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

GCB closing is disabled, if the parameter is set to Disabled. It is blocked as well, if the parameter is set to ExtDisable and LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** is active.

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Subgroup: Voltage Protection

Generator <> Voltage Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Force value**	YES*
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 376)**, **Generator Overvoltage Wrn (page 376)**, **Generator Undervoltage BOC (page 377)**, **Generator Undervoltage Wrn (page 377)** and **Generator <> Voltage Delay (page 378)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

GCB closing is disabled, if the parameter is set to Disabled. It is blocked as well, if the parameter is set to ExtDisable and LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** is active.

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Generator V Unbalance Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Force value**	YES*
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 **Generator V Unbalance (page 378)** and **Generator V Unbalance Delay (page 378)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

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Bus Measurement Error Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Force value**	YES*
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: › GCB (own) was closed in MAN or AUTO mode. › MCB (feedback) was closed in AUTO mode. › Any other GCB in power management group (on CAN bus) was closed. The alarm is activated after 20 s. However, the GCB (own) closing is blocked immediately for safety reasons.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

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Subgroup: Frequency Protection

Generator Frequency Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Force value**	YES*
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 379)**, **Generator Overfrequency Wrn (page 379)**, **Generator Underfrequency BOC (page 380)**, **Generator Underfrequency Wrn (page 380)**, and **Generator <> Frequency Delay (page 380)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

GCB closing is disabled, if the parameter is set to Disabled. It is blocked as well, if the parameter is set to ExtDisable and LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** is active.

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Subgroup: Phase Rotation Protection

Phase Rotation Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled/Disabled/ExtDisable [-]		
Default value	Enabled	**Force value**	
Step	[-]		
Comm object	19709	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the behavior of generator Phase Rotation protection.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoint **Phase Rotation (page 326)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

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Subgroup: Reverse Power Protection

Reverse Power Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Force value**	YES*
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 381)** for time longer than the value of setpoint **Reverse Power Delay (page 381)**.

This setpoint adjusts behavior of generator Reverse power protection.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoints **Reverse Power Level (page 381)**, **Reverse Power Delay (page 381)**
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

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Subgroup: Excitation Loss Protection

Excitation Loss Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Force value**	YES*
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 381)** for time longer than the value of setpoint **Excitation Loss Delay (page 382)**.

Enabled:	Protection is enabled. Behavior of protection is adjusted via setpoints **Excitation Loss Level (page 381)**, **Excitation Loss Delay (page 382)**
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

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Subgroup: Speed Protection

Underspeed Protection

Setpoint group	Protections	**Related FW**	2.1.0
Range [units]	Enabled / Disabled / ExtDisable [-]		
Default value	Enabled	**Force value**	YES*
Step	[-]		
Comm object	15671	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			

Under speed protection.

Enabled	Protection is enabled. Behavior of protection is adjusted via setpoint **Underspeed Sd (page 349)**.
Disabled:	Protection is disabled.
ExtDisable:	Protection is enabled or disabled by the state of LBI **PROTECTION FORCE DISABLE 1 (PAGE 745)** **PROTECTION FORCE DISABLE 2* (PAGE 746)** and **PROTECTION FORCE DISABLE 3* (PAGE 747)** ar available in AGC archive.

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Group: Mains Settings

Subgroup: AMF Timers

Emergency Start Delay

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	0 .. 6 000 [s]		
Default value	5 s	**Force value**	NO
Step	1 s		
Comm object	8301	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Delay after the mains failure to the start command of the Gen-set.			

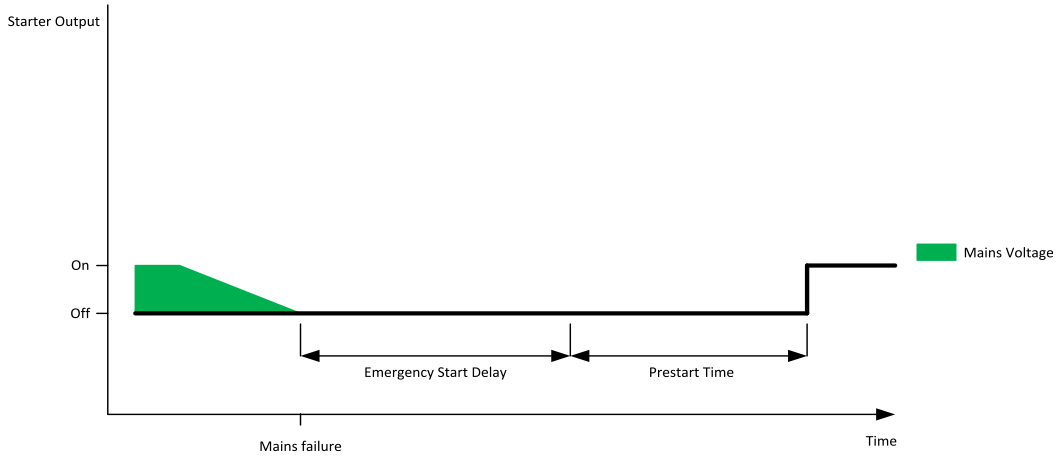


Image 8.16 Emergency Start Delay

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Mains Return Delay

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	1 .. 3 600 [s]		
Default value	20 s	**Force value**	NO
Step	1 s		
Comm object	8302	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
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**	2.1.0
Range [units]	0.0 .. 60.0 [s]		
Default value	5.0 s	**Force value**	NO
Step	0.1 s		
Comm object	8389	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Delay after mains returns to MCB closing, if the Gen-set is not running (e.g. is in start-up procedure). **IMPORTANT: This is a fixed parameter, it isn't possible to adjust it in any manner. This parameter isn't visible either in controller or in PC tools.**			

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AMF Start

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	**Force value**	NO
Step	[-]		
Comm object	9238	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Use this setpoint to enable or disable the **AMF operation (page 120)**.			

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Subgroup: Mains Voltage Limits

Mains Overvoltage

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	**Mains Undervoltage (page 397)** .. 150 [%]		
Default value	110 %	**Force value**	NO
Step	1 % of **Generator Nominal Voltage Ph-Ph (page 316)**		
Comm object	8305	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Threshold for Mains overvoltage. All three phases are checked. Maximum out of three is used.			

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Mains Overvoltage Delay

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	2.0 s	**Force value**	NO
Step	0.1 s		
Comm object	8306	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Delay for **Mains Overvoltage (page 394)** protection.			

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Mains Overvoltage Hys

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	100 .. **Mains Overvoltage (page 394)** [%]		
Default value	105 %	**Force value**	NO
Step	1 %		
Comm object	14132	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			

Threshold defines the level of turning off Mains overvoltage protection.

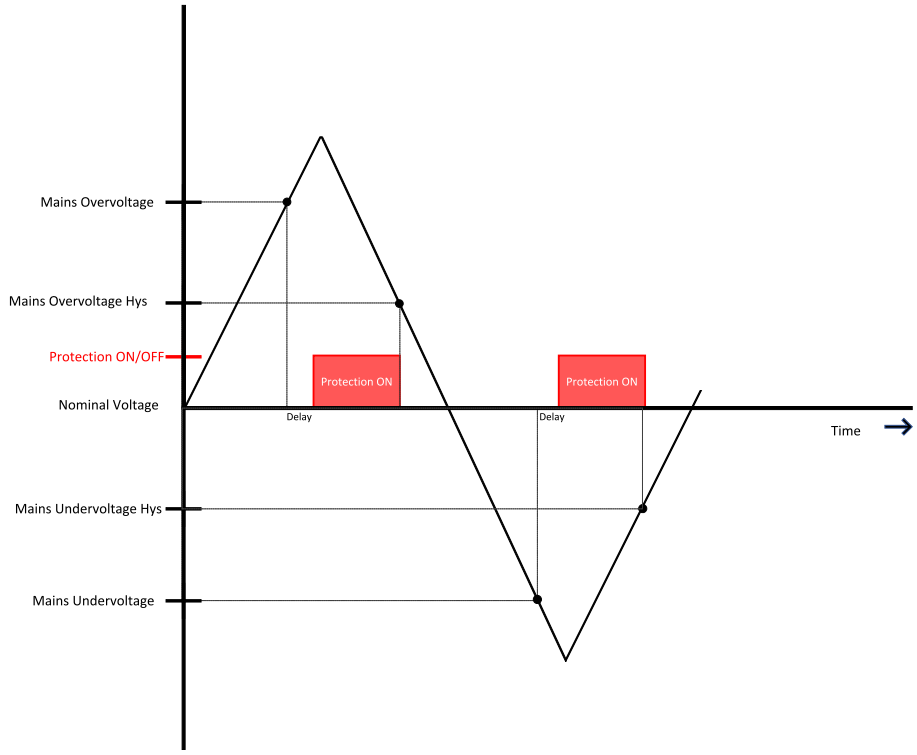


Image 8.17 Mains Overvoltage Hys

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Mains Undervoltage

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	50 .. **Mains Overvoltage (page 394)** [%]		
Default value	60 %	**Force value**	NO
Step	1 % of **Generator Nominal Voltage Ph-Ph (page 316)**		
Comm object	8307	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Threshold for Mains undervoltage. All three phases are checked. Minimum voltage out of three phases is used.			

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Mains Undervoltage Delay

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	2.0 s	**Force value**	NO
Step	0.1 s		
Comm object	8308	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Delay for **Mains Undervoltage (page 397)** protection.			

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Mains Undervoltage Hys

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	**Mains Undervoltage (page 397)** .. 100 [%]		
Default value	65 %	**Force value**	NO
Step	1 %		
Comm object	14130	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			

Threshold defines the level of turning off Mains undervoltage protection.

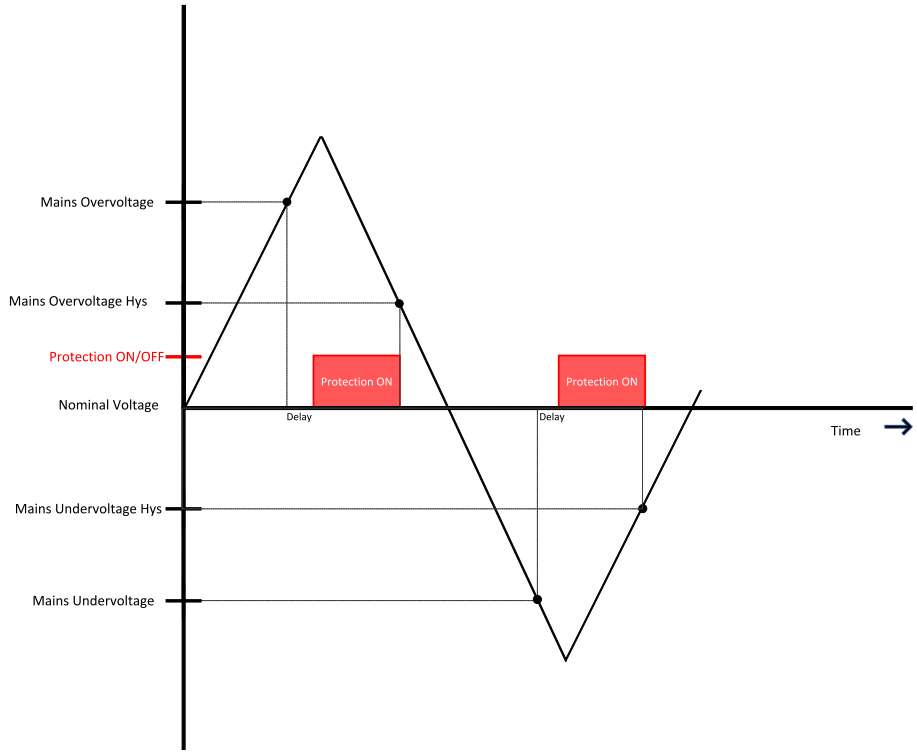


Image 8.18 Mains Undervoltage Hys

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Mains Voltage Unbalance

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	1 .. 150 [%] of **Generator Nominal Voltage Ph-Ph (page 316)** or **Generator Nominal Voltage Ph-N (page 316)**		
Default value	10 %	**Force value**	NO
Step	1 %		
Comm object	8446	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Threshold for Mains voltage unbalance.			

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Mains Voltage Unbalance Delay

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	2.0 s	**Force value**	NO
Step	0.1 s		
Comm object	8447	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Delay for **Mains Voltage Unbalance (page 399)** protection.			

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Subgroup: Mains Frequency Limits

Mains Overfrequency

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	**Mains Underfrequency (page 401)** .. 150 [%]		
Default value	102.0 %	**Force value**	NO
Step	1.0 % of **Nominal Frequency (page 320)**		
Comm object	8310	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Threshold for Mains overfrequency.			

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Mains Overfrequency Hys

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	100 .. **Mains Overfrequency (page 399)** [%]		
Default value	102.0 %	**Force value**	NO
Step	0.1 %		
Comm object	14134	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			

Threshold defines the level of turning off Mains overfrequency protection.

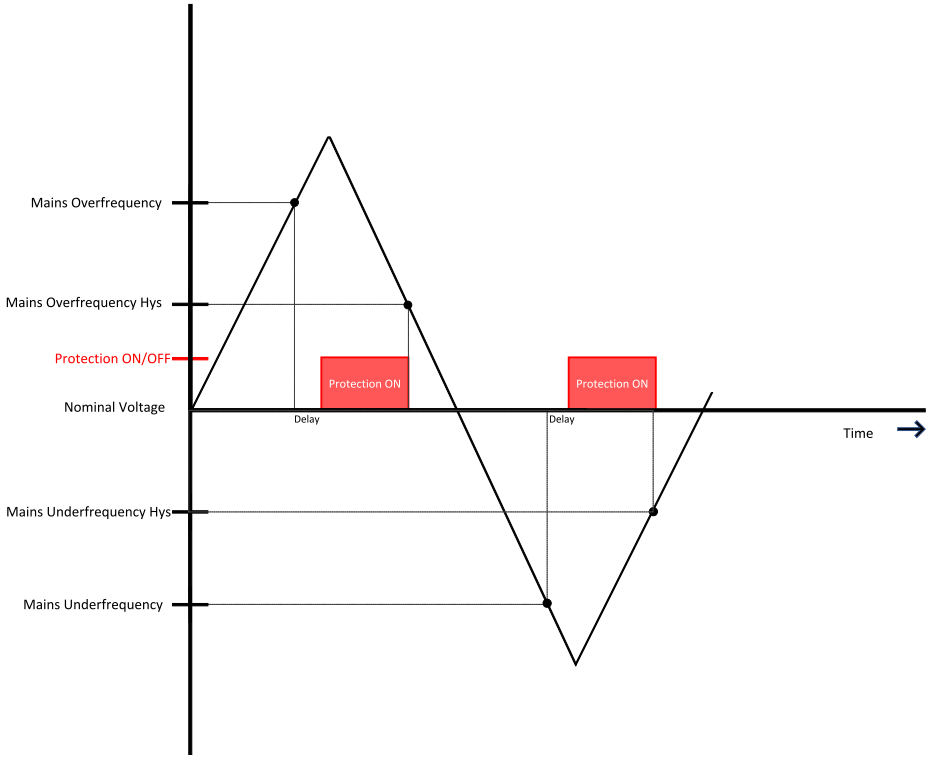


Image 8.19 Mains Overfrequency Hys

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Mains Underfrequency

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	50 .. **Mains Overfrequency (page 399)** [%]		
Default value	98.0 %	**Force value**	NO
Step	1.0 % of **Nominal Frequency (page 320)**		
Comm object	8312	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Threshold for Mains underfrequency.			

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Mains Underfrequency Hys

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	**Mains Underfrequency (page 401)** .. 100 [%]		
Default value	98.0 %	**Force value**	NO
Step	0.1 %		
Comm object	14135	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			

Threshold defines the level of turning off Mains underfrequency protection.

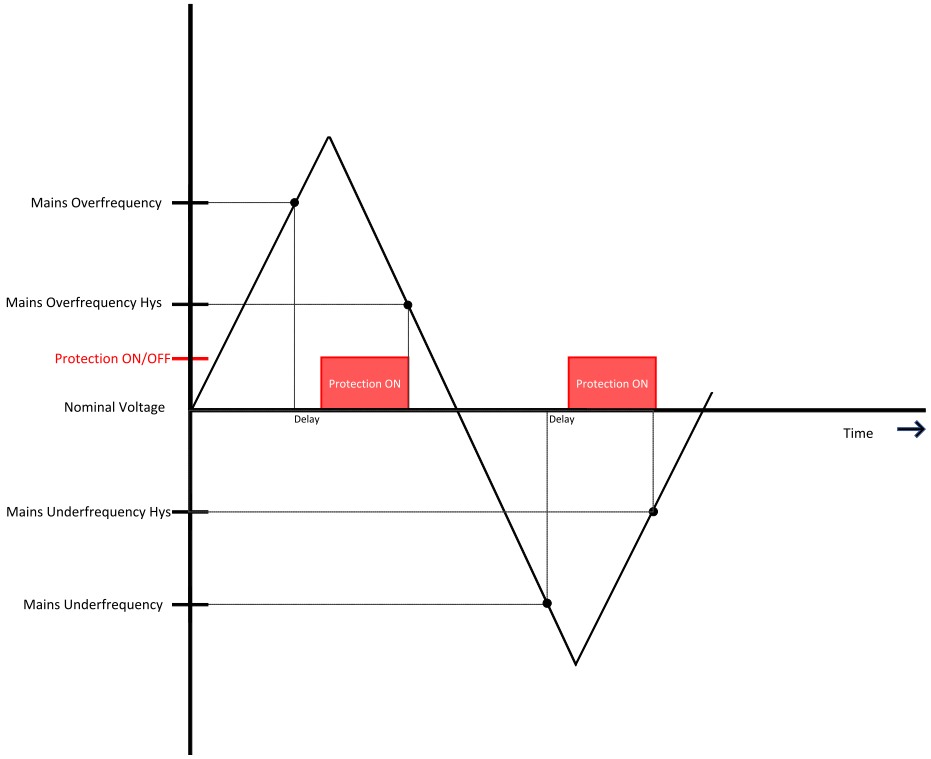


Image 8.20 Mains Underfrequency Hys

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Mains < > Frequency Delay

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	0.5 s	**Force value**	NO
Step	0.1 s		
Comm object	8311	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
Delay for **Mains Underfrequency (page 401)** and **Mains Overfrequency (page 399)** protection.			

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Subgroup: AMF Settings

Return From Island

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	Manual / Auto [-]		
DefaultFixed value	Auto	**Force value**	YES*
Step	[-]		
Comm object	9590	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
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. **ALI Manual Restore (page 888)** message is displayed in alarmlist to notify operator – it will disappear automatically after MCB close button is pushed. ***Note:*** *Select MANUAL in case you need to manually control the moment when the load is transferred back to the mains.*
Auto	The MCB is closed automatically after the timer **Mains Return Delay (page 393)** elapses. The transfer of load from a generator to mains is given by the setpoint **Transfer Gen To Mains (page 445)**.

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MCB Logic

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	Close On / Close Off [-]		
Default value	Close Off	**Force value**	YES*

Step	[-]		
Comm object	8444	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		

Description

The setpoint influences the behavior of the output **MCB CLOSE/OPEN (PAGE 803)**.

Close On When the output **MCB CLOSE/OPEN (PAGE 803)** is active – MCB should be closed.

Close Off When the output **MCB CLOSE/OPEN (PAGE 803)** is active – MCB should be opened.

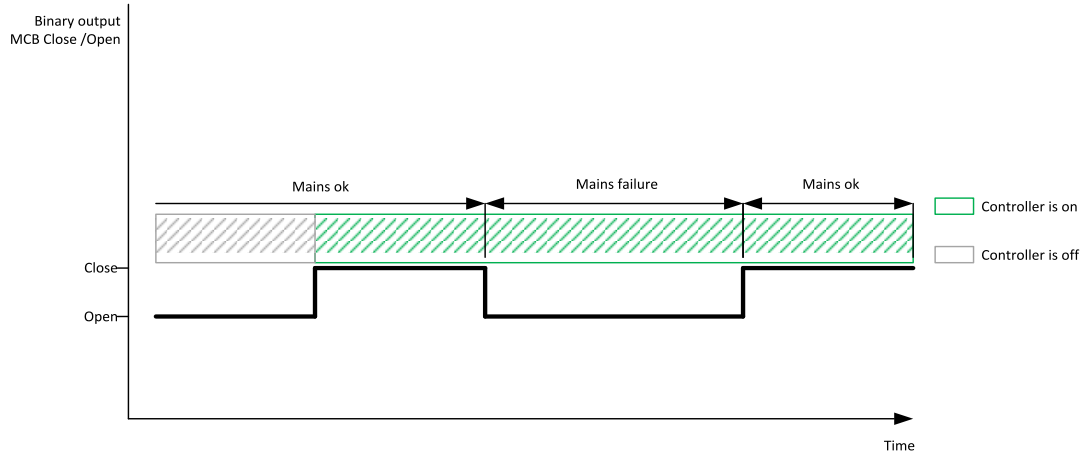


Image 8.21 MCB Logic 1

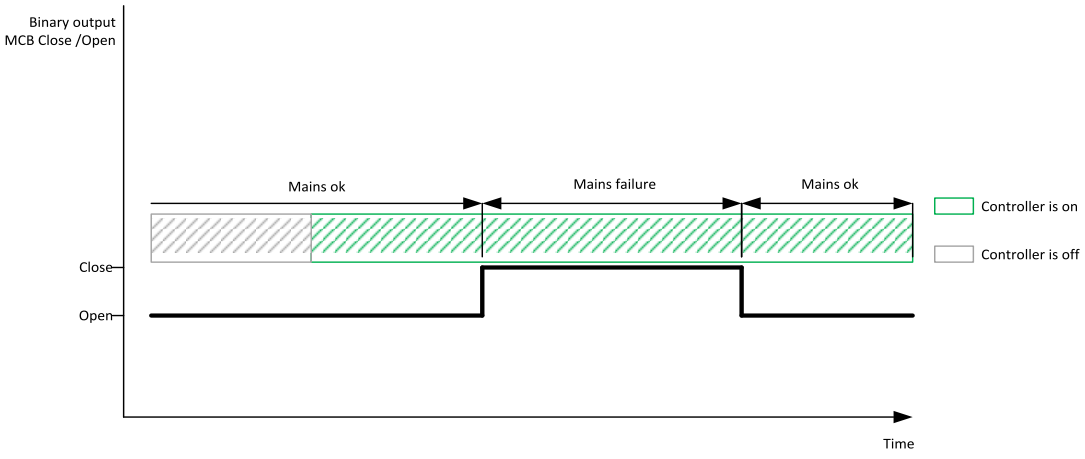


Image 8.22 MCB Logic 2

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MCB Opens On

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	Mains Fail / Gen Run [-]		
Default value	Gen Run	**Force value**	YES*
Step	[-]		
Comm object	9850	**Related applications**	SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
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 394)** is applied before MCB closing.
Gen Run	MCB will be opened when engine will be running and it will be possible to transfer load from Mains to Gen-set (after stabilization phase). ***Note:*** *This option should be used for MCBs using 230V control and not equipped with the undervoltage coil.*

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Subgroup: Mains Decoupling Protection

Vector Shift Protection

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	Enabled / Parallel Only / Disabled [-]		
Default value	Disabled	**Force value**	YES*
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 409)****. 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 393)****, as the mains is evaluated as healthy.*

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Vector Shift Limit

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	1 .. 45 [°]		
Default value	10 °	**Force value**	NO
Step	1 °		
Comm object	9843	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint adjusts the threshold level for the vector shift protection.

> ***Note:*** *To adjust this setpoint properly, check the value* ***Vector Shift Limit (page 407)****. 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**	2.1.0
Range [units]	Enabled / Parallel Only / Disabled [-]		
Default value	Disabled	**Force value**	YES*
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 409)****. 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 393)****, as the mains is evaluated as healthy.*

Note: *When enabled this protection is active during both MAN and AUTO modes.*

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ROCOF Windows Length

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	3 .. 30 [-]		
Default value	5	**Force value**	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 408)**. 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**	2.1.0
Range [units]	0.01 .. 10.0 [Hz/s]		
Default value	1.0 Hz/s	**Force value**	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 408)** (Rate Of Change Of Frequency).			

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Vector Shift CB Selector

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	MCB / GCB [-]		
Default value	MCB	**Force value**	YES*
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 406)** or **ROCOF Protection (page 408)** protection is detected.

Note: *If the MGCB is selected and a mains failure occurs the MGCB will be opened immediately when the vectorshift or ROCOF is detected, however also MCB will be opened consequently due to other mains protection as underfrequency or undervoltage.*

Note: *When enabled this protection is active during both MAN and AUTO modes.*

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Group: Load Shedding

Subgroup: Dummy Load

Dummy Load Active

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	GenOnly / Disable [-]		
Default value	Disabled	**Force value**	YES*
Step	[-]		
Comm object	11776	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		
Description			
This setpoint enables / disables Dummy Load function. > **IMPORTANT: If Gen Only option is chosen, no dummy load will be activated when in parallel with mains.**			

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Dummy Load On

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	0.0 .. **Dummy Load Off (page 411)** [%]		
Default value	20 %	**Force value**	YES*
Step	0.1 %		
Comm object	11772	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	If **Dummy Load Active (page 410)** is not set to disabled		
Description			
This setpoint determines power level which when not matched will trigger Dummy Load Function to activate additional power bank level (by activating additional Dummy Load Stage LBOs).			

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Dummy Load On Delay

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	15 s	**Force value**	YES*
Step	0.1 s		
Comm object	14506	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	If **Dummy Load Active (page 410)** is not set to disabled		
Description			
This setpoint determines delay after which additional Dummy Load Stage will be activated.			

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Dummy Load Off

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	**Dummy Load On (page 410)** .. 200.0 [%]		
Default value	50 %	**Force value**	YES*
Step	0.1 %		
Comm object	11773	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	If **Dummy Load Active (page 410)** is not set to disabled		
Description			
This setpoint determines power level which when exceeded will trigger Dummy Load Function to remove/activate power bank stages (by deactivating additional Dummy Load Level LBOs).			

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Dummy Load Off Delay

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	0.0 .. 600. [s]		
Default value	15 s	**Force value**	YES*
Step	0.1 s		
Comm object	14508	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	If **Dummy Load Active (page 410)** is not set to disabled		
Description			
This setpoint determines delay after which additional Dummy Load Stage will be deactivated.			

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Subgroup: Load Shedding

Load Shedding Active

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	Disabled / Island Only / Isl+Trip Paral / All the time [-]		
Default value	Disabled	**Force value**	YES*
Step	[-]		
Comm object	11001	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Always		

Description

This setpoint is used for adjustment when the load shedding function is active.

Disabled	The Load shedding function is disabled. All the outputs are open.
Island only	In Island operation (e.g. MCB is open and (M)GCB is closed) Load shedding outputs are controlled by load shedding function. › Load shedding outputs are activated / deactivated one by one in island operation › All Loadshedding outputs are tripped once the Gen-set comes into the island operation from "NO LOAD" operation (MCB and (M)GCB were opened -> Gen-set started and (M)GCB closed).
ISL+Trip paral	This setting adjusts the same behavior as ISLAND ONLY but in addition to it all load shedding outputs are closed when Gen-set group goes from parallel operation ino the island operation. › Load shedding outputs are activated / Deactivated one by one in island operation. › All Loadshedding outputs are tripped at once when the Gen-set comes into the island operation from "NO LOAD" operation (MCB and (M)GCB were opened -> Gen-set started and (M)GCB closed). › All Load shedding outputs are tripped at once when the Gen-set comes from Parallel operation (MCB, (M)GCB closed) to island operation (MCB opens, (M)GCB stays closed). This scenario is also valid when Test On Load is taken.
All the time	Load shedding Outputs are controlled by the load shedding function regardless of breaker positions. › Loadshedding is active in island operation, in parallel operation too. › All Loadshedding outputs are never tripped at once.

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Load Shedding Level

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	Load Reconnection Level .. 200 [%] of **Nominal Power (page 311)**		
Default value	80 %	**Force value**	YES*
Step	1 %		
Comm object	8884	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 412)** is enabled		
Description			
This setpoint is used to activates the next Load shedding stage.When Gen-set load exceeds this level for more than **Load Shedding Delay (page 413)** time.			

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Load Shedding Delay

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	10 s	**Force value**	YES*
Step	1 s		
Comm object	8887	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 412)** is enabled		
Description			
This setpoint is used to proceeds the next Load shedding stage. When Gen-set load exceeds **Load Shedding Level (page 413)** for more than this delay's time, the controller proceeds to the next Load shedding stage – the next binary output Load Shedding Stage 1-325 is active.			

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Subgroup: Load Reconnection Settings

Load Reconnection Level

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	0 .. **Load Shedding Level (page 413)** [%]		
Default value	20 %	**Force value**	YES*
Step	1 %		
Comm object	8890	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 412)** is enabled		
Description			
This setpoint is used to proceed to the lower load shedding stage when the Gen-set load drops below this level for more than **Load Reconnection Delay (page 414)**.			

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Load Reconnection Delay

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	10 s	**Force value**	YES*
Step	1 s		
Comm object	8893	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 412)** is enabled		
Description			
This setpoint is used to proceeds the lower Load shedding stage. When Gen-set load drops under **Load Reconnection Level (page 414)** for more than this delay time, the binary output for higher stage is opened. Automatic load reconnection works only when **Auto Load Reconnection (page 415)** = Enabled.			

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Auto Load Reconnection

Setpoint group	Load Shedding	**Related FW**	2.1.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Force value**	YES*
Step	[-]		
Comm object	9649	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Visible only if **Load Shedding Active (page 412)** is enabled		
Description			

Switch between manual and automatic reconnection of shedded load..

Disabled	Rising edge on binary input **MANUAL LOAD RECONNECTION (PAGE 739)** resets controller to the lower stage, but only if the load is under the **Load Reconnection Level (page 414)**. **Load Reconnection Delay (page 414)** is not taken into account in this case.
Enabled	Load reconnection is automatic depend on setpoints **Load Reconnection Level (page 414)** and **Load Reconnection Delay (page 414)**. Binary input **MANUAL LOAD RECONNECTION (PAGE 739)** has no function.

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Group: Power Management

Subgroup: Power Management Control

Power Management

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Force value**	YES*
Step	[-]		
Comm object	8551	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			

This setpoint is used to enable or disable the **Power management (page 203)** 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 751)** 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**	2.1.0
Range [units]	0 .. 3600 [s]		
Default value	0 s	**Force value**	NO
Step	1 s		
Comm object	12488	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			

Setpoint defines delay of the **Power Management (page 415)**. When **REMOTE START/STOP (PAGE 751)** signal is activated and the gen-sets should start, all the engines (where **Power Management (page 415)** is enabled) are started and stay running for time period specified by this parameter. After this period elapses, only the Gen-set(s) needed according to the Power Management calculation stay running and the rest is stopped.

> **Example:** This delay is useful, when you need to start gen-sets to an unknown load. Setting for example 360 s (6 minutes) and activating **REMOTE START/STOP (PAGE 751)** 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**	2.1.0
Range [units]	ABS [kW] / REL [%]		
Default value	ABS	**Force value**	NO
Step	[-]		
Comm object	9874	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			

This setpoint is used to select the **Power Management (page 415)**power management 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 902)** 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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Dynamic Spinning Reserve

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	ENABLED, DISABLED [-]		
Default value	ENABLED	**Force value**	NO
Step	-		
Comm object	14126	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to enable / disable use of the Dynamic Spinning Reserve functionality with power management.			

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Priority

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	1 .. 32 [-]		
Default value	1	**Force value**	YES*
Step	1		
Comm object	8488	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
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 758)*** *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 416) = ABS).**

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#Priority Auto Swap

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	Disabled / Run Hours Equal / Efficient [-]		
Default value	Disabled	**Force value**	NO
Step	[-]		
Comm object	10593	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			

This setpoint adjusts priority auto swapping.

Disabled	Optimization is disabled. Priorities are given directly by the values adjusted in the setpoints **Priority (page 417)**.
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 433)**).
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. 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 758) can be used only if #Priority Auto Swap (page 418) = Disabled.**

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#System Start Delay

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	5	**Force value**	NO
Step	1		
Comm object	8549	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			

This setpoint adjusts the delay of the system activation after the binary input **REMOTE START/STOP (PAGE 751)** has been activated.

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#System Stop Delay

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	30	**Force value**	NO
Step	1		
Comm object	8550	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
This setpoint adjusts the delay of the system deactivation after the binary input **REMOTE START/STOP (PAGE 751)** has been deactivated.			

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Subgroup: Load Reserve Set 1

#Starting Load Reserve 1

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. **#Stopping Load Reserve 1 (page 420)** [-]		
Default value	60 kW	**Force value**	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 416)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 738) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

> ***Note:*** *See **Power management (page 203)** chapter for more information.*

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#Stopping Load Reserve 1

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	**#Starting Load Reserve 1 (page 419)** .. 32000 [-]		
Default value	110 kW	**Force value**	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 416)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 738) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

Note: *See **Power management (page 203)** chapter for more information.*

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#Starting Rel Load Reserve 1

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. **#Stopping Rel Load Reserve 1 (page 421)** [%]		
Default value	60 %	**Force value**	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 416)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 738) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

Note: *See **Power management (page 203)** chapter for more information.*

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#Stopping Rel Load Reserve 1

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	**#Starting Rel Load Reserve 1 (page 420)** .. 110 [%]		
Default value	80 %	**Force value**	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 416)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 738) has to be deactivated, otherwise setpoints of Load Reserve Set 2 are used.**

Note: *See **Power management (page 203)** chapter for more information.*

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Subgroup: Load Reserve Set 2

#Starting Load Reserve 2

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. **#Stopping Load Reserve 2 (page 422)** [-]		
Default value	410 kW	**Force value**	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 416)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 738) has to be deactivated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 203)** chapter for more information.*

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#Stopping Load Reserve 2

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	**#Starting Load Reserve 2 (page 421)** .. 32000 [kW]		
Default value	460 kW	**Force value**	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 416)** = ABS.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 738) has to be deactivated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 203)** chapter for more information.*

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#Starting Rel Load Reserve 2

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. **#Stopping Rel Load Reserve 2 (page 423)** [%]		
Default value	60 %	**Force value**	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 416)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 738) has to be deactivated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 203)** chapter for more information.*

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#Stopping Rel Load Reserve 2

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	**#Starting Rel Load Reserve 2 (page 422)** .. 110 [%]		
Default value	80 %	**Force value**	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 416)** = REL.

> **IMPORTANT: Logical binary input LOAD RES 2 ACTIVE (PAGE 738) has to be deactivated, otherwise setpoints of Load Reserve Set 1 are used.**

Note: *See **Power management (page 203)** chapter for more information.*

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Subgroup: Load Reserve Set 3*

#Starting Load Reserve 3*

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. **#Stopping Load Reserve 3* (page 424)** [kW]		
Default value	410 kW	**Force value**	NO
Step	1 kW		
Comm object	8831	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **#Power Management Mode (page 416)** = ABS [kW]		
Description			

This setpoint adjusts required minimal **Actual Reserve (page 658)** for **Power management (page 203)** function.

If Load Reserve Set 3 is activated and **Actual Reserve (page 658)** drops bellow this limit, next Gen-set will be started.

The currently active reserve set is selected by binary inputs **LOAD RES 2 ACTIVE (PAGE 738)**, **LOAD RES 3 ACTIVE* (PAGE 738)** and **LOAD RES 4 ACTIVE* (PAGE 739)**. If none of these inputs is active the Load Reserve Set 1 is selected.

> ***Note:*** *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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#Stopping Load Reserve 3*

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	**#Starting Load Reserve 3* (page 423)** .. 32000 [kW]		
Default value	460 kW	**Force value**	NO
Step	1 kW		
Comm object	8833	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **#Power Management Mode (page 416)** = ABS [kW]		
Description			

This setpoint adjusts required maximal **Actual Reserve (page 658)** for **Power management (page 203)** function.

If Load Reserve Set 3 is activated and **Actual Reserve (page 658)** rises over this limit, next Gen-set will be stoped.

The currently active reserve set is selected by binary inputs **LOAD RES 2 ACTIVE (PAGE 738)**, **LOAD RES 3 ACTIVE* (PAGE 738)** and **LOAD RES 4 ACTIVE* (PAGE 739)**. If none of these inputs is active the Load Reserve Set 1 is selected.

Note: *The reserve for stop must be always adjusted higher than the reserve for start.*

Note: *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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#Starting Rel Load Reserve 3*

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. **#Stopping Rel Load Reserve 3* (page 425)** [%]		
Default value	60 %	**Force value**	NO
Step	1 %		
Comm object	10650	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **#Power Management Mode (page 416)** = REL [%]		
Description			

This setpoint adjusts required minimal **Actual Relative Reserve (page 658)** for **Power management (page 203)** function.

If Load Reserve Set 3 is activated and **Actual Relative Reserve (page 658)** drops below this limit, next Gen-set will be started.

The currently active reserve set is selected by binary inputs **LOAD RES 2 ACTIVE (PAGE 738)**, **LOAD RES 3 ACTIVE* (PAGE 738)** and **LOAD RES 4 ACTIVE* (PAGE 739)**. If none of these inputs is active the Load Reserve Set 1 is selected.

> ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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#Stopping Rel Load Reserve 3*

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	**#Starting Rel Load Reserve 3* (page 425)** .. 110 [%]		
Default value	80 %	**Force value**	NO
Step	1 %		
Comm object	10654	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **#Power Management Mode (page 416)** = REL [%]		
Description			

This setpoint adjusts required maximal **Actual Relative Reserve (page 658)** for **Power management (page 203)** function.

If Load Reserve Set 3 is activated and **Actual Relative Reserve (page 658)** rises over this limit, next Gen-set will be stopped.

The currently active reserve set is selected by binary inputs **LOAD RES 2 ACTIVE (PAGE 738)**, **LOAD RES 3 ACTIVE* (PAGE 738)** and **LOAD RES 4 ACTIVE* (PAGE 739)**. If none of these inputs is active the Load Reserve Set 1 is selected.

> ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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Subgroup: Load Reserve Set 4*

#Starting Load Reserve 4*

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. **#Stopping Load Reserve 4* (page 427)** [kW]		
Default value	410 kW)	**Force value**	NO
Step	1 kW		
Comm object	8832	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **#Power Management Mode (page 416)** = ABS [kW]		
Description			

This setpoint adjusts required minimal **Actual Reserve (page 658)** for **Power management (page 203)** function.

If Load Reserve Set 4 is activated and **Actual Reserve (page 658)** drops bellow this limit, next Gen-set will be started.

The currently active reserve set is selected by binary inputs **LOAD RES 2 ACTIVE (PAGE 738)**, **LOAD RES 3 ACTIVE* (PAGE 738)** and **LOAD RES 4 ACTIVE* (PAGE 739)**. If none of these inputs is active the Load Reserve Set 1 is selected.

> ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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#Stopping Load Reserve 4*

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	**#Starting Load Reserve 4* (page 426)** .. 32000 [kW]		
Default value	460 kW	**Force value**	NO
Step	1 kW		
Comm object	8834	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **#Power Management Mode (page 416)** = ABS [kW]		
Description			

This setpoint adjusts required maximal **Actual Reserve (page 658)** for **Power management (page 203)** function.

If Load Reserve Set 4 is activated and **Actual Reserve (page 658)** rises over this limit, next Gen-set will be stopped.

The currently active reserve set is selected by binary inputs **LOAD RES 2 ACTIVE (PAGE 738)**, **LOAD RES 3 ACTIVE* (PAGE 738)** and **LOAD RES 4 ACTIVE* (PAGE 739)**. If none of these inputs is active the Load Reserve Set 1 is selected.

Note: *The reserve for stop must be always adjusted higher than the reserve for start.*

Note: *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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#Starting Rel Load Reserve 4*

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. **#Stopping Rel Load Reserve 4* (page 428)** [%]		
Default value	60 %	**Force value**	NO
Step	1 %		
Comm object	10651	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **#Power Management Mode (page 416)** = REL [%]		
Description			

This setpoint adjusts required minimal **Actual Relative Reserve (page 658)** for **Power management (page 203)** function.

If Load Reserve Set 4 is activated and **Actual Relative Reserve (page 658)** drops below this limit, next Gen-set will be started.

The currently active reserve set is selected by binary inputs **LOAD RES 2 ACTIVE (PAGE 738)**, **LOAD RES 3 ACTIVE* (PAGE 738)** and **LOAD RES 4 ACTIVE* (PAGE 739)**. If none of these inputs is active the Load Reserve Set 1 is selected.

> ***Note:*** *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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#Stopping Rel Load Reserve 4*

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	**#Starting Rel Load Reserve 4* (page 428)** .. 110 [%]		
Default value	80 %	**Force value**	NO
Step	1 %		
Comm object	10655	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Only if **#Power Management Mode (page 416)** = REL [%]		
Description			

This setpoint adjusts required maximal **Actual Relative Reserve (page 658)** for **Power management (page 203)** function.

If Load Reserve Set 4 is activated and **Actual Relative Reserve (page 658)** rises over this limit, next Gen-set will be stopped.

The currently active reserve set is selected by binary inputs **LOAD RES 2 ACTIVE (PAGE 738)**, **LOAD RES 3 ACTIVE* (PAGE 738)** and **LOAD RES 4 ACTIVE* (PAGE 739)**. If none of these inputs is active the Load Reserve Set 1 is selected.

> ***Note:*** *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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Subgroup: Minimal Running Power

#Min Run Power 1

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. 65 000 [kW]		
Default value	210 kW	**Force value**	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 ACT (PAGE 742)**), 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 ACT (PAGE 742)** needs to be activated on all Gen-sets in the same time.*

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#Min Run Power 2*

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. 65 000 [kW]		
Default value	210 kW	**Force value**	NO
Step	1 kW		
Comm object	9585	**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 ACT 2* (PAGE 743)**), 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 ACT 2* (PAGE 743)** needs to be activated on all Gen-sets in the same time.*

> ***Note:*** *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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#Min Run Power 3*

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. 65 000 [kW]		
Default value	210 kW	**Force value**	NO
Step	1 kW		
Comm object	9586	**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 ACT 3* (PAGE 743)**), 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 ACT 3* (PAGE 743)** needs to be activated on all Gen-sets in the same time.*

> ***Note:*** *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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Subgroup: Start/Stop Timing

#Next Engine Start Delay

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. 3 600 [s]		
Default value	5 s	**Force value**	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**	2.1.0
Range [units]	0 .. 3 600 [s]		
Default value	20 s	**Force value**	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**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Force value**	NO
Step	1 s		
Comm object	8495	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to adjust how long the particular Gen-set will suppress it's own Slow stop alarm to give chance to another Gen-set to start and replace the defective one. ***Note:*** *If there isn't any available Gen-set to start, the alarm is not suppressed.*			

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Subgroup: Over Load Next Start Protection

#Overload Next Start Protection

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Force value**	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 432)** right after the delay **#Overload Next Start Delay (page 432)**.			

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#Overload Next Start Level

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. 100 [%]		
Default value	80 %	**Force value**	NO
Step	1 %		
Comm object	14941	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
Threshold level for **#Overload Next Start Protection (page 432)**.			

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#Overload Next Start Delay

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. 5 [s]		
Default value	1 s	**Force value**	NO
Step	1 s		
Comm object	8493	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
Delay for **#Overload Next Start Protection (page 432)**.			

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Subgroup: Run Hours Equalization

Run Hours Base

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0.0 .. 200000.0 [h]		
Default value	0.0 h	**Force value**	YES*
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**	2.1.0
Range [units]	0 .. 65 000 [h]		
Default value	100 h	**Force value**	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 418)** = 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 Settings

#Power Band Change Up Delay

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. 3 600 [s]		
Default value	10 s	**Force value**	NO
Step	1 s		
Comm object	8896	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for adjusting the delay of changing the power band if the load demand rose above the upper limit of the current power band. Setpoint is taken into account only if **#Priority Auto Swap (page 418)** = Efficient.			

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#Power Band Change Down Delay

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	0 .. 3 600 [s]		
Default value	10 s	**Force value**	NO
Step	1 s		
Comm object	10795	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used for adjusting the delay of changing the power band if the load demand drops below the lower limit of the current power band. Setpoint is taken into account only if **#Priority Auto Swap (page 418)** = Efficient.			

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Subgroup: Group Settings

Control Group

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	1,2 .. 32 [-]		
Default value	1	**Force value**	NO
Step	1		
Comm object	10589	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint selects the control group(to get more information on this function please refer to the chapter **Control groups (page 132)** to which the particular Gen-set belongs. If there aren't logical groups at the site, adjust the setpoint to 1.

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

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Group Link L

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	1,2 .. 32 [-]		
Default value	1	**Force value**	NO
Step	1		
Comm object	10590	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			

If the input **GROUP LINK (PAGE 737)**Group Link 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 132)**), then this setpoint is used to select which group is located at the left side of the group link breaker (bus tie breaker). If this particular controller is not used for the group link function, adjust this setpoint to 1.

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Group Link R

Setpoint group	Power Management	**Related FW**	2.1.0
Range [units]	1,2 .. 32 [-]		
Default value	1	**Force value**	NO
Step	1		
Comm object	10591	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Always		
Description			
If the input **GROUP LINK (PAGE 737)**Group Link 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 132)**), 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 Control

Group: Speed Control

Speed Regulator Character

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	Positive / Negative [-]		
Default value	Positive	**Force value**	YES*
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**	2.1.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	0.00 V	**Force value**	YES*
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**	2.1.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	-10.00 V	**Force value**	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**	2.1.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	10.00 V	**Force value**	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**	2.1.0
Range [units]	500 .. 2 900 [Hz]		
Default value	500 Hz	**Force value**	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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Frequency Regulation Loop

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	Sync Only / All The Time [-]		
Default value	Sync Only	**Force value**	YES*
Step	[-]		
Comm object	9891	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoint selects when the frequency regulation loop is active.

- **SYNC ONLY**: The frequency regulation loop is active only during synchronizing to match the Generator, Mains, or Bus frequencies together. It is assumed that in all other situations where the frequency is to be regulated the engine governor maintains itself.

  Note: *This option is suitable for most governors.*

- **ALL THE TIME**: This option activates the frequency regulation loop also while the Gen-set is running without load and during the island operation. The controller maintains frequency at its nominal value adjusted by setpoint **Nominal Frequency (page 320)**.

  Note: *This option can be used e.g. for the elimination of the droop at governors that do not support isochronous mode.*

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Tau Speed Governor Actuator

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	1.0 .. 300.0 [s]		
Default value	10.0 s	**Force value**	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 817)** and **SPEED DOWN (PAGE 817)**. 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**	2.1.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Force value**	NO
Step	0.1 %		
Comm object	8715	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the frequency control PI loop. ***Note:*** *See the chapter* ***Regulation loops (page 223)*** *for more information.*			

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Frequency Int

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0 .. 200 [%]		
Default value	50 %	**Force value**	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 223)*** *for more information.*			

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Angle Gain

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Force value**	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 223)*** *for more information.*

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Load Gain

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Force value**	NO
Step	0.1 %		
Comm object	8659	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

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

Note: *During synchronization, first the frequency loop is started to match the generator frequency with the mains or bus and after that the phase angle loop is started to match the phase angle.*

Note: *See the chapter* ***Regulation loops (page 223)*** *for more information.*

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Load Int

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0 .. 200 [%]		
Default value	50 %	**Force value**	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 223)*** *for more information.*			

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Load Sharing Gain

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Force value**	NO
Step	0.1 %		
Comm object	8725	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
This setpoint adjusts the gain factor (P-factor) of the load sharing control PI loop. ***Note:*** *See the chapter* ***Regulation loops (page 223)*** *for more information.*			

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Load Sharing Int

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0 .. 200 [%]		
Default value	50 %	**Force value**	NO
Step	1 %		
Comm object	9035	**Related applications**	MINT
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			
This setpoint adjusts the relative integration factor (I-factor) of the load sharing control PI loop. ***Note:*** *See the chapter* ***Regulation loops (page 223)*** *for more information.*			

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Subgroup: Load Transfer

Close Transfer Max Duration

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0.1 .. 600.0 [s]		
Default value	5.0 s	**Force value**	NO
Step	0.1 s		
Comm object	8661	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Only if **Active Application (page 674)** = SPTM		
Description			

The time of parallel work of generator and mains in close transition.

Note: *Minimal time of parallel operation is 300 ms.*

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Open Transfer Min Break

Setpoint group	Mains Settings	**Related FW**	2.1.0
Range [units]	0.0 .. 600.0 [s]		
Default value	1.0 s	**Force value**	NO
Step	0.1 s		
Comm object	8303	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Default Application Select (page 293)**		
Description			

Minimal duration of break in open transition when **Transfer Gen To Mains (page 445)** or **Transfer Mains To Gen (page 444)** is chosen as open transfer.

IMPORTANT: This setpoint is used in 2 functions:

- **Delay after GCB opening to MCB closing**
- **Delay used in SPtM function**

Delay after GCB opening to MCB closing during the return procedure. Delay after MCB opening to GCB closing if the setpoint **MCB Opens On (page 405)** is set to GENRUN.

The time charts bellow show recommended setting of Transfer Delay setpoint.

If the Transfer Delay setpoint is set shorter than the time required for opening of the circuit breaker, the controller closes **GCB CLOSE/OPEN (PAGE 788)** output straight away (100 ms) after the **MCB FEEDBACK (PAGE 741)** input deactivates.

If some delay between **MCB FEEDBACK (PAGE 741)** deactivation and closing of **GCB CLOSE/OPEN (PAGE 788)** output is required, then the Transfer Delay must be set to sum of "MCB opening" + "Delay" time.

Delay used in SPtM function. This delay is used when load from first Gen-set is transferred to second Gen-set. Delay starts to countdown when GCB of first Gen-set is open. When this delay countdown, GCB of second Gen-set is closed. This delay is important for correct function of external interlock.

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Transfer Mains To Gen

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	Open / Close Only / Close Prim / SoftTransf [-]		
Default value	SoftTransf	**Force value**	NO
Step	[-]		
Comm object	12969	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Only if **Active Application (page 674)** = SPTM		
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 443)** 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 443)**. In case of synchronization fail, MCB stays close and Gen-set is stopped.
Close Prim	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 443)**. In case of synchronization fail, open transfer is done.
SoftTransf	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 447)**. 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 446)**).

Note: *Close transfer of load is also affected by setpoint* ***Subgroup: Mains Import Measurement (page 304)****.*

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Transfer Gen To Mains

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	Open / Close Only / Close Prim / SoftTransf [-]		
Default value	SoftTransf	**Force value**	NO
Step	[-]		
Comm object	14688	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Only if **Active Application (page 674)** = SPTM		
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 443)** 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 443)**.
Close Prim	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 443)**. In case of synchronization fail, open transfer is done.
SoftTransf	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 447)**. 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 446)**).

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Generator Unload GCB Open Level

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0 .. 100 [%] of **Nominal Power (page 311)**		
Default value	10 % of **Nominal Power (page 311)**	**Force value**	NO
Step	1 % of **Nominal Power (page 311)**		
Comm object	8547	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **Default Application Select (page 293)** = MGCB		
Description			
This setpoint adjusts the required value of the **Total Running P (page 662)** (power of all Gen-sets connected to the bus) when the GCB is opened during unloading of the (Gen-sets). ***Note:*** *This setpoint is usually higher than 0 to prevent the engine going to reverse power.*			

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Mains Unload MCB Open Window

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0 .. 100 [%] of **Nominal Power (page 311)**		
Default value	10 % of **Nominal Power (page 311)**	**Force value**	NO
Step	1 % of **Nominal Power (page 311)**		
Comm object	14694	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Only if **Active Application (page 674)** = SPTM		
Description			
This setpoint adjusts the value which defines the level where the mains is considered as unloaded. ***Note:*** *This setpoint is window. It means that when you adjust this setpoint to 10%, there is window from -10% to +10%. The reason is import/export function.*			

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Load Ramp

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	5 s	**Force value**	YES*
Step	1 s		
Comm object	8658	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the ramping time of **Required P Target (page 663)** while loading/unloading. The ramping time is set for ΔP which is given by the setpoint **Nominal Power (page 311)**.			

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Ramp Start Level*

Setpoint group	Speed/Load Control	**Related FW**	2.1.0
Range [units]	0 .. 100 [%] of **Nominal Power (page 311)**		
Default value	0 % of **Nominal Power (page 311)**	**Force value**	NO
Step	1 % of **Nominal Power (page 311)**		
Comm object	10912	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the load level at which the **Load Ramp (page 447)** starts after the GCB has been closed. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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Group: Voltage/PF Control

Subgroup: Voltage Control

Voltage Regulator Character

Setpoint group	Voltage/PF Control	**Related FW**	2.1.0
Range [units]	Positive / Negative [-]		
Default value	Positive	**Force value**	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**	2.1.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	0.00 V	**Force value**	YES
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**	2.1.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	-10.00 V	**Force value**	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**	2.1.0
Range [units]	-10.00 .. 10.00 [V]		
Default value	10.00 V	**Force value**	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 Regulator Actuator

Setpoint group	Voltage/PF Control	**Related FW**	2.1.0
Range [units]	1.0 .. 300.0 [s]		
Default value	10.0 s	**Force value**	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 regulator output to the pulses at the binary outputs **AVR Up (page 775)** and **AVR Down (page 775)**. 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**	2.1.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Force value**	NO
Step	0.01 %		
Comm object	8501	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the gain factor (P-factor) of the voltage control PI loop. ***Note:*** *See the chapter* ***Regulation loops (page 223)*** *for more information.*			

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Voltage Int

Setpoint group	Voltage/PF Control	**Related FW**	2.1.0
Range [units]	0 .. 200 [%]		
Default value	50 %	**Force value**	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 223)*** *for more information.*			

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PF Gain

Setpoint group	Voltage/PF Control	**Related FW**	2.1.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.0 %	**Force value**	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 223)*** *for more information.*			

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PF Int

Setpoint group	Voltage/PF Control	**Related FW**	2.1.0
Range [units]	0 .. 200 [%]		
Default value	50 %	**Force value**	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 223)*** *for more information.*			

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VAr Sharing Gain

Setpoint group	Voltage/PF Control	**Related FW**	2.1.0
Range [units]	0.0 .. 200.0 [%]		
Default value	10.00 %	**Force value**	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 223)*** *for more information.*			

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VAr Sharing Int

Setpoint group	Voltage/PF Control	**Related FW**	2.1.0
Range [units]	0 .. 200 [%]		
Default value	50 %	**Force value**	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 223)*** *for more information.*			

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Group: Synchronization

Subgroup: Synchronisation

Synchronization Type

Setpoint group	Synchronization	**Related FW**	2.1.0
Range [units]	Phase Match / Slip Synchro [-]		
Default value	Phase Match	**Force value**	YES*
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 454)** and **Phase Window (page 455)**. When voltage and phase shift are match, **Dwell Time (page 455)** 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 455)** (Mains frequency in SPtM, Bus frequency in MINT application). When this frequency is reached, **Dwell Time (page 455)** 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 456)** and **MCB Latency (page 456)**. ***Note:*** *Condition of **Voltage Window (page 454)** has to be also fulfilled.* ***Note:*** *Slip synchronization can not be used for synchronization of Mains to Mains.* ***Note:*** *Synchronization is not allowed if there is already synchronized any Mains CU in the control group.*

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Synchronization Timeout

Setpoint group	Synchronization	**Related FW**	2.1.0
Range [units]	OFF / 1 .. 1800 [s]		
Default value	60 s	**Force value**	YES*
Step	1 s		
Comm object	8657	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the maximum duration of synchronizing. ***Note:*** *If this setpoint is adjusted to OFF then automatic restart of synchronization occurs every 180 s. This method helps to synchronize successfully even in difficult conditions.*			

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Voltage Window

Setpoint group	Synchronization	**Related FW**	2.1.0
Range [units]	0.0 .. 100.0 [%]		
Default value	10.0 %	**Force value**	YES*
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	Synchronization	**Related FW**	2.1.0
Range [units]	0 .. 90 [°]		
Default value	10 °	**Force value**	YES*
Step	1 °		
Comm object	8652	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint adjusts the maximum absolute value of difference between actual phase angle and between the generator and mains/bus voltages for synchronization. In order to disable breaker close command, adjust this setpoint to zero degree. Synchronisation procedure will go on for set timeout or till breaker is closed from an external device.			

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Dwell Time

Setpoint group	Synchronization	**Related FW**	2.1.0
Range [units]	0.0 .. 25.0 [s]		
Default value	0.3 s	**Force value**	YES*
Step	0.1 s		
Comm object	8653	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
The period of time, during which the phase angle difference must be within **Phase Window (page 455)** and voltage difference within **Voltage Window (page 454)**, before the breaker is closed.			

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Slip Frequency

Setpoint group	Synchronization	**Related FW**	2.1.0
Range [units]	-0.50 .. 0.50 [Hz]		
Default value	-0.25 Hz	**Force value**	YES*
Step	0.1 Hz		
Comm object	14798	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Slip frequency for slip synchronization (**Synchronization Type (page 453)** = Slip Synchro).			

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Slip Frequency Window

Setpoint group	Synchronization	**Related FW**	2.1.0
Range [units]	0.01 .. 0.50 [Hz]		
Default value	0.15 Hz	**Force value**	YES*
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 453)** = Slip Synchro).			

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GCB Latency

Setpoint group	Synchronization	**Related FW**	2.1.0
Range [units]	20 .. 1 000 [ms]		
Default value	80 ms	**Force value**	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 has Split Synchro value.**			

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MCB Latency

Setpoint group	Synchronization	**Related FW**	2.1.0
Range [units]	20 .. 1 000 [ms]		
Default value	80 ms	**Force value**	NO
Step	1 ms		
Comm object	14801	**Related applications**	SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Latency of MCB. **IMPORTANT: This setpoint is enable, when Synchronization Type has Split Synchro value.**			

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Gen to Mains/Bus Phase Shift

Setpoint group	Synchronization	**Related FW**	2.1.0
Range [units]	-120 .. 120 [°]		
Default value	0 °	**Force value**	YES
Step	1 °		
Comm object	9578	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
This setpoint is used to compensate phase shift which is caused by transformer.			

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Group: Droop Settings

Subgroup: Droop Settings

Load/Var Sharing Regulation Type

Setpoint group	Droop Settings	**Related FW**	2.1.0
Range [units]	Isochronous / Droop / Emergency Droop [-]		
Default value	Isonchronous	**Force value**	YES*
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. 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**	2.1.0
Range [units]	Disabled / Enabled [-]		
Default value	Disabled	**Force value**	NO
Step	[-]		
Comm object	13952	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Always Only if **Load/Var Sharing Regulation Type (page 457)** is not set to Isochronous		
Description			

This setpoint adjusts the behavior of GCB for droop regulation in AUTO mode. If the bus values are without the limits then the controller is prohibited to close it's GCB because of safety reasons.

Disabled	If the bus values are within 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 within 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**	2.1.0
Range [units]	0.0 .. 20.0 [%]		
Default value	4.0 %	**Force value**	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 320)**) on the range of the requested power from 0 to 100% of Basic settings: **Nominal Power (page 311)**.

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Frequency Droop Offset

Setpoint group	Droop Settings	**Related FW**	2.1.0
Range [units]	0 .. 100 [%]		
Default value	100 %	**Force value**	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 320)**). 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**	2.1.0
Range [units]	0.0 .. 20.0 [%]		
Default value	4.0 %	**Force value**	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: **Generator Nominal Voltage Ph-N (page 316)**) 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 **Generator Nominal Voltage Ph-Ph (page 316)** whilst the PF=0,8).			

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Voltage Droop Offset

Setpoint group	Droop Settings	**Related FW**	2.1.0
Range [units]	0 .. 100 [%]		
Default value	100 %	**Force value**	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: **Generator Nominal Voltage Ph-N (page 316)**). Allows to shift the droop correlation line up or down.			

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Subgroup: Emergency Droop Settings

#Number Of Controllers On CAN

Setpoint group	Droop Settings	**Related FW**	2.1.0
Range [units]	1 .. 32 [-]		
Default value	1	**Force value**	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 461)**. 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 461)**.

> ***Note:*** *This function is available only when* ***Load/Var Sharing Regulation Type (page 457)*** *= Emergency Droop.*

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#Emergency Droop On Delay

Setpoint group	Droop Settings	**Related FW**	2.1.0
Range [units]	0.0 .. 10.0 [s]		
Default value	10.0 s	**Force value**	NO
Step	0.1 s		
Comm object	13954	**Related applications**	MINT
Config level	Advanced		
Setpoint visibility	Always		
Description			

This setpoint adjusts the delay for switching from isochronous regulation to droop regulation when number of controller detected by the controller on CAN2 is lower than the number in the setpoint **#Number Of Controllers On CAN (page 460)**.

> ***Note:*** *This function is available only when* ***Load/Var Sharing Regulation Type (page 457)*** *= Emergency Droop.*

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#Emergency Droop Off Delay

Setpoint group	Droop Settings	**Related FW**	2.1.0
Range [units]	0.0 .. 10.0 [s]		
Default value	10.0 s	**Force value**	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 Controllers On CAN (page 460)**.

> ***Note:*** *This function is available only when* ***Load/Var Sharing Regulation Type (page 457)*** *= Emergency Droop.*

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Group: User Buttons

Subgroup: User Buttons

User Button 1

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20826	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 1 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 1 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 1 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 2

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20827	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 2 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 2 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 2 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 3

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20828	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 3 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 3 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 3 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 4

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20829	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 4 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 4 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 4 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 5

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20830	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 5 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 5 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 5 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 6

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20831	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 6 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 6 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 6 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 7

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20832	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 7 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 7 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 7 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 8

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20833	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 8 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 8 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 8 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 9

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20834	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 9 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 9 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 9 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 10

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20835	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 10 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 10 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 10 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 11

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20836	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 11 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 11 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 11 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 12

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20837	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 12 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 12 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 12 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 13

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20838	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 13 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 13 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 13 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 14

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20839	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 14 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 14 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 14 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 15

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20840	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 15 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 15 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 15 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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User Button 16

Setpoint group	User Buttons	**Related FW**	2.1.0
Range [units]	COMMAND / MAN OFF / MAN ON [-]		
Default value	COMMAND	**Force value**	NO
Step	-		
Comm object	20841	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

User button is a binary signal which value can be set by its setpoint or by remote connection (WebSupervisor or by third party device(Modbus).

Option	Description
COMMAND	The LBO User Button 16 is controlled by command from WebSupervisor or third party device.
MAN OFF	The LBO User Button 16 is controlled manually via the setpoint, value of the user button is still 0.
MAN ON	The LBO User Button 16 is controlled manually via the setpoint, value of the user button is still 1. ***Note:*** *You should always switch from MAN ON to MAN OFF before switching to COMMAND, otherwise value of the LBO User Button will be 1 until command is received.*

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Group: Analog Switches

Subgroup: Analog Switches 1

AIN Switch01 On

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11407	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH01 (PAGE 763)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH01 (PAGE 763)** on. The value is measured from **AIN SWITCH 01 (PAGE 829)** analog input.



Image 8.23 General analog input 1 switch

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AIN Switch01 Off

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11410	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH01 (PAGE 763)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH01 (PAGE 763)** off. The value is measured from **AIN SWITCH 01 (PAGE 829)** analog input.

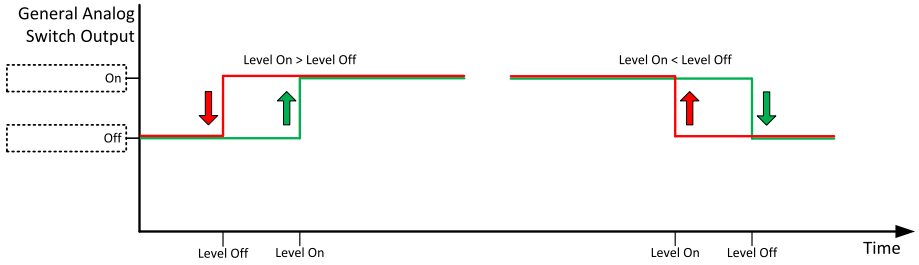


Image 8.24 General analog input 1 switch

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Subgroup: Analog Switches 2

AIN Switch02 On

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11408	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH02 (PAGE 763)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH02 (PAGE 763)** on. The value is measured from **AIN SWITCH 02 (PAGE 829)** analog input.

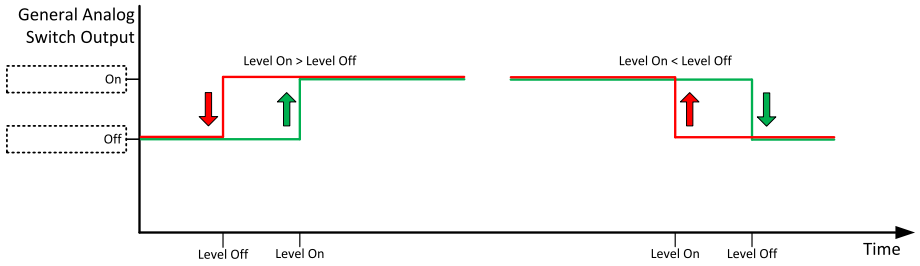


Image 8.25 General analog input 2 switch

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AIN Switch02 Off

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11411	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH02 (PAGE 763)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH02 (PAGE 763)** off. The value is measured from **AIN SWITCH 02 (PAGE 829)** analog input.

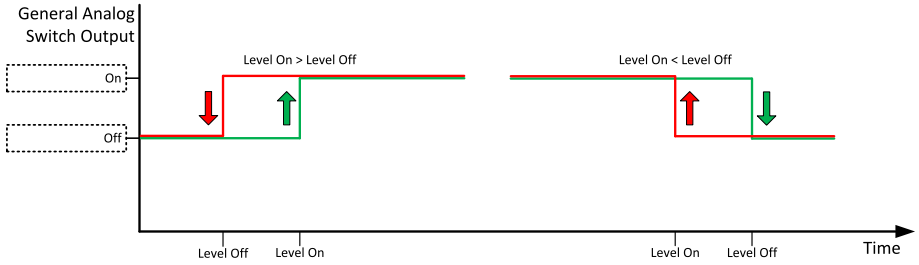


Image 8.26 General analog input 2 switch

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Subgroup: Analog Switches 3

AIN Switch03 On

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11409	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH03 (PAGE 764)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH03 (PAGE 764)** on. The value is measured from **AIN SWITCH 03 (PAGE 829)** analog input.

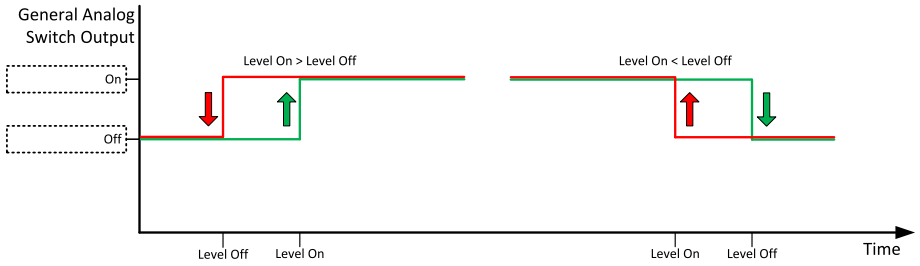


Image 8.27 General analog input 3 switch

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AIN Switch03 Off

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	11412	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH03 (PAGE 764)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH03 (PAGE 764)** off. The value is measured from **AIN SWITCH 03 (PAGE 829)** analog input.

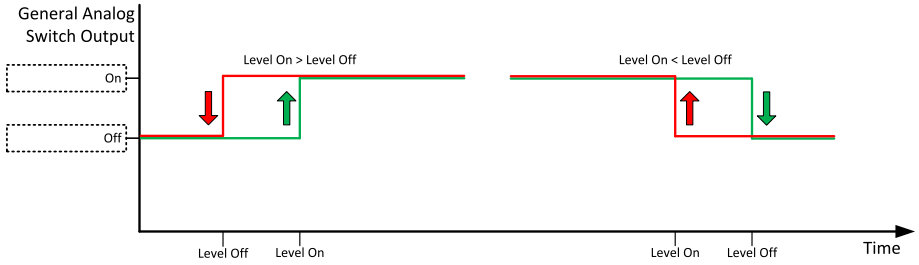


Image 8.28 General analog input 3 switch

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Subgroup: Analog Switches 4

AIN Switch04 On

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14385	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 764)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH04 (PAGE 764)** on. The value is measured from **AIN SWITCH 04 (PAGE 830)** analog input.

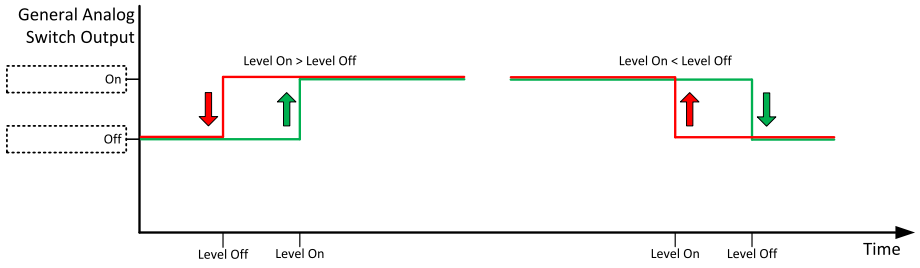


Image 8.29 General analog input 4 switch

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AIN Switch04 Off

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14386	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH04 (PAGE 764)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH04 (PAGE 764)** off. The value is measured from **AIN SWITCH 04 (PAGE 830)** analog input.

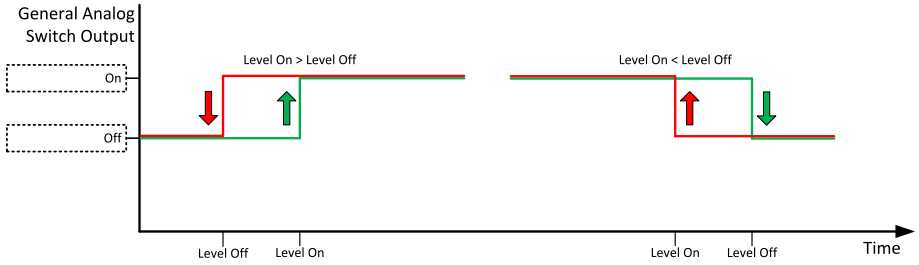


Image 8.30 General analog input 4 switch

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Subgroup: Analog Switches 5

AIN Switch05 On

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14963	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH05 (PAGE 765)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH05 (PAGE 765)** on. The value is measured from **AIN SWITCH 05 (PAGE 830)** analog input.

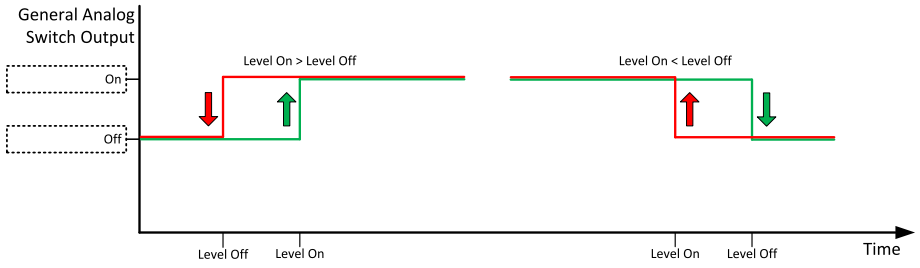


Image 8.31 General analog input 5 switch

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AIN Switch05 Off

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14979	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH05 (PAGE 765)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH05 (PAGE 765)** off. The value is measured from **AIN SWITCH 05 (PAGE 830)** analog input.

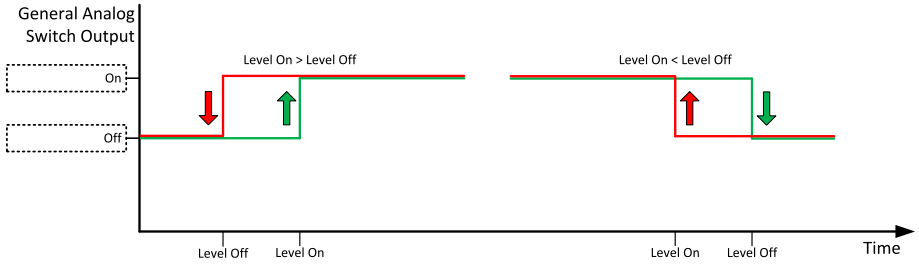


Image 8.32 General analog input 5 switch

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Subgroup: Analog Switches 6

AIN Switch06 On

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14964	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH06 (PAGE 765)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH06 (PAGE 765)** on. The value is measured from **AIN SWITCH 06 (PAGE 830)** analog input.

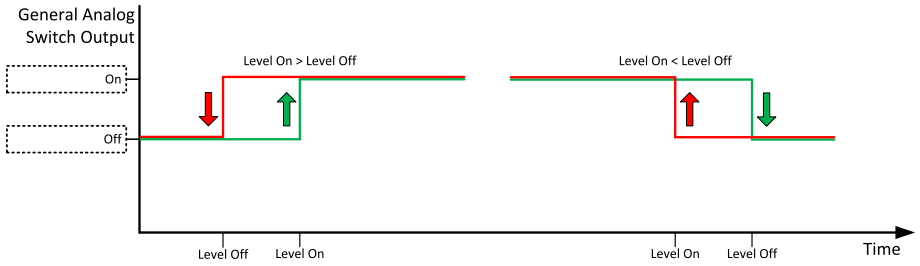


Image 8.33 General analog input 6 switch

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AIN Switch06 Off

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14980	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH06 (PAGE 765)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH06 (PAGE 765)** off. The value is measured from **AIN SWITCH 06 (PAGE 830)** analog input.

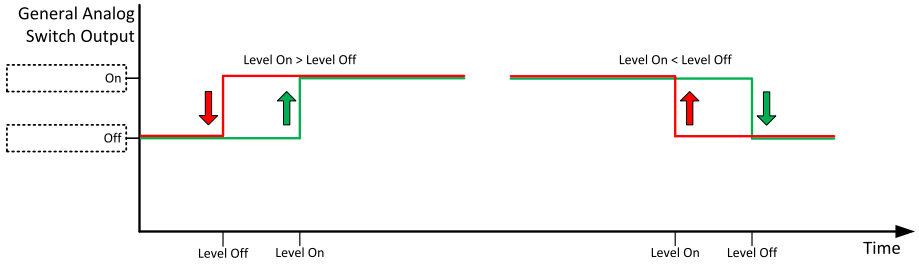


Image 8.34 General analog input 6 switch

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Subgroup: Analog Switches 7

AIN Switch07 On

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14965	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH07 (PAGE 766)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH07 (PAGE 766)** on. The value is measured from **AIN SWITCH 07 (PAGE 831)** analog input.

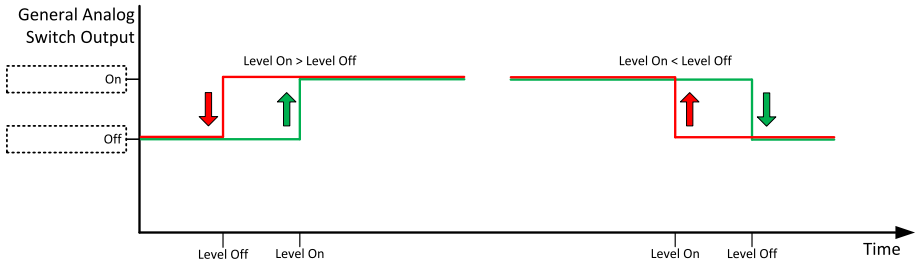


Image 8.35 General analog input 7 switch

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AIN Switch07 Off

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14981	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH07 (PAGE 766)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH07 (PAGE 766)** off. The value is measured from **AIN SWITCH 07 (PAGE 831)** analog input.

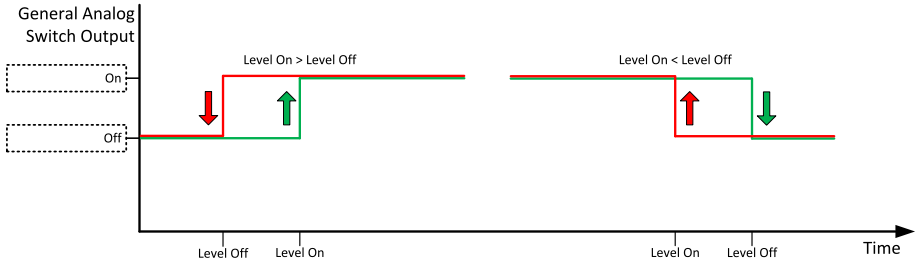


Image 8.36 General analog input 7 switch

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Subgroup: Analog Switches 8

AIN Switch08 On

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14966	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH08 (PAGE 766)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH08 (PAGE 766)** on. The value is measured from **AIN SWITCH 08 (PAGE 831)** analog input.

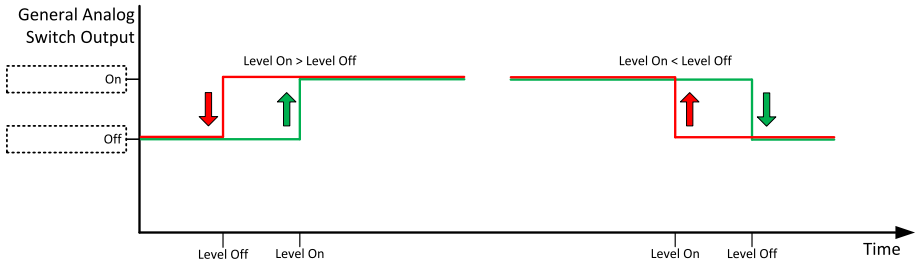


Image 8.37 General analog input 8 switch

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AIN Switch08 Off

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14982	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH08 (PAGE 766)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH08 (PAGE 766)** off. The value is measured from **AIN SWITCH 08 (PAGE 831)** analog input.

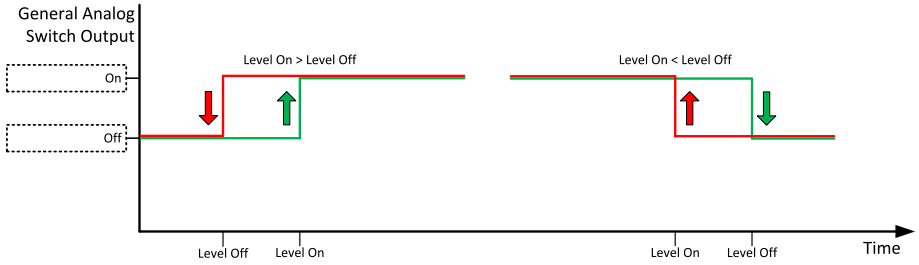


Image 8.38 General analog input 8 switch

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Subgroup: Analog Switches 9

AIN Switch09 On

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14967	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH09 (PAGE 767)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH09 (PAGE 767)** on. The value is measured from **AIN SWITCH 09 (PAGE 831)** analog input.

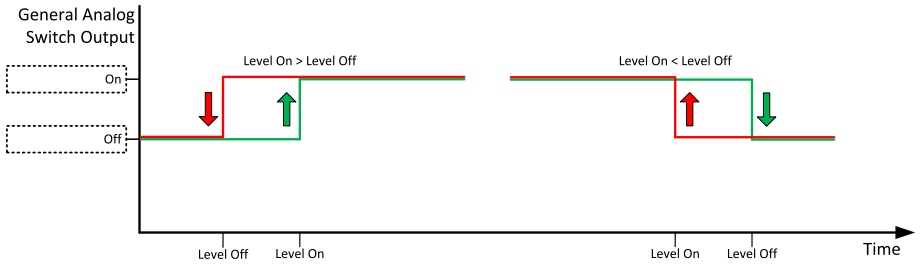


Image 8.39 General analog input 9 switch

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AIN Switch09 Off

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14983	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH09 (PAGE 767)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH09 (PAGE 767)** off. The value is measured from **AIN SWITCH 09 (PAGE 831)** analog input.

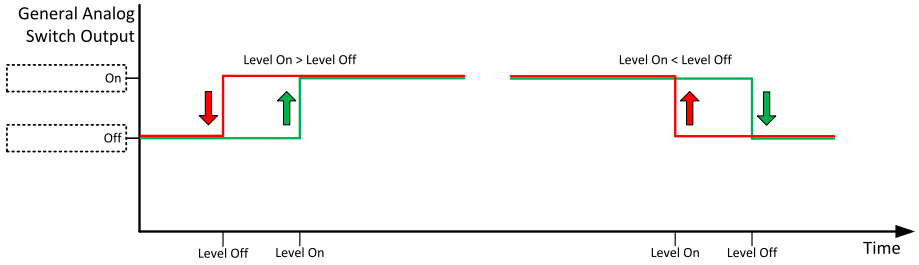


Image 8.40 General analog input 9 switch

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Subgroup: Analog Switches 10

AIN Switch10 On

Setpoint group	Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14968	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH10 (PAGE 767)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH10 (PAGE 767)** on. The value is measured from **AIN SWITCH 10 (PAGE 832)** analog input.

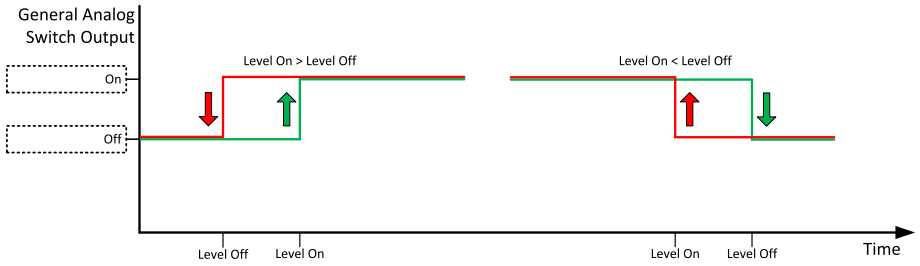


Image 8.41 General analog input 10 switch

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AIN Switch10 Off

Setpoint group	General Analog Inputs Analog Switches	**Related FW**	2.1.0
Range [units]	the range is defined by an analog sensor curve		
Default value	the value is defined by an analog sensor curve	**Force value**	NO
Step	the step is defined by an analog sensor curve		
Comm object	14984	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Visible only if the logical binary output **AIN SWITCH10 (PAGE 767)** is configured		
Description			

Threshold level for switching the binary output **AIN SWITCH10 (PAGE 767)** off. The value is measured from **AIN SWITCH 10 (PAGE 832)** analog input.



Image 8.42 General analog input 10 switch

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Group: Scheduler

Subgroup: Time & Date

Time

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	HH:MM:SS [-]		
Default value	00:00:00	**Force value**	NO
Step	[-]		
Comm object	24554	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Real time clock adjustment.

Note: *RTC has no backup battery. This setpoint needs to be set-up after connection of +/- terminal.*

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Date

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	DD/MM/YYYY [-]		
Default value	1.1.2015	**Force value**	NO
Step	[-]		
Comm object	24553	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Actual date adjustment. ***Note:*** *RTC has no backup battery. This setpoint needs to be set-up after connection of +/- terminal.*			

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Time Stamp Period

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	0 .. 240 [min]		
Default value	60 min	**Force value**	NO
Step	1 min		
Comm object	8979	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			
Time interval for periodic history records. ***Note:*** *History record is made only when engine is running.*			

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DST Switching Mode

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	AUTO / MANUAL / DISABLED [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	20250	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Switches the mode of Daylight Saving Time (DST).

AUTO	Activation, deactivation of the DST, and changing of the RTC Time value accordingly is performed automatically by the controller. The user always sees valid local time without any action from his side.
MANUAL	Activation, and deactivation of the DST is performed manually by the user via the setpoint **Time Mode (page 499)**. Changing of the RTC Time value accordingly is then performed automatically by the controller. So the user does not need to readjust the RTC time, he only needs to select the proper **Time Mode (page 499)**.
DISABLED	**Time Mode (page 499)** is fixedly set to STD and the function does not perform any changes of RTC time.

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Time Mode

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	STD / DST [-]		
Default value	STD	**Force value**	NO
Step	[-]		
Comm object	20249	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **DST Switching Mode (page 499)** = MANUAL		
Description			

In manual **DST Switching Mode (page 499)** this input is used to adjust the actual time mode. In any other **DST Switching Mode (page 499)** this input is not taken into account.

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DST Period Rule

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	AUSTRALIA, CHILE, EUROPE, MEXICO, NEW ZEALAND, PARAGUAY, US/CANADA [-]		
Default value	Europe	**Force value**	NO
Step	[-]		
Comm object	20251	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **DST Switching Mode (page 499)** = AUTO		
Description			

Selection of the rule that will be applied for the calculation of the Daylight Saving Time (DST) validity period.

DST Period Rule	DST Validity period
EUROPE	01:00 GMT last Sunday in March – 01:00 GMT last Sunday in October.
US/CANADA	02:00 local time 2nd Sunday in March – 03:00 local time 1st Sunday in November.
MEXICO	02:00 local time 1st Sunday in April – 03:00 local time last Sunday in October.
AUSTRALIA	02:00 local time 1st Sunday in October – 03:00 local time 1st Sunday in April.
NEW ZEALAND	02:00 local time last Sunday in September – 03:00 local time 1st Sunday in April.
CHILE	00:00 local time 1st Sunday in September – 00:00 local time 1st Sunday in April.
PARAGUAY	00:00 local time 1st Sunday in October – 00:00 local time 4th Sunday in March.

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Time Zone

Setpoint group	Ethernet 2	**Related FW**	2.1.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00	**Force value**	NO
Step	[-]		
Comm object	24366	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
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.*

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Subgroup: Timer 1

Timer 1 Function

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Disable / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	Disable	**Force value**	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 784)** is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.

Timer 1 has higher priority over Timer 2. So if **Timer 1 Function (page 501)** is configured for OFF mode and **Timer 2 Function (page 509)** 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.
Manual On	LBO Timer is active, but the Timer itself is disabled. ***Note:*** *This function serves for testing purposes.*
No Func	There is no any other function, only binary output of timer is activated.
Mode OFF	When this option is chosen then the binary output of timer is internally connected to the **REMOTE OFF (PAGE 750)** binary input.
Rem Start/Stop	When this option is chosen then the binary output of timer is internally connected to the **REMOTE START/STOP (PAGE 751)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 752)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 748)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 739)** binary input.

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Timer 1 Setup

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[-]		
Default value	[-]	**Force value**	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 501)**
- **Timer 1 Repetition (page 503)**
- **Timer 1 First Occur. Date (page 502)**
- **Timer 1 First Occur. Time (page 503)**
- **Timer 1 Duration (page 503)**
- **Timer 1 Repeated (page 504)**
- **Timer 1 Repeat Day (page 504)**
- **Timer 1 Day (page 505)**
- **Timer 1 Repeated Day In Week (page 505)**
- **Timer 1 Repeat Day In Month (page 505)**
- **Timer 1 Repeat Week In Month (page 506)**
- **Timer 1 Refresh Period (page 507)**
- **Timer 1 Weekends (page 508)**

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Timer 1 First Occur. Date

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			

Date of first occurrence of **Timer 1 Function (page 501)**.

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Timer 1 First Occur. Time

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			
Time of first occurrence of **Timer 1 Function (page 501)**.			

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Timer 1 Duration

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			
Timer 1 Function (page 501) duration time.			

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Timer 1 Repetition

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			

Defines repetition of **Timer 1 Function (page 501)**.

Off	**Timer 1 Function (page 501)** will not be activated.
Once	**Timer 1 Function (page 501)** will be activated only one time.
Repeated	**Timer 1 Function (page 501)** will be repeatedly activated.

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Timer 1 Repeated

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			

Repeated interval of **Timer 1 Function (page 501)**.

Daily	**Timer 1 Function (page 501)** is repeated every day.
Weekly	**Timer 1 Function (page 501)** is repeated every week in chosen days.
Monthly	**Timer 1 Function (page 501)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 1 Function (page 501)** is repeated in adjusted period.

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Timer 1 Repeat Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 1 Function (page 501)**.

Repeated Day	Chose one day in month when **Timer 1 Function (page 501)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 1 Function (page 501)** will be activated.

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Timer 1 Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
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 1 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			
Use this setpoint to select the day of week when timer will be activated. ***Note:*** *More day can be selected. Timer will be activated on the day which happened like the first.*			

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Timer 1 Repeat Day In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1..31 [day]		
Default value	0	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			
Use this setpoint to chose the day in month when the **Timer 1 Function (page 501)** will be activated.			

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Timer 1 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Force value**	NO
Step	1 week		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			
This setpoint adjust the week of month in which the **Timer 1 Function (page 501)** will be activated.			

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Timer 1 Refresh Period

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			

Refresh period of **Timer 1 Function (page 501)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 1 Repeated (page 504)**.

Daily	Range [units]: 1 .. 1000 [day]. This setpoint adjust that every X day the timer will be activated. **Example:** If you have daily repetition and you set this setpoint to 2, then every second day from first occurrence of **Timer 1 Function (page 501)**, the **Timer 1 Function (page 501)** will be activated.
Weekly	Range [units]: 1 .. 60 [week]. This setpoint adjust that every X week the timer will be activated. **Example:** If you have weekly repetition and you set this setpoint to 2, then every second week from first occurrence of **Timer 1 Function (page 501)**, the **Timer 1 Function (page 501)** will be activated in selected days adjusted by **Timer 1 Day (page 505)**.
Monthly	Range [units]: 1 .. 12 [month]. This setpoint adjust that every X month the timer will be activated. **Example:** If you have monthly repetition and you set this setpoint to 2, then every second month from first occurrence of **Timer 1 Function (page 501)**, the **Timer 1 Function (page 501)** will be activated in selected day of month adjusted by **Timer 1 Repeat Day In Month (page 505)** or in selected days of week of month adjusted by **Timer 1 Day (page 505)** and **Timer 1 Repeat Week In Month (page 506)**.
Short Period	Range [units]: [HH:MM]. This setpoint adjust that every X short period the timer will be activated. **Example:** If you have short period repetition and you set this setpoint to 2, then every second minute from first occurrence of **Timer 1 Function (page 501)**, the **Timer 1 Function (page 501)** will be activated.

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Timer 1 Weekends

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 1 Function (page 501)**		
Description			

Behavior of **Timer 1 Function (page 501)** on weekends.

Including	**Timer 1 Function (page 501)** counter is running on the weekends and **Timer 1 Function (page 501)** can be active.
Skip	**Timer 1 Function (page 501)** counter is running on the weekends but **Timer 1 Function (page 501)** isn't active.
Postpone	**Timer 1 Function (page 501)** counter isn't running on the weekends and **Timer 1 Function (page 501)** 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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Subgroup: Timer 2

Timer 2 Function

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Disable / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	No Func	**Force value**	NO
Step	[-]		
Comm object	15359	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Note: *It is possible to choose from following Timer functions. Binary output* ***EXERCISE TIMER 2 (PAGE 784)*** *is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.*

Timer 1 has higher priority over Timer 2. So if **Timer 1 Function (page 501)** is configured for OFF mode and **Timer 2 Function (page 509)** 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.
Manual On	LBO Timer is active, but the Timer itself is disabled. ***Note:*** *This function serves for testing purposes.*
No Func	There is no any other function, only binary output of timer is activated.
Mode OFF	When this option is chosen then the binary output of timer is internally connected to the **REMOTE OFF (PAGE 750)** binary input.
Rem Start/Stop	When this option is chosen then the binary output of timer is internally connected to the **REMOTE START/STOP (PAGE 751)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 752)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 748)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 739)** binary input.

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Timer 2 Setup

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[-]		
Default value	[-]	**Force value**	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 509)**
- **Timer 2 Repetition (page 511)**
- **Timer 2 First Occur. Date (page 510)**
- **Timer 2 First Occur. Time (page 511)**
- **Timer 2 Duration (page 511)**
- **Timer 2 Repeated (page 512)**
- **Timer 2 Repeat Day (page 512)**
- **Timer 2 Day (page 513)**
- **Timer 2 Repeated Day In Week (page 513)**
- **Timer 2 Repeat Day In Month (page 513)**
- **Timer 2 Repeat Week In Month (page 514)**
- **Timer 2 Refresh Period (page 515)**
- **Timer 2 Weekends (page 516)**

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Timer 2 First Occur. Date

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			

Date of first occurrence of**Timer 2 Function (page 509)**.

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Timer 2 First Occur. Time

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			
Time of first occurrence of **Timer 2 Function (page 509)**.			

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Timer 2 Duration

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			
Timer 2 Function (page 509) duration time.			

back to List of setpoints

Timer 2 Repetition

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			

Defines repetition of **Timer 2 Function (page 509)**.

Off	**Timer 2 Function (page 509)** will not be activated.
Once	**Timer 2 Function (page 509)** will be activated only one time.
Repeated	**Timer 2 Function (page 509)** will be repeatedly activated.

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Timer 2 Repeated

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			

Repeated interval of **Timer 2 Function (page 509)**.

Daily	**Timer 2 Function (page 509)** is repeated every day.
Weekly	**Timer 2 Function (page 509)** is repeated every week in chosen days.
Monthly	**Timer 2 Function (page 509)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 2 Function (page 509)** is repeated in adjusted period.

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Timer 2 Repeat Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 2 Function (page 509)**.

Repeated Day	Chose one day in month when **Timer 2 Function (page 509)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 2 Function (page 509)** will be activated.

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Timer 2 Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			
Use this setpoint to include or exclude individual days of week. To select the day use Up and Down buttons. To change the value of day use Enter button.			

back to List of setpoints

Timer 2 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			
Use this setpoint to select the day of week when timer will be activated. ***Note:*** *More day can be selected. Timer will be activated on the day which happened like the first.*			

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Timer 2 Repeat Day In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1..31 [day]		
Default value	0	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			
Use this setpoint to chose the day in month when the **Timer 2 Function (page 509)** will be activated.			

back to List of setpoints

Timer 2 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Force value**	NO
Step	1 week		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			
This setpoint adjust the week of month in which the **Timer 2 Function (page 509)** will be activated.			

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Timer 2 Refresh Period

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			

Refresh period of **Timer 2 Function (page 509)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 2 Repeated (page 512)**.

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 509)**, the **Timer 2 Function (page 509)** 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 509)**, the **Timer 2 Function (page 509)** will be activated in selected days adjusted by **Timer 2 Day (page 513)**.
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 509)**, the **Timer 2 Function (page 509)** will be activated in selected day of month adjusted by **Timer 2 Repeat Day In Month (page 513)** or in selected days of week of month adjusted by **Timer 2 Day (page 513)** and **Timer 2 Repeat Week In Month (page 514)**.
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 509)**, the **Timer 2 Function (page 509)** will be activated.

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Timer 2 Weekends

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 2 Function (page 509)**		
Description			

Behavior of **Timer 2 Function (page 509)** on weekends.

Including	**Timer 2 Function (page 509)** counter is running on the weekends and **Timer 2 Function (page 509)** can be active.
Skip	**Timer 2 Function (page 509)** counter is running on the weekends but **Timer 2 Function (page 509)** isn't active.
Postpone	**Timer 2 Function (page 509)** counter isn't running on the weekends and **Timer 2 Function (page 509)** 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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Subgroup: Timer 3

Timer 3 Function

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Disable / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	No Func	**Force value**	NO
Step	[-]		
Comm object	15360	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

It is possible to choose from following Timer functions. Binary output **EXERCISE TIMER 3 (PAGE 784)** is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.

Timer 1 has higher priority over Timer 3. So if **Timer 3 Function (page 517)** is configured for OFF mode and **Timer 3 Function (page 517)** 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.
Manual On	LBO Timer is active, but the Timer itself is disabled. ***Note:*** *This function serves for testing purposes.*
No Func	There is no any other function, only binary output of timer is activated.
Mode OFF	When this option is chosen then the binary output of timer is internally connected to the **REMOTE OFF (PAGE 750)** binary input.
Rem Start/Stop	When this option is chosen then the binary output of timer is internally connected to the **REMOTE START/STOP (PAGE 751)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 752)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 748)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 739)** binary input.

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Timer 3 Setup

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	10971	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Related setpoints for timer 3 are:

- **Timer 3 Function (page 517)**
- **Timer 3 Repetition (page 519)**
- **Timer 3 First Occur. Date (page 518)**
- **Timer 3 Duration (page 519)**
- **Timer 3 Repeated (page 520)**
- **Timer 3 Repeat Day (page 520)**
- **Timer 3 Day (page 521)**
- **Timer 3 Repeated Day In Week (page 521)**
- **Timer 3 Repeat Day In Month (page 521)**
- **Timer 3 Repeat Week In Month (page 522)**
- **Timer 3 Refresh Period (page 523)**
- **Timer 3 Weekends (page 524)**

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Timer 3 First Occur. Date

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			

Date of first occurrence of**Timer 3 Function (page 517)**.

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Timer 3 First Occur. Time

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			
Time of first occurrence of **Timer 3 Function (page 517)**.			

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Timer 3 Duration

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			
Timer 3 Function (page 517) duration time.			

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Timer 3 Repetition

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			

Defines repetition of **Timer 3 Function (page 517)**.

Off	**Timer 3 Function (page 517)** will not be activated.
Once	**Timer 3 Function (page 517)** will be activated only one time.
Repeated	**Timer 3 Function (page 517)** will be repeatedly activated.

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Timer 3 Repeated

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			

Repeated interval of **Timer 3 Function (page 517)**.

Daily	**Timer 3 Function (page 517)** is repeated every day.
Weekly	**Timer 3 Function (page 517)** is repeated every week in chosen days.
Monthly	**Timer 3 Function (page 517)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 3 Function (page 517)** is repeated in adjusted period.

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Timer 3 Repeat Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 3 Function (page 517)**.

Repeated Day	Chose one day in month when **Timer 3 Function (page 517)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 3 Function (page 517)** will be activated.

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Timer 3 Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
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 3 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			
Use this setpoint to select the day of week when timer will be activated. ***Note:*** *More day can be selected. Timer will be activated on the day which happened like the first.*			

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Timer 3 Repeat Day In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1..31 [day]		
Default value	0	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			
Use this setpoint to chose the day in month when the **Timer 3 Function (page 517)** will be activated.			

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Timer 3 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Force value**	NO
Step	1 week		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			
This setpoint adjust the week of month in which the **Timer 3 Function (page 517)** will be activated.			

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Timer 3 Refresh Period

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			

Refresh period of **Timer 3 Function (page 517)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 3 Repeated (page 520)**.

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 3, then every second day from first occurrence of **Timer 3 Function (page 517)**, the **Timer 3 Function (page 517)** 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 3, then every second week from first occurrence of **Timer 3 Function (page 517)**, the **Timer 3 Function (page 517)** will be activated in selected days adjusted by **Timer 3 Day (page 521)**.
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 3, then every second month from first occurrence of **Timer 3 Function (page 517)**, the **Timer 3 Function (page 517)** will be activated in selected day of month adjusted by **Timer 3 Repeat Day In Month (page 521)** or in selected days of week of month adjusted by **Timer 3 Day (page 521)** and **Timer 3 Repeat Week In Month (page 522)**.
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 3, then every second minute from first occurrence of **Timer 3 Function (page 517)**, the **Timer 3 Function (page 517)** will be activated.

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Timer 3 Weekends

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 3 Function (page 517)**		
Description			

Behavior of **Timer 3 Function (page 517)** on weekends.

Including	**Timer 3 Function (page 517)** counter is running on the weekends and **Timer 3 Function (page 517)** can be active.
Skip	**Timer 3 Function (page 517)** counter is running on the weekends but **Timer 3 Function (page 517)** isn't active.
Postpone	**Timer 3 Function (page 517)** counter isn't running on the weekends and **Timer 3 Function (page 517)** 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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Subgroup: Timer 4

Timer 4 Function

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Disable / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	No Func	**Force value**	NO
Step	[-]		
Comm object	15361	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

It is possible to choose from following Timer functions. Binary output **EXERCISE TIMER 4 (PAGE 784)** is always activated when Timer is active regardless of chosen timer function. Timer functions require controller running in AUTO mode.

Timer 1 has higher priority over Timer 2. So if **Timer 4 Function (page 525)** is configured for OFF mode and **Timer 4 Function (page 525)** 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.
Manual On	LBO Timer is active, but the Timer itself is disabled. ***Note:*** *This function serves for testing purposes.*
No Func	There is no any other function, only binary output of timer is activated.
Mode OFF	When this option is chosen then the binary output of timer is internally connected to the **REMOTE OFF (PAGE 750)** binary input.
Rem Start/Stop	When this option is chosen then the binary output of timer is internally connected to the **REMOTE START/STOP (PAGE 751)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 752)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 748)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 739)** binary input.

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Timer 4 Setup

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	10973	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

Related setpoints for timer 4 are:

- **Timer 4 Function (page 525)**
- **Timer 4 Repetition (page 527)**
- **Timer 4 First Occur. Date (page 526)**
- **Timer 4 First Occur. Time (page 527)**
- **Timer 4 Duration (page 527)**
- **Timer 4 Repeated (page 528)**
- **Timer 4 Repeat Day (page 528)**
- **Timer 4 Day (page 529)**
- **Timer 4 Repeated Day In Week (page 529)**
- **Timer 4 Repeat Day In Month (page 529)**
- **Timer 4 Repeat Week In Month (page 530)**
- **Timer 4 Refresh Period (page 531)**
- **Timer 4 Weekends (page 532)**

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Timer 4 First Occur. Date

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			

Date of first occurrence of**Timer 4 Function (page 525)**.

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Timer 4 First Occur. Time

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			
Time of first occurrence of **Timer 4 Function (page 525)**.			

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Timer 4 Duration

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			
Timer 4 Function (page 525) duration time.			

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Timer 4 Repetition

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			

Defines repetition of **Timer 4 Function (page 525)**.

Off	**Timer 4 Function (page 525)** will not be activated.
Once	**Timer 4 Function (page 525)** will be activated only one time.
Repeated	**Timer 4 Function (page 525)** will be repeatedly activated.

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Timer 4 Repeated

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			

Repeated interval of **Timer 4 Function (page 525)**.

Daily	**Timer 4 Function (page 525)** is repeated every day.
Weekly	**Timer 4 Function (page 525)** is repeated every week in chosen days.
Monthly	**Timer 4 Function (page 525)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 4 Function (page 525)** is repeated in adjusted period.

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Timer 4 Repeat Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 4 Function (page 525)**.

Repeated Day	Chose one day in month when **Timer 4 Function (page 525)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 4 Function (page 525)** will be activated.

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Timer 4 Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
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 4 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			
Use this setpoint to select the day of week when timer will be activated. ***Note:*** *More day can be selected. Timer will be activated on the day which happened like the first.*			

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Timer 4 Repeat Day In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1..31 [day]		
Default value	0	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			
Use this setpoint to chose the day in month when the **Timer 4 Function (page 525)** will be activated.			

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Timer 4 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Force value**	NO
Step	1 week		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			
This setpoint adjust the week of month in which the **Timer 4 Function (page 525)** will be activated.			

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Timer 4 Refresh Period

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			

Refresh period of **Timer 4 Function (page 525)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 4 Repeated (page 528)**.

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 4, then every second day from first occurrence of **Timer 4 Function (page 525)**, the **Timer 4 Function (page 525)** 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 4, then every second week from first occurrence of **Timer 4 Function (page 525)**, the **Timer 4 Function (page 525)** will be activated in selected days adjusted by **Timer 4 Day (page 529)**.
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 4, then every second month from first occurrence of **Timer 4 Function (page 525)**, the **Timer 4 Function (page 525)** will be activated in selected day of month adjusted by **Timer 4 Repeat Day In Month (page 529)** or in selected days of week of month adjusted by **Timer 4 Day (page 529)** and **Timer 4 Repeat Week In Month (page 530)**.
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 4, then every second minute from first occurrence of **Timer 4 Function (page 525)**, the **Timer 4 Function (page 525)** will be activated.

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Timer 4 Weekends

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 4 Function (page 525)**		
Description			

Behavior of **Timer 4 Function (page 525)** on weekends.

Including	**Timer 4 Function (page 525)** counter is running on the weekends and **Timer 4 Function (page 525)** can be active.
Skip	**Timer 4 Function (page 525)** counter is running on the weekends but **Timer 4 Function (page 525)** isn't active.
Postpone	**Timer 4 Function (page 525)** counter isn't running on the weekends and **Timer 4 Function (page 525)** 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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Subgroup: Timer 5

Timer 5 Function

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Disable / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	Disable	**Force value**	YES
Step	[-]		
Comm object	15362	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

This setpoint defines and enables the function of the Timer 5. The functions which are supposed to change the Controller Mode requires controller running in AUTO mode. The activation condition of the Timer is configured via setpoint **Timer 5 Setup (page 534)**.

Once the Timer is activated the LBO **EXERCISE TIMER 5 (PAGE 785)** is closed regardless of chosen timer function. If the CU is switched off when the Timer should be activated, the Timer will be activated immediately after the CU is switched on if the Timer condition is still fulfilled.

> **IMPORTANT: The LBO is activated always when the Timer should be activated e.g. even when controller is in different mode than AUTO.**

> **IMPORTANT: In case that Timer 1, Timer 2, etc. should be activated at the same time, the Timer with selected higher priority function is executed.**

Disable	The Timer is disabled.
Manual On	LBO Timer is active, but the Timer itself is disabled. ***Note:*** *This function serves for testing purposes.*
No Func	There is no any other function, only binary output of timer is activated.
Mode OFF	When this option is chosen then the binary output of timer is internally connected to the **REMOTE OFF (PAGE 750)** binary input.
Rem Start/Stop	When this option is chosen then the binary output of timer is internally connected to the **REMOTE START/STOP (PAGE 751)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 752)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 748)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 739)** binary input.

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Timer 5 Setup

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	N/A [-]		
Default value	N/A [-]	**Force value**	NO
Step	N/A [-]		
Comm object	10974	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **Timer 5 Function (page 533)** != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 5. See **Exercise timers (page 148)** for step by step manual.			

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Timer 5 First Occur. Date

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			
Date of first occurrence of **Timer 5 Function (page 533)**.			

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Timer 5 First Occur. Time

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			
Time of first occurrence of **Timer 5 Function (page 533)**.			

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Timer 5 Duration

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			
Timer 5 Function (page 533) duration time.			

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Timer 5 Repetition

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			

Defines repetition of **Timer 5 Function (page 533)**.

Off	**Timer 5 Function (page 533)** will not be activated.
Once	**Timer 5 Function (page 533)** will be activated only one time.
Repeated	**Timer 5 Function (page 533)** will be repeatedly activated.

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Timer 5 Repeated

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			

Repeated interval of **Timer 5 Function (page 533)**.

Daily	**Timer 5 Function (page 533)** is repeated every day.
Weekly	**Timer 5 Function (page 533)** is repeated every week in chosen days.
Monthly	**Timer 5 Function (page 533)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 5 Function (page 533)** is repeated in adjusted period.

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Timer 5 Repeat Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 5 Function (page 533)**.

Repeated Day	Chose one day in month when **Timer 5 Function (page 533)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 5 Function (page 533)** will be activated.

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Timer 5 Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
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 5 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			
Use this setpoint to select the day of week when timer will be activated. ***Note:*** *More day can be selected. Timer will be activated on the day which happened like the first.*			

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Timer 5 Repeat Day In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1..31 [day]		
Default value	0	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			
Use this setpoint to chose the day in month when the **Timer 5 Function (page 533)** will be activated.			

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Timer 5 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Force value**	NO
Step	1 week		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			
This setpoint adjust the week of month in which the **Timer 5 Function (page 533)** will be activated.			

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Timer 5 Refresh Period

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			

Refresh period of **Timer 5 Function (page 533)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 4 Repeated (page 528)**.

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 4, then every second day from first occurrence of **Timer 5 Function (page 533)**, the **Timer 5 Function (page 533)** 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 4, then every second week from first occurrence of **Timer 5 Function (page 533)**, the **Timer 5 Function (page 533)** will be activated in selected days adjusted by **Timer 5 Day (page 537)**.
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 4, then every second month from first occurrence of **Timer 5 Function (page 533)**, the **Timer 5 Function (page 533)** will be activated in selected day of month adjusted by **Timer 5 Repeat Day In Month (page 537)** or in selected days of week of month adjusted by **Timer 5 Day (page 537)** and **Timer 5 Repeat Week In Month (page 538)**.
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 4, then every second minute from first occurrence of **Timer 5 Function (page 533)**, the **Timer 5 Function (page 533)** will be activated.

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Timer 5 Weekends

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 5 Function (page 533)**		
Description			

Behavior of **Timer 5 Function (page 533)** on weekends.

Including	**Timer 5 Function (page 533)** counter is running on the weekends and **Timer 5 Function (page 533)** can be active.
Skip	**Timer 5 Function (page 533)** counter is running on the weekends but **Timer 5 Function (page 533)** isn't active.
Postpone	**Timer 5 Function (page 533)** counter isn't running on the weekends and **Timer 5 Function (page 533)** 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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Subgroup: Timer 6

Timer 6 Function

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Disable / Manual On / No Func / Mode OFF / Rem Start/Stop / TEST / Test OnLd / MFail Blk [-]		
Default value	Disable	**Force value**	YES
Step	[-]		
Comm object	15363	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		

Description

This setpoint defines and enables the function of the Timer 6. The functions which are supposed to change the Controller Mode requires controller running in AUTO mode. The activation condition of the Timer is configured via setpoint **Timer 6 Setup (page 542)**.

Once the Timer is activated the LBO **EXERCISE TIMER 6 (PAGE 785)** is closed regardless of chosen timer function. If the CU is switched off when the Timer should be activated, the Timer will be activated immediately after the CU is switched on if the Timer condition is still fulfilled.

> **IMPORTANT: The LBO is activated always when the Timer should be activated e.g. even when controller is in different mode than AUTO.**

> **IMPORTANT: In case that Timer 1, Timer 2, etc. should be activated at the same time, the Timer with selected higher priority function is executed.**

Disable	The Timer is disabled.
Manual On	LBO Timer is active, but the Timer itself is disabled. ***Note:*** *This function serves for testing purposes.*
No Func	There is no any other function, only binary output of timer is activated.
Mode OFF	When this option is chosen then the binary output of timer is internally connected to the **REMOTE OFF (PAGE 750)** binary input.
Rem Start/Stop	When this option is chosen then the binary output of timer is internally connected to the **REMOTE START/STOP (PAGE 751)** binary input.
TEST	When this option is chosen then the binary output of timer is internally connected to the binary input **REMOTE TEST (PAGE 752)**.
TEST OnLd	When this option is chosen then the binary output of timer is internally connected to the **REM TEST ON LOAD (PAGE 748)** binary input.
MFail Blk	When this option is chosen then the binary output of timer is internally connected to the **MAINS FAIL BLOCK (PAGE 739)** binary input.

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Timer 6 Setup

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	N/A [-]		
Default value	N/A [-]	**Force value**	NO
Step	N/A [-]		
Comm object	10975	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **Timer 6 Function (page 541)** != Disabled or Manual On		
Description			
Use this setpoint to setup the exercise Timer 6. See **Exercise timers (page 148)** for step by step manual.			

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Timer 6 First Occur. Date

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2000	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			
Date of first occurrence of**Timer 6 Function (page 541)**.			

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Timer 6 First Occur. Time

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			
Time of first occurrence of **Timer 6 Function (page 541)**.			

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Timer 6 Duration

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[HH:MM]		
Default value	00:00	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			
Timer 6 Function (page 541) duration time.			

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Timer 6 Repetition

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Off / Once / Repeated [-]		
Default value	Off	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			
Defines repetition of **Timer 6 Function (page 541)**.			

Off	**Timer 6 Function (page 541)** will not be activated.
Once	**Timer 6 Function (page 541)** will be activated only one time.
Repeated	**Timer 6 Function (page 541)** will be repeatedly activated.

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Timer 6 Repeated

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Daily / Weekly / Monthly / Short Period [-]		
Default value	Daily	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			

Repeated interval of **Timer 6 Function (page 541)**.

Daily	**Timer 6 Function (page 541)** is repeated every day.
Weekly	**Timer 6 Function (page 541)** is repeated every week in chosen days.
Monthly	**Timer 6 Function (page 541)** is repeated in chosen day every month or in chosen days of chosen week of month
Short Period	**Timer 6 Function (page 541)** is repeated in adjusted period.

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Timer 6 Repeat Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Repeated Day / Repeated Day In Week [-]		
Default value	Repeated Day	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			

Use this setpoint to adjust behavior of monthly repetition of the **Timer 6 Function (page 541)**.

Repeated Day	Chose one day in month when **Timer 6 Function (page 541)** will be activated.
Repeated Day In Week	Chose days in one week when **Timer 6 Function (page 541)** will be activated.

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Timer 6 Day

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
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 6 Repeated Day In Week

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Monday / Tuesday / Wednesday / Thursday / Friday / Saturday/ Sunday[-]		
Default value	All OFF	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			
Use this setpoint to select the day of week when timer will be activated. ***Note:*** *More day can be selected. Timer will be activated on the day which happened like the first.*			

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Timer 6 Repeat Day In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1..31 [day]		
Default value	0	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			
Use this setpoint to chose the day in month when the **Timer 6 Function (page 541)** will be activated.			

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Timer 6 Repeat Week In Month

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	1 .. 5 [week]		
Default value	1 week	**Force value**	NO
Step	1 week		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			
This setpoint adjust the week of month in which the **Timer 6 Function (page 541)** will be activated.			

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Timer 6 Refresh Period

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			

Refresh period of **Timer 6 Function (page 541)**. Meaning of this setpoint depends on type of repetition adjusted in **Timer 6 Repeated (page 544)**.

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 4, then every second day from first occurrence of **Timer 6 Function (page 541)**, the **Timer 6 Function (page 541)** 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 4, then every second week from first occurrence of **Timer 6 Function (page 541)**, the **Timer 6 Function (page 541)** will be activated in selected days adjusted by **Timer 6 Day (page 545)**.
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 4, then every second month from first occurrence of **Timer 6 Function (page 541)**, the **Timer 6 Function (page 541)** will be activated in selected day of month adjusted by **Timer 6 Repeat Day In Month (page 545)** or in selected days of week of month adjusted by **Timer 6 Day (page 545)** and **Timer 6 Repeat Week In Month (page 546)**.
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 4, then every second minute from first occurrence of **Timer 6 Function (page 541)**, the **Timer 6 Function (page 541)** will be activated.

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Timer 6 Weekends

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Including / Skip / Postpone [-]		
Default value	Including	**Force value**	NO
Step	[-]		
Comm object	0	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Conditioned by the setpoint **Timer 6 Function (page 541)**		
Description			

Behavior of **Timer 6 Function (page 541)** on weekends.

Including	**Timer 6 Function (page 541)** counter is running on the weekends and **Timer 6 Function (page 541)** can be active.
Skip	**Timer 6 Function (page 541)** counter is running on the weekends but **Timer 6 Function (page 541)** isn't active.
Postpone	**Timer 6 Function (page 541)** counter isn't running on the weekends and **Timer 6 Function (page 541)** 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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Subgroup: Rental Timers

Rental Timer 1

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Disabled / 1 .. 8 760 [h]		
Default value	Disabled	**Force value**	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 **AHI Rental Timer 1 Elapsed (page 895)** will be recorded in alarm list.

> **IMPORTANT: To reset Rental Timer 1 (page 548) we have to set up Rental Timer 1 (page 548) again. It means go to setpoint group Scheduler and to the setpoint Rental Timer 1 (page 548). Then press enter button , change the value if it is necessary and press enter button again.**

When the **Rental Timer 1 (page 548)** elapsed during engine run the Gen-set will not stop immediately. The adjustable **Rental Timer BOC (page 552)** timer will start in this moment. The engine will be cooled and stopped when the **Rental Timer BOC (page 552)** time elapsed.

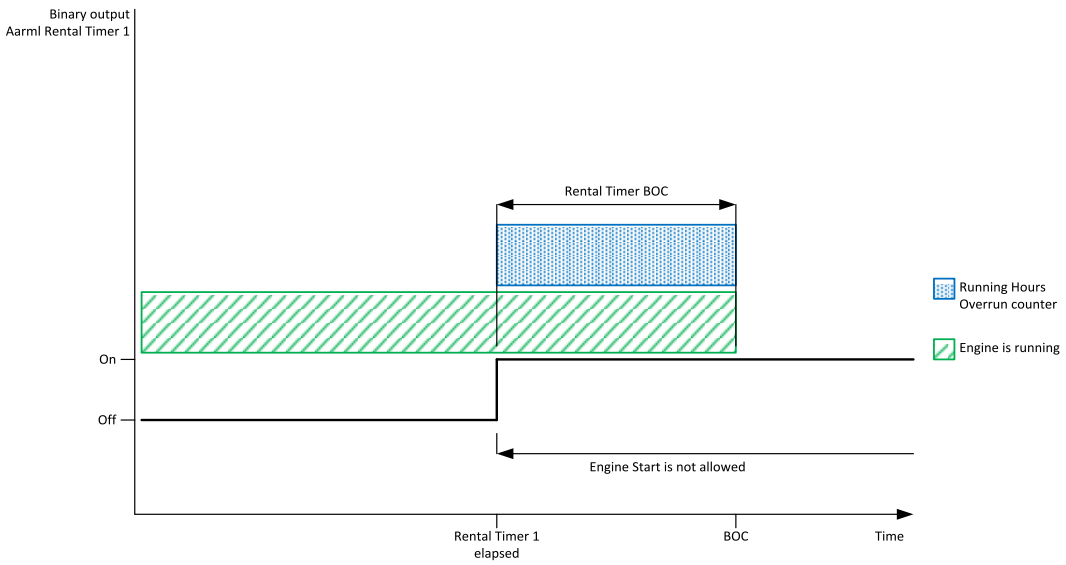


Image 8.43 Rental Timer 1

The Running Hours Overrun counter will start increment when the engine is continue running after the **Rental Timer 1 (page 548)** elapsed.

> ***Note:*** *There is no priority between Rental Timer 1 and Rental Timer 2. The sooner timer will activated the **Rental Timer BOC (page 552)** protection.*

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Rental Timer 1 Wrn

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Disabled / 1.. **Rental Timer 1 (page 548)** [h]		
Default value	Disabled	**Force value**	NO
Step	1 h		
Comm object	14332	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Rental Timer 1 (page 548)**		
Description			

Alarm **Wrn Rental Timer 1 (page 895)** comes up after xx running hours from adjusting the **Rental Timer 1 (page 548)**. Hours are adjusted by this setpoint.

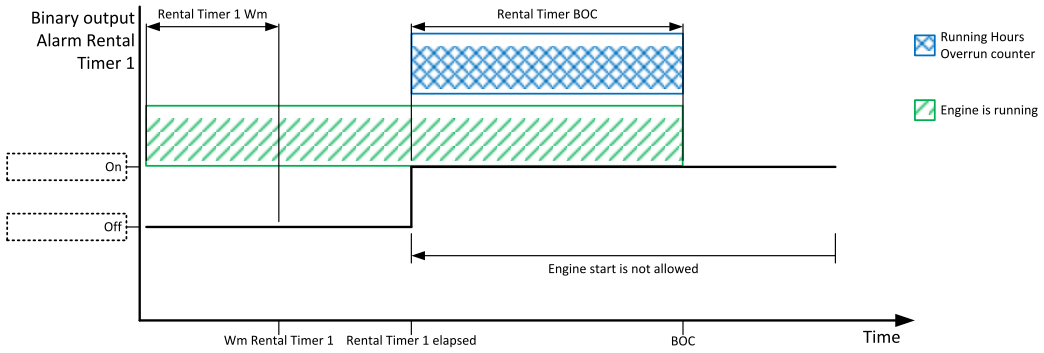


Image 8.44 Rental Timer 1 Wrn

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Rental Timer 2

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	[DD/MM/YYYY]		
Default value	01/01/2015	**Force value**	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 **AHl Rental Timer 2 Elapsed (page 896)** will be recorded in alarm list.

> **IMPORTANT: To reset Rental Timer 2 (page 550) we have to set up Rental Timer 2 (page 550) again. It means go to setpoint group Scheduler and to the setpoint Rental Timer 2 (page 550). Then press enter button , change the value if it is necessary and press enter button again.**

> **IMPORTANT: To disable Rental Timer 2 (page 550) set date to 01/01/2015.**

When the **Rental Timer 2 (page 550)** elapsed during engine run the Gen-set will not stop immediately. The adjustable **Rental Timer BOC (page 552)** timer will start in this moment. The engine will be cooled and stopped when the **Rental Timer BOC (page 552)** time elapsed.

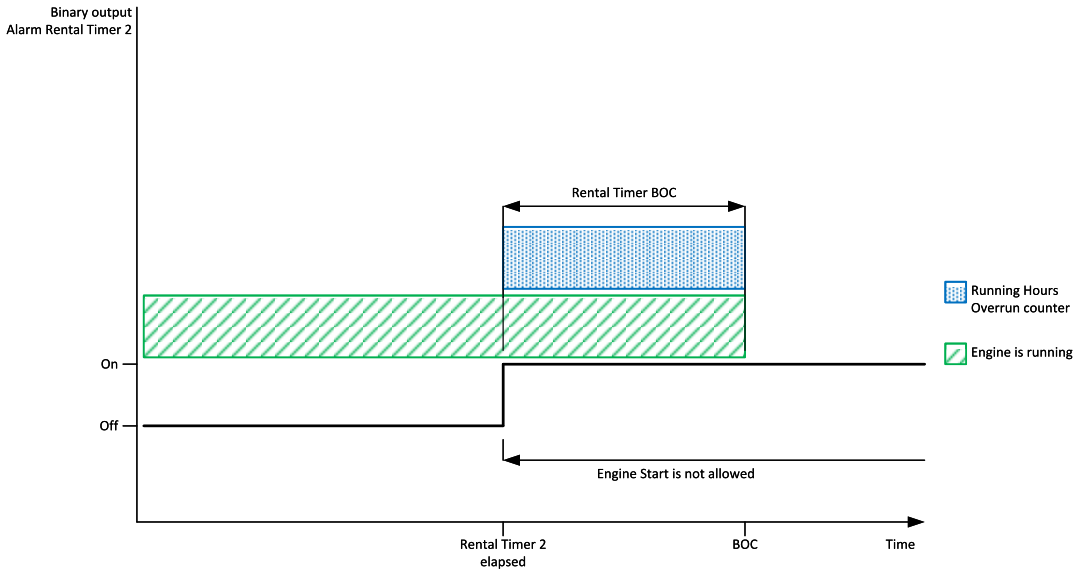


Image 8.45 Rental Timer 2

The Running Hours Overrun counter will start increment when the engine is continue running after the **Rental Timer 2 (page 550)** elapsed.

> ***Note:*** *There is no priority between Rental Timer 1 and Rental Timer 2. The sooner timer will activated the **Rental Timer BOC (page 552)** protection.*

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Rental Timer 2 Wrn

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Disabled / 01/01/2015 .. **Rental Timer 2 (page 550)** [DD/MM/YYYY]		
Default value	01/01/2015	**Force value**	NO
Step	1 day		
Comm object	14368	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoint **Rental Timer 2 (page 550)**		
Description			

Alarm **Wrn Rental Timer 2 (page 896)** comes up xx days before the **Rental Timer 2 (page 550)**. Days are adjusted by this setpoint.

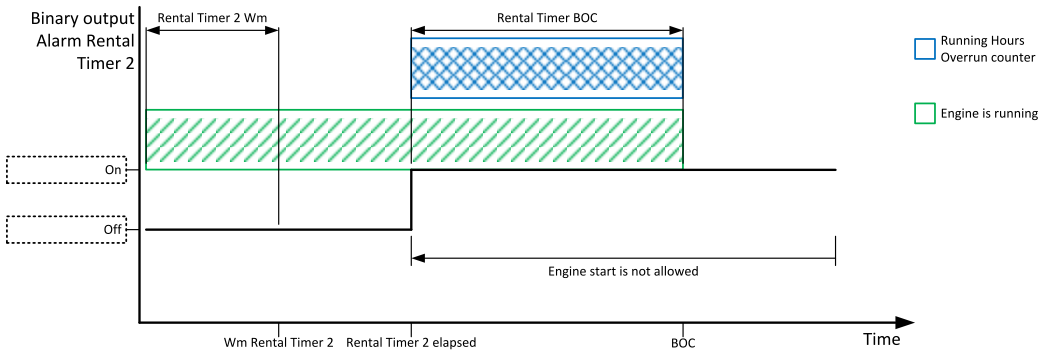


Image 8.46 Rental Timer 2 Wrn

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Rental Timer BOC

Setpoint group	Scheduler	**Related FW**	2.1.0
Range [units]	Disabled / 1 .. 210 [h]		
Default value	24 h	**Force value**	NO
Step	1 h		
Comm object	14334	**Related applications**	MINT, SPtM
Config level	Advanced		
Setpoint visibility	Conditioned by the setpoints **Rental Timer 1 (page 548)** and **Rental Timer 2 (page 550)**		
Description			

This timer will start after **Rental Timer 1 (page 548)** or **Rental Timer 2 (page 550)** 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

Subgroup: Geo Fencing

Geo-Fencing

Setpoint group	Geo-Fencing	**Related FW**	2.1.0
Range [units]	Disabled / Enabled / LBI Enable [-]		
Default value	Disabled	**Force value**	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 555)** and **Fence 2 Protection (page 557)** are disabled.
Enabled	**Fence 1 Protection (page 555)** and **Fence 2 Protection (page 557)** are enabled.
LBI Enable	**Fence 1 Protection (page 555)** and **Fence 2 Protection (page 557)** are enabled only when logical binary input .**GEO-FENCING ENABLE (PAGE 737)** is active.

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Subgroup: Position

Home Latitude

Setpoint group	Geo-Fencing	**Related FW**	2.1.0
Range [units]	-90,0000..90,0000 [°]		
Default value	0,0000 °	**Force value**	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 554)** are used for counting **Fence 1 Radius (page 556)** and **Fence 2 Radius (page 558)**.*

Note: *This value can be also obtained automatically via logical binary input **GEO HOME POSITION (PAGE 736)**. 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**	2.1.0
Range [units]	-180,0000..180,0000 [°]		
Default value	0,0000 °	**Force value**	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 553)*** *are used for counting* ***Fence 1 Radius (page 556)*** *and* ***Fence 2 Radius (page 558)****.*

Note: *This value can be also obtained automatically via logical binary input* ***GEO HOME POSITION (PAGE 736)****. 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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Subgroup: Fence 1

Fence 1 Protection

Setpoint group	Geo-Fencing	**Related FW**	2.1.0
Range [units]	HistRecOnl / Wrn / Sd / BOC[-]		
Default value	HistRecOnl	**Force value**	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 1 Radius (page 556)**. Delay for protection is adjusted by setpoint **Fence 1 Delay (page 556)**.

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 1 Radius (page 556)**.
Wrn	Position of Gen-set is used for warning protection only. Protection is activated when position of the Gen-set is out of **Fence 1 Radius (page 556)**.
Sd	Position of Gen-set is used for shutdown protection. Protection is activated when position of the Gen-set is out of **Fence 1 Radius (page 556)**.
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 1 Radius (page 556)**.

Note: *Protection is activated also when GPS signal is lost for **Fence 1 Delay (page 556)**.*

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Fence 1 Radius

Setpoint group	Geo-Fencing	**Related FW**	2.1.0
Range [units]	0,0..99,9 [km]		
Default value	0,0 km	**Force value**	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 555)** is activated after **Fence 1 Delay (page 556)**. ***Note:*** *The center of this circle area is defined by "Home" position – setpoints* ***Home Longitude (page 554)*** *and* ***Home Latitude (page 553)****.*			

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Fence 1 Delay

Setpoint group	Geo-Fencing	**Related FW**	2.1.0
Range [units]	0..3600 [s]		
Default value	0 s	**Force value**	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 555)**.			

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Subgroup: Fence 2

Fence 2 Protection

Setpoint group	Geo-Fencing	**Related FW**	2.1.0
Range [units]	HistRecOnl / Wrn / Sd / BOC[-]		
Default value	HistRecOnl	**Force value**	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 2 Radius (page 558)**. Delay for protection is adjusted by setpoint **Fence 2 Delay (page 558)**.

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 2 Radius (page 558)**.
Wrn	Position of Gen-set is used for warning protection only. Protection is activated when position of the Gen-set is out of **Fence 2 Radius (page 558)**.
Sd	Position of Gen-set is used for shutdown protection. Protection is activated when position of the Gen-set is out of **Fence 2 Radius (page 558)**.
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 2 Radius (page 558)**.

Note: *Protection is activated also when GPS signal is lost for **Fence 2 Delay (page 558)**.*

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Fence 2 Radius

Setpoint group	Geo-Fencing	**Related FW**	2.1.0
Range [units]	0,0..99,9 [km]		
Default value	0,0 km	**Force value**	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 557)** is activated after **Fence 2 Delay (page 558)**. ***Note:*** *The center of this circle area is defined by "Home" position - setpoints* ***Home Longitude (page 554)*** *and* ***Home Latitude (page 553)****.*			

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Fence 2 Delay

Setpoint group	Geo-Fencing	**Related FW**	2.1.0
Range [units]	0..3600 [s]		
Default value	0 s	**Force value**	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 557)**.			

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Group: Plug-In Modules

Subgroup: Slot A

Slot A

Setpoint group	Plug-In Modules	**Related FW**	2.1.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	**Force value**	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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Subgroup: Slot B

Slot B

Setpoint group	Plug-In Modules	**Related FW**	2.1.0
Range [units]	ENABLED / DISABLED [-]		
Default value	ENABLED	**Force value**	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: CM-RS232-485

Subgroup: COM1 Setting

COM1 Mode

Setpoint group	CM-RS232-485	**Related FW**	2.1.0
Range [units]	Direct / MODBUS [-]		
Default value	Direct	**Force value**	NO
Step	[-]		
Comm object	24522	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Communication protocol switch for the COM1 channel.			

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

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COM1 Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	2.1.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	**Force value**	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 559)**		
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.			

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COM1 MODBUS Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	2.1.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Force value**	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 559)**		
Description			
If the MODBUS mode is selected on COM1 channel, the MODBUS communication speed can be adjusted here.			

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COM1 Modbus Mode

Setpoint group	CM-RS232-485	**Related FW**	2.1.0
Range [units]	8N1 / 8N2 / 8E1 [-]		
Default value	8N1 [-]	**Force value**	NO
Step	[-]		
Comm object	23867	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint adjusts communication mode of Modbus-RTU.

Possible options

8N1	8 data bits, 1 stop bit, no parity
8N2	8 data bits, 2 stop bits, no parity
8E1	8 data bits, 1 stop bit, even parity

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Subgroup: COM2 Setting

COM2 Mode

Setpoint group	CM-RS232-485	**Related FW**	2.1.0
Range [units]	Direct / MODBUS [-]		
Default value	Direct	**Force value**	NO
Step	[-]		
Comm object	24451	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

Communication protocol switch for the COM2 channel.

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

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COM2 Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	2.1.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200[bps]		
Default value	57600 bps	**Force value**	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 561)**
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.	

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COM2 MODBUS Communication Speed

Setpoint group	CM-RS232-485	**Related FW**	2.1.0
Range [units]	9600 / 19200 / 38400 / 57600 / 115200 [bps]		
Default value	9600 bps	**Force value**	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 561)**		
Description			
If the MODBUS mode is selected on COM2 channel, the MODBUS communication speed can be adjusted here.			

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COM2 Modbus Mode

Setpoint group	CM-RS232-485	**Related FW**	2.1.0
Range [units]	8N1 / 8N2 / 8E1 [-]		
Default value	8N1 [-]	**Force value**	NO
Step	[-]		
Comm object	23866	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint adjusts communication mode of Modbus-RTU.			

Possible options

8N1	8 data bits, 1 stop bit, no parity
8N2	8 data bits, 2 stop bits, no parity
8E1	8 data bits, 1 stop bit, even parity

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Group: CM-4G-GPS

Subgroup: Cellular Interface

Internet Connection

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Force value**	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.			

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Network Mode

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	2G / 3G / 4G / Automatic [-]		
Default value	Automatic	**Force value**	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 CM2-4G-GPS module.			

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Access Point Name

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	internet	**Force value**	NO
Step	[-]		
Comm object	24363	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
Description			
APN (Access Point Name) of the network, provided by GSM operator.			

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Connection Check IP1

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	[-]		
Default value	"empty"	**Force value**	NO
Step	[-]		
Comm object	23978	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		

Description

IP address of reliable server in the internet.

To provide maximal reliability of wireless cellular connection the module is equipped with function that periodically checks the data connection over the cellular network is working.

This function is based on periodical sending of ICMP messages (known as "ping") to reliable servers in the internet and checking of their responses. If there is not any response received from any of the servers (at least one setpoint Connection Check IP1, IP2, IP3 is filled with IP address) for certain time period, the cellular connection is considered as non-working and the module will close and reestablish the connection.

If all three servers are not defined (setpoints Connection Check IP1, IP2, IP3 have empty addresses) then the cellular connection check is disabled

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Connection Check IP2

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	[-]		
Default value	"empty"	**Force value**	NO
Step	[-]		
Comm object	23977	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		

Description

IP address of reliable server in the internet.

To provide maximal reliability of wireless cellular connection the module is equipped with function that periodically checks the data connection over the cellular network is working.

This function is based on periodical sending of ICMP messages (known as "ping") to reliable servers in the internet and checking of their responses. If there is not any response received from any of the servers (at least one setpoint Connection Check IP1, IP2, IP3 is filled with IP address) for certain time period, the cellular connection is considered as non-working and the module will close and reestablish the connection.

If all three servers are not defined (setpoints Connection Check IP1, IP2, IP3 have empty addresses) then the cellular connection check is disabled

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Connection Check IP3

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	[-]		
Default value	"empty"	**Force value**	NO
Step	[-]		
Comm object	23976	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		

Description

IP address of reliable server in the internet.

To provide maximal reliability of wireless cellular connection the module is equipped with function that periodically checks the data connection over the cellular network is working.

This function is based on periodical sending of ICMP messages (known as "ping") to reliable servers in the internet and checking of their responses. If there is not any response received from any of the servers (at least one setpoint Connection Check IP1, IP2, IP3 is filled with IP address) for certain time period, the cellular connection is considered as non-working and the module will close and reestablish the connection.

If all three servers are not defined (setpoints Connection Check IP1, IP2, IP3 have empty addresses) then the cellular connection check is disabled

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Subgroup: TCP/IP Settings

DNS Mode

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	Automatic / Manual [-]		
Default value	Automatic	**Force value**	NO
Step	[-]		
Comm object	23988	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint enables to enter DNS server addresses manually, even with the **Internet Connection (page 563)** set to Automatic.

Automatic	DNS server addresses automatically obtained from a DHCP server are used
Manual	**DNS IP Address 1 (page 567)** and **DNS IP Address 2 (page 568)** can be adjusted manually. Use this option to resolve e.g. internet access policy related issue, if local DNS server addresses automatically obtained from a DHCP server do not work

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DNS IP Address 1

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Force value**	NO
Step	[-]		
Comm object	24314	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

The setpoint is used to select the method how the DNS Address 1 is adjusted.

If **DNS Mode (page 567)** is MANUAL this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.

If **DNS Mode (page 567)** 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-4G-GPS	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Force value**	NO
Step	[-]		
Comm object	23986	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

The setpoint is used to select the method how the DNS Address 2 is adjusted.

If **DNS Mode (page 567)** is FIXED this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.

If **DNS Mode (page 567)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.

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IP Firewall

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	ENABLED / DISABLED [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	23959	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoints enables to switch on the built-in Firewall functionality.

DISABLED	The firewall function is switched off
ENABLED	The firewall function is switched on, use InteliConfig to setup the firewall rules (configuration card Others – Firewall)

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Subgroup: AirGate Settings

AirGate Connection

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	Disabled/ Enabled [-]		
Default value	Enabled	**Force value**	NO
Step	[-]		
Comm object	23968	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
Description			

This setpoint enable or disable AirGate connection via CM2-4G-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 610)**.

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

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AirGate Address

Setpoint group	CM-4G-GPS; CM-Ethernet	**Related FW**	2.1.0
Range [units]	[-]		
Default value	global.airgate.link	**Force value**	NO
Step	[-]		
Comm object	24364	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
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 global.airgate.link.

Note: *This setpoint is common for in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*

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Airgate Port

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	1 .. 65535 [-]		
Default value	54440	**Force value**	NO
Step	1		
Comm object	24091	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
Description			
This port is used for TCP communication with the AirGate server. ***Note:*** *Use port 54440 for standard ComAp AirGate service.*			

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Subgroup: ComAp Client Settings

Direct Connection

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Force value**	NO
Step	[-]		
Comm object	23961	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this to enable/disable direct connection of a ComAp client (e.g. InteliConfig) to the IP address of the controller. ***Note:*** *For Direct connection the controller IP address must be reachable from the client IP address.*			

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Direct Connection Port

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	1 .. 65535 [-]		
Default value	23	**Force value**	NO
Step	[-]		
Comm object	23960	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used to listen for an incoming TCP connection if Direct Connection is ENABLED.			

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ComAp Client Inactivity Timeout

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Force value**	NO
Step	1 s		
Comm object	24098	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Connection (TCP socket) is closed by controller, if a client (e.g. InteliConfig) does not communicate for this time. This timeout applies to both direct and AirGate connection.			

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Subgroup: E-mail Settings

SMTP Server Address

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	airgate.comap.cz global.airgate.link:9925	**Force value**	NO
Step	[-]		
Comm object	23962	**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.czglobal.airgate.link" 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-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	23884	**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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SMTP User Name

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	23883	**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-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 15 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	23882	**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 Encryption

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	None / SSL-TLS / STARTTLS [-]		
Default value	None	**Force value**	NO
Step	[-]		
Comm object	23965	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
Description			

Encryption settings of SMTP communication.

NONE	E-SMTP protocol without encryption is used.
STARTTLS	Communication is started without encryption and then is switched to TLS encryption.
TLS	Communication runs in TLS encryption.

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Email Address 1

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24298	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*

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Email Address 2

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24297	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Email Address 3

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24145	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Email Address 4

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24144	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Subgroup: Message Settings

E-mail/SMS Language

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	Depends on CU languages [-]		
Default value	English	**Force value**	YES*
Step	[-]		
Comm object	24299	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to set the language of SMS and e-mail. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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Event Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
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 CM3-Ethernet and CM2-4G-GPS modules.			

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Wrn Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
Step	[-]		
Comm object	8482	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Wrn Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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BOC Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
Step	[-]		
Comm object	10566	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Sd Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
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 Message. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Stp Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
Step	[-]		
Comm object	8485	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables sending of Slow Stop Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Telephone Number 1

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Force value**	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 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-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Force value**	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 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-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Force value**	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 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-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Force value**	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 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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Subgroup: GPS Settings

GPS Tracking

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Force value**	NO
Step	[-]		
Comm object	23975	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
Description			
If GPS tracking is enabled the module sends position/speed data to the controller with period 10 s.			

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Subgroup: RTC Synchronization

NTP Clock Sync

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	23964	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint is used to enable/disable controller time synchronization with exact time from an NTP server. The period of synchronization is 1 hour or when the cotnroller is reset or when the setpoint is reset (Enabled->Disabled->Enabled).			

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NTP Server

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	[-]		
Default value	pool.ntp.org	**Force value**	NO
Step	[-]		
Comm object	23963	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
NTP server address.			

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GPS Clock Sync

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	Enabled / Disabled [-]		
Default value	Enabled	**Force value**	NO
Step	[-]		
Comm object	23974	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
Description			
This setpoint is used to enable/disable synchronization of the controller's time with the exact time from GPS. The module sends UTC timestamp to the controller after reset/power on and then in period of 60 minutes.			

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Time Zone

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Force value**	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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Group: CM-Ethernet

Subgroup: TCP/IP Settings

IP Address Mode

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	MANUAL / AUTOMATIC / DISABLED [-]		
Default value	AUTOMATIC	**Force value**	NO
Step	[-]		
Comm object	23939	**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.

MANUAL	The Ethernet connection is fixed by means of the setpoints IP Addr, NetMask, GateIP, DNS IP Address. This method should be used for a classic Ethernet or internet connection. When this type of connection opens, the controller is specified by its IP address. This means that it would be inconvenient if the IP address were not fixed (static).
AUTOMATIC	The Ethernet connection setting is obtained **automatically from the DHCP server**. The obtained settings are then copied to the related setpoints. If the process of obtaining the settings from the DHCP server is not successful, the value *000.000.000.000* is copied to the setpoint IP address and the module continues to try to obtain the settings.
DISABLED	The Ethernet terminal is disabled.

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IP Address

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 15 characters [-]		
Default value	192.168.1.254	**Force value**	NO
Step	[-]		
Comm object	23950	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 584)**		
Description			

The setpoint is used to set the address when you are in static mode .

If **IP Address Mode (page 584)** is MANUAL 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 584)** is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server.

If **IP Address Mode (page 584)** is DISABLED Ethernet terminal is disabled.

> ***Note:*** *Only valid IP address can be inserted.*

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Subnet Mask

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	255.255.255.0	**Force value**	NO
Step	[-]		
Comm object	23949	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 584)**		
Description			

The setpoint is used to select the method how the Subnet Mask is adjusted.

If **IP Address Mode (page 584)** is MANUAL this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting.

If **IP Address Mode (page 584)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.

If **IP Address Mode (page 584)** is DISABLED Ethernet terminal is disabled.

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Gateway IP

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	192.168.1.1	**Force value**	NO
Step	[-]		
Comm object	23948	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **IP Address Mode (page 584)**		
Description			

The setpoint is used to select the method how the Gateway IP is adjusted.

If **IP Address Mode (page 584)** is MANUAL this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting.

If **IP Address Mode (page 584)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.

If **IP Address Mode (page 584)** is DISABLED Ethernet terminal is disabled.

A gateway is a device which connects the respective segment with the other segments and/or Internet.

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DNS Mode

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	Automatic / Manual [-]		
Default value	Automatic	**Force value**	NO
Step	[-]		
Comm object	23921	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint enables to enter DNS server addresses manually, even with the **IP Address Mode (page 584)** set to Automatic.

Automatic	DNS server addresses automatically obtained from a DHCP server are used
Manual	**DNS IP Address 1 (page 587)** and **DNS IP Address 2 (page 587)** can be adjusted manually. Use this option to resolve e.g. internet access policy related issue, if local DNS server addresses automatically obtained from a DHCP server do not work

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DNS IP Address 1

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Force value**	NO
Step	[-]		
Comm object	23947	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

The setpoint is used to select the method how the DNS Address 1 is adjusted .

If **IP Address Mode (page 584)** is MANUAL this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.

If **IP Address Mode (page 584)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.

If **IP Address Mode (page 584)** is DISABLED Ethernet terminal is disabled.

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DNS IP Address 2

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Force value**	NO
Step	[-]		
Comm object	23946	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

The setpoint is used to select the method how the DNS Address 2 is adjusted.

If **IP Address Mode (page 584)** is MANUAL this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses.

If **IP Address Mode (page 584)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server.

If **IP Address Mode (page 584)** is DISABLED Ethernet terminal is disabled.

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IP Firewall

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	ENABLED / DISABLED [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	23920	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoints enables to switch on the built-in Firewall functionality.

DISABLED	The firewall function is switched off
ENABLED	The firewall function is switched on, use InteliConfig to setup the firewall rules (configuration card Others – Firewall)

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Subgroup: AirGate Settings

AirGate Connection

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Force value**	NO
Step	[-]		
Comm object	23935	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint selects the AirGate 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 610)**. Also the standard TCP/IP is enabled.

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AirGate Address

Setpoint group	CM-4G-GPS; CM-Ethernet	**Related FW**	2.1.0
Range [units]	[-]		
Default value	global.airgate.link	**Force value**	NO
Step	[-]		
Comm object	24364	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
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 global.airgate.link. ***Note:*** *This setpoint is common for in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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AirGate Port

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	1 .. 65535 [-]		
Default value	23	**Force value**	NO
Step	1		
Comm object	23919	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used for TCP data communication with the AirGate server. ***Note:*** *Use port 21, 23 or 6127 for standard ComAp AirGate service.*			

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Subgroup: ComAp Client Settings

ComAp Client Inactivity Timeout

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Force value**	NO
Step	1 s		
Comm object	24098	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Connection (TCP socket) is closed by controller, if a client (e.g. InteliConfig) does not communicate for this time. This timeout applies to both direct and AirGate connection.			

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Direct Connection

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Force value**	NO
Step	[-]		
Comm object	23917	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this to enable/disable direct connection of a ComAp client (e.g. InteliConfig) to the IP address of the controller. ***Note:*** *For Direct connection the controller IP address must be reachable from the client IP address.*			

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Direct Connection Port

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	1 .. 65535 [-]		
Default value	23	**Force value**	NO
Step	[-]		
Comm object	23918	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used to listen for an incoming TCP connection if Direct Connection is ENABLED.			

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Subgroup: MODBUS Settings

MODBUS Server

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	DISABLED / ENABLED [-]		
Default value	Disabled	**Force value**	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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MODBUS Client Inactivity Timeout

Setpoint group	CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Force value**	NO
Step	1 s		
Comm object	24097	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Modbus connection (TCP socket) is closed by controller, if a Modbus client does not communicate for this time.			

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Subgroup: SNMP Settings

SNMP Agent

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	Disabled / SNMP v1/v2c / SNMP v3 [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	23936	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoints Enables or disables Simple Network Management Protocol (SNMP) Agent. ***Note:*** *SNMP v3 has upgraded encryption, remote configuration, and security (extra setpoints are available).* ***Note:*** *It is supported only User-Based security model (USM, RFC-3414). View-based Access Control Model (VACM, RFC-3415) is not supported.*			

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SNMP Trap Format

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	v1Trap / v2Notif / v2Inform [-]		
Default value	v1Trap	**Force value**	NO
Step	[-]		
Comm object	23922	**Related applications**	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 Traps IP Address 1

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	24095	**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**	2.1.0
Range [units]	Valid IP address [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	24094	**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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SNMP RD Community String

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	public	**Force value**	NO
Step	[-]		
Comm object	23941	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **SNMP Agent (page 592)**		
Description			
SNMP Community String only for reading.			

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SNMP WR Community String

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	0..31 characters [-]		
Default value	private	**Force value**	NO
Step	[-]		
Comm object	23940	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **SNMP Agent (page 592)**		
Description			
SNMP Community String for writing and reading.			

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SNMP Engine User Name

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	-	**Force value**	NO
Step	[-]		
Comm object	23851	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SNMP Agent (page 613)** = SNMP v3		
Description			
Defines SNMP v3 Engine User Name.			

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SNMP Privacy Protocol

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	DES / 3DES / AES128 / AES256 [-]		
Default value	AES128	**Force value**	NO
Step	[-]		
Comm object	23853	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SNMP Agent (page 592)** = SNMP v3		
Description			
Selects SNMP v3 Privacy Protocol.			

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SNMP Authentication Protocol

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	MD5 / SHA / SHA256[-]		
Default value	SHA	**Force value**	NO
Step	[-]		
Comm object	23853	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SNMP Agent (page 592)** = SNMP v3		
Description			
Selects SNMP v3 Authentication Protocol.			

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SNMP Security Level

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	NONE/ AUTH-NOPRIV / AUTH-PRIV [-]		
Default value	NONE	**Force value**	NO
Step	[-]		
Comm object	23852	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SNMP Agent (page 592)** = SNMP v3		
Description			
Selects SNMP v3 security level. If NONE the agent will work in SNMP v2c mode.			

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Subgroup: E-mail Settings

SMTP Sender Address

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	23881	**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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SMTP Server Address

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	airgate.comap.cz	**Force value**	NO
Step	[-]		
Comm object	23942	**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 UserName

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	23880	**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**	2.1.0
Range [units]	0 .. 15 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	23879	**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 Encryption

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	None / SSL-TLS / STARTTLS [-]		
Default value	None	**Force value**	NO
Step	[-]		
Comm object	23938	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
Description			

Encryption settings of SMTP communication.

NONE	E-SMTP protocol without encryption is used.
STARTTLS	Communication is started without encryption and then is switched to TLS encryption.
TLS	Communication runs in TLS encryption.

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Email Address 1

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24298	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*

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Email Address 2

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24297	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Email Address 3

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24145	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Email Address 4

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24144	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Subgroup: Messages Settings

E-mail/SMS Language

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	Depends on CU languages [-]		
Default value	English	**Force value**	YES*
Step	[-]		
Comm object	24299	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to set the language of SMS and e-mail. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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BOC Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
Step	[-]		
Comm object	10566	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Event Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
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 CM3-Ethernet and CM2-4G-GPS modules.			

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Sd Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
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 Message. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Stp Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
Step	[-]		
Comm object	8485	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables sending of Slow Stop Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Wrn Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
Step	[-]		
Comm object	8482	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables Wrn Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Subgroup: NTP Settings

NTP Clock Synchronization

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	23934	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint is used to enable/disable controller time synchronization with exact time from an NTP server.			

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NTP Server

Setpoint group	CM-Ethernet	**Related FW**	2.1.0
Range [units]	[-]		
Default value	pool.ntp.org	**Force value**	NO
Step	[-]		
Comm object	23933	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
NTP server address.			

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Time Zone

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Force value**	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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*

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Group: Ethernet

Subgroup: TCP/IP Settings

IP Address Mode

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	MANUAL / AUTOMATIC / DISABLED [-]		
Default value	AUTOMATIC	**Force value**	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.

MANUAL	The Ethernet connection is fixed by means of the setpoints IP Addr, NetMask, GateIP, DNS IP Address. This method should be used for a classic Ethernet or internet connection. When this type of connection opens, the controller is specified by its IP address. This means that it would be inconvenient if the IP address were not fixed (static).
AUTOMATIC	The Ethernet connection setting is obtained **automatically from the DHCP server**. The obtained settings are then copied to the related setpoints. If the process of obtaining the settings from the DHCP server is not successful, the value *000.000.000.000* is copied to the setpoint IP address and the module continues to try to obtain the settings.
DISABLED	The Ethernet terminal is disabled.

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IP Address

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 15 characters [-]		
Default value	192.168.1.254	**Force value**	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 605)**		
Description			

The setpoint is used to set the address when you are in static mode .

If **IP Address Mode (page 605)** is MANUAL 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 605)** is AUTOMATIC this setpoint is inactive. The IP address is assigned by the DHCP server.

If **IP Address Mode (page 605)** is DISABLED Ethernet terminal is disabled.

Note: *Only valid IP address can be inserted.*

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Subnet Mask

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	255.255.255.0	**Force value**	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 605)**		
Description			

The setpoint is used to select the method how the Subnet Mask is adjusted.

If **IP Address Mode (page 605)** is MANUAL this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting.

If **IP Address Mode (page 605)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.

If **IP Address Mode (page 605)** is DISABLED Ethernet terminal is disabled.

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Gateway IP

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	192.168.1.1	**Force value**	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 605)**		
Description			

The setpoint is used to select the method how the Gateway IP is adjusted.

If **IP Address Mode (page 605)** is MANUAL this setpoint is used to adjust the Subnet Mask. Ask your IT specialist for help with this setting.

If **IP Address Mode (page 605)** is AUTOMATIC this setpoint is inactive. The Subnet Mask is assigned by the DHCP server.

If **IP Address Mode (page 605)** is DISABLED Ethernet terminal is disabled.

A gateway is a device which connects the respective segment with the other segments and/or Internet.

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DNS Mode

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	Automatic / Manual [-]		
Default value	Automatic	**Force value**	NO
Step	[-]		
Comm object	24101	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint enables to enter DNS server addresses manually, even with the **IP Address Mode (page 605)** set to Automatic.

Automatic	DNS server addresses automatically obtained from a DHCP server are used.
Manual	**DNS IP Address 1 (page 608)** and **DNS IP Address 2 (page 608)** can be adjusted manually. Use this option to resolve e.g. internet access policy related issue, if local DNS server addresses automatically obtained from a DHCP server do not work.

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DNS IP Address 1

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Force value**	NO
Step	[-]		
Comm object	24362	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
The setpoint is used to select the method how the DNS Address 1 is adjusted. If **IP Address Mode (page 605)** is MANUAL this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses. If **IP Address Mode (page 605)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server. If **IP Address Mode (page 605)** is DISABLED Ethernet terminal is disabled.			

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DNS IP Address 2

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	8.8.8.8	**Force value**	NO
Step	[-]		
Comm object	24331	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
The setpoint is used to select the method how the DNS Address 2 is adjusted. If **IP Address Mode (page 605)** is MANUAL this setpoint is used to adjust the domain name server (DNS), which is needed to translate domain names in email addresses and server names into correct IP addresses. If **IP Address Mode (page 605)** is AUTOMATIC this setpoint is inactive. The DNS server IP address is assigned by the DHCP server. If **IP Address Mode (page 605)** is DISABLED Ethernet terminal is disabled.			

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IP Firewall

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	ENABLED / DISABLED [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	24092	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoints enables to switch on the built-in Firewall functionality.

DISABLED	The firewall function is switched off
ENABLED	The firewall function is switched on, use InteliConfig to setup the firewall rules (configuration card Others – Firewall)

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Subgroup: AirGate Settings

AirGate Connection

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Force value**	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 610)**. Also the standard TCP/IP is enabled.

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AirGate Address

Setpoint group	CM-4G-GPS; CM-Ethernet	**Related FW**	2.1.0
Range [units]	[-]		
Default value	global.airgate.link	**Force value**	NO
Step	[-]		
Comm object	24364	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
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 global.airgate.link. ***Note:*** *This setpoint is common for in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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AirGate Port

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	1 .. 65535 [-]		
Default value	23	**Force value**	NO
Step	1		
Comm object	24096	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used for TCP data communication with the AirGate server. ***Note:*** *Use port 21, 23 or 6127 for standard ComAp AirGate service.*			

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Subgroup: ComAp Client Settings

ComAp Client Inactivity Timeout

Setpoint group	CM-4G-GPS	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Force value**	NO
Step	1 s		
Comm object	24098	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Connection (TCP socket) is closed by controller, if a client (e.g. InteliConfig) does not communicate for this time. This timeout applies to both direct and AirGate connection.			

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Direct Connection

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	Disabled / Enabled [-]		
Default value	Enabled	**Force value**	NO
Step	[-]		
Comm object	24099	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this to enable/disable direct connection of a ComAp client (e.g. InteliConfig) to the IP address of the controller. ***Note:*** *For Direct connection the controller IP address must be reachable from the client IP address.*			

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Direct Connection Port

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	1 .. 65535 [-]		
Default value	23	**Force value**	NO
Step	[-]		
Comm object	24374	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This port is used to listen for an incoming TCP connection if Direct Connection is ENABLED.			

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Subgroup: MODBUS Settings

MODBUS Server

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	DISABLED / ENABLED [-]		
Default value	Disabled	**Force value**	NO
Step	[-]		
Comm object	23937	**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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MODBUS Client Inactivity Timeout

Setpoint group	CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 600 [s]		
Default value	60 s	**Force value**	NO
Step	1 s		
Comm object	24097	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Modbus connection (TCP socket) is closed by controller, if a Modbus client does not communicate for this time.			

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Subgroup: SNMP Settings

SNMP Agent

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	Disabled / SNMP v1/v2c / SNMP v3 [-]		
Default value	Disabled	**Force value**	NO
Step	[-]		
Comm object	24336	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Always		
Description			

This setpoints Enables or disables Simple Network Management Protocol (SNMP) Agent.

Note: *SNMP v3 has upgraded encryption, remote configuration, and security (extra setpoints are available).*

Note: *It is supported only User-Based security model (USM, RFC-3414). View-based Access Control Model (VACM, RFC-3415) is not supported.*

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SNMP Trap Format

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	v1Trap / v2Notif / v2Inform [-]		
Default value	v1Trap	**Force value**	NO
Step	[-]		
Comm object	24136	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint adjusts type of SNMP traps.

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SNMP Traps IP Address 1

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	24095	**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	Ethernet	**Related FW**	2.1.0
Range [units]	Valid IP address [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	24094	**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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SNMP RD Community String

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	public	**Force value**	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 613)**		
Description			
SNMP Community String only for reading.			

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SNMP WR Community String

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	0..31 characters [-]		
Default value	private	**Force value**	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 613)**		
Description			
SNMP Community String for writing and reading.			

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SNMP Engine User Name

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	-	**Force value**	NO
Step	[-]		
Comm object	23851	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SNMP Agent (page 613)** = SNMP v3		
Description			
Defines SNMP v3 Engine User Name.			

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SNMP Privacy Protocol

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	DES / 3DES / AES128 / AES256 [-]		
Default value	AES128	**Force value**	NO
Step	[-]		
Comm object	23856	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SNMP Agent (page 613)** = SNMP v3		
Description			
Selects SNMP v3 Privacy Protocol.			

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SNMP Authentication Protocol

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	MD5 / SHA / SHA256[-]		
Default value	SHA	**Force value**	NO
Step	[-]		
Comm object	23857	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SNMP Agent (page 613)** = SNMP v3		
Description			
Selects SNMP v3 Authentication Protocol.			

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SNMP Security Level

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	NONE/ AUTH-NOPRIV / AUTH-PRIV [-]		
Default value	NONE	**Force value**	NO
Step	[-]		
Comm object	23855	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if **SNMP Agent (page 613)** = SNMP v3		
Description			
Selects SNMP v3 security level. If NONE the agent will work in SNMP v2c mode.			

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Subgroup: E-mail Settings

SMTP Server Address

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	airgate.comap.cz	**Force value**	NO
Step	[-]		
Comm object	24093	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			

This setpoint is used for entering the domain name (e.g. smtp.yourprovider.com) or IP address (e.g. 74.125.39.109) or number of port (with colon like a first mark) of the SMTP server. Ask your internet provider or IT manager for this information.

> ***Note:*** *You may use also any public SMTP server which does not require connection over SSL/TLS channels. If the device is connected to AirGate the AirGate SMTP server at "airgate.comap.cz" may be used. Ports 25 and 9925 are supported. After controller connects to AirGate for the first time (or with new public IP address), it may not be able to send emails for first 5-10 minutes.*

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SMTP Sender Address

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	23878	**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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SMTP UserName

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 31 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	23877	**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	Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 15 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	23876	**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 Encryption

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	None / SSL-TLS / STARTTLS [-]		
Default value	None	**Force value**	NO
Step	[-]		
Comm object	24076	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
Description			

Encryption settings of SMTP communication.

NONE	E-SMTP protocol without encryption is used.
STARTTLS	Communication is started without encryption and then is switched to TLS encryption.
TLS	Communication runs in TLS encryption.

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Email Address 1

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24298	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*

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Email Address 2

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24297	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Email Address 3

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24145	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Email Address 4

Setpoint group	CM-4G-GPS CM-Ethernet Ethernet	**Related FW**	2.1.0
Range [units]	0 .. 63 characters [-]		
Default value	[-]	**Force value**	NO
Step	[-]		
Comm object	24144	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Subgroup: Messages Settings

E-mail/SMS Language

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	Depends on CU languages [-]		
Default value	English	**Force value**	YES*
Step	[-]		
Comm object	24299	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Use this setpoint to set the language of SMS and e-mail. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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BOC Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
Step	[-]		
Comm object	10566	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables BOC Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Event Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
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 CM3-Ethernet and CM2-4G-GPS modules.			

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Sd Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
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 Message. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Stp Message

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	ON / OFF [-]		
Default value	ON	**Force value**	YES*
Step	[-]		
Comm object	8485	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
This setpoint enables or disables sending of Slow Stop Messages. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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Time Zone

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Force value**	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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*			

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Subgroup: RTC Synchronization

NTP Clock Synchronization

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	DISABLED / ENABLED [-]		
Default value	DISABLED	**Force value**	NO
Step	[-]		
Comm object	24075	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed + conditioned by the setpoint **Internet Connection (page 563)**		
Description			
This setpoint is used to enable/disable controller time synchronization with exact time from an NTP server. This setpoint is common for CM3-Ethernet and CM2-4G-GPS modules.			

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NTP Server

Setpoint group	Ethernet	**Related FW**	2.1.0
Range [units]	[-]		
Default value	pool.ntp.org	**Force value**	NO
Step	[-]		
Comm object	24074	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
NTP server address.			

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Time Zone

Setpoint group	CM-4G-GPS CM-Ethernet	**Related FW**	2.1.0
Range [units]	GMT-12:00 .. GMT+13:00 [hours]		
Default value	GMT+1:00 hour	**Force value**	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 in-build Ethernet, CM3-Ethernet and CM2-4G-GPS modules.*

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Group: EM-BIO8-EFCP

Subgroup: EFCP Settings

Earth Fault Current Protection

Setpoint group	EM-BIO8-EFCP	**Related FW**	2.1.0
Range [units]	DISABLED / ENABLED [-]		
Default value	ENABLED	**Force value**	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 627)**, **Earth Fault CT Ratio (page 627)**, **IDMT Earth Fault Current Delay (page 626)** and **IDMT Earth Fault Current Sd (page 627)**.

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IDMT Earth Fault Current Delay

Setpoint group	EM-BIO8-EFCP	**Related FW**	2.1.0
Range [units]	0.03 .. 5.00 [s]		
Default value	0.10 s	**Force value**	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**	2.1.0
Range [units]	1 [A] / 5 [A]		
Default value	5 A	**Force value**	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 626)**. 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**	2.1.0
Range [units]	1 .. 2000 [1/(1or5) A]		
Default value	500 1/(1or5)A	**Force value**	NO
Step	1 A/ 1A; 1 A/5 A		
Comm object	14339	**Related applications**	MINT, SPtM
Config level	Standard		
Setpoint visibility	Only if relevant module is installed		
Description			
Earth Fault current transformer ratio. ***Note:*** *Type of units depends on setpoint **Earth Fault CT Input Range (page 627)** which have to be set before this setpoint.*			

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IDMT Earth Fault Current Sd

Setpoint group	EM-BIO8-EFCP	**Related FW**	2.1.0
Range [units]	0.03 .. 200.00 [A]		
Default value	0.30 A	**Force value**	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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8.1.3 Values

What values are:

Values (or quantities) are analog or binary data objects, measured or computed by the controller, that are intended for reading from the controller screen, PC, MODBUS, etc. Values are organized into groups according to their meaning.

For a full list of values go to the chapter **List of values (page 629)**.

Invalid flag

If valid data is not available for a particular value, the invalid flag is set to it. This situation may be due to the following:

- The value is not being evaluated in the scope of the current application and configuration.
- Sensor failure has been detected on an analog input.
- The configured ECU or extension module does not provide the particular value.
- The communication with the ECU or extension module is interrupted.

A value containing the invalid flag is displayed as "####" in InteliConfig and on the controller screen. If such a value is read out via MODBUS, it will contain the data 32768 in the case of signed values and 65535 in the case of unsigned values.

List of values

Group: Engine 632
RPM 632
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Mains PF 653
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Mains Load Character L2 654
Mains Load Character L3 654
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Group: Controller I/O 655
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Group: Engine

RPM

Value group	Engine	**Related FW**	2.1.0
Units	RPM		
Comm object	10123	**Related applications**	MINT, SPtM
Description			
This value contains the current engine speed. The value is obtained from one of the following sources: › ECU, if an ECU is configured › Pickup input › Generator frequency			

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ECU State

Value group	Engine	**Related FW**	2.1.0
Units	-		
Comm object	10034	**Related applications**	MINT, SPtM
Description			
Shows binary status (0 or 1) of ECU: › ECU Yellow Lamp › ECU Red Lamp › Wait To Start			

back to List of values

ECU Frequency Select

Value group	Engine	**Related FW**	2.1.0
Units	-		
Comm object	12926	**Related applications**	MINT, SPtM
Description			
Shows selected frequency of ECU. The value is calculated from setpoint **Nominal Frequency (page 320)** › If is **Nominal Frequency (page 320)** in range from 45 Hz to 54 Hz, is considered as 50 Hz application. The value is set to 0. › If is **Nominal Frequency (page 320)** 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 AIN 1

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10153	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 2

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10154	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 3

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10155	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 4

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10156	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 5

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10157	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 6

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10158	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 7

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10159	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 8

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10160	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 9

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10161	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 10

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10162	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 11

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10163	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 12

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10164	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 13

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10165	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 14

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10166	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 15

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10167	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 16

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10168	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 17

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10169	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 18

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10170	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 19

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10171	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU AIN 20

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10172	Related applications	MINT, SPtM
Description			
This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU. ***Note:*** *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*			

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ECU-AIN-EXT-1

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10173	Related applications	MINT, SPtM
Description			

This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.

Note: *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*

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ECU-AIN-EXT-2

Value group	Engine	Related FW	2.1.0
Units	Depends on ECU value		
Comm object	10174	Related applications	MINT, SPtM
Description			

This is one of the inputs, which are defined by ECU. Order of values depends on type of ECU.

Note: *Usually there are engine speed[RPM], fuel rate[L/h], coolant temperature[°C], intake temperature[°C], oil pressure[bar], boost pressure[bar], load[%], oil temperature[°C] etc.*

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Speed Request

Value group	Engine Speed/Load Control	Related FW	2.1.0
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 %.

Speed request	Requested speed	Accelerator pedal position
0%	1350 RPM	0%
50%	1500 RPM	50%
100%	1650 RPM	100%

Note: *Accelerator pedal position will be 0 if the engine is not running or loaded.*

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DPF Soot Load

Value group	Engine	Related FW	2.1.0
Units	%		
Comm object	12484	Related applications	MINT, SPtM
Description			
Indicates the soot load percentage of diesel particulate filter (DPF).			

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DPF Ash Load

Value group	Engine	Related FW	2.1.0
Units	%		
Comm object	12483	Related applications	MINT, SPtM
Description			
Indicates the ash load percentage of diesel particulate filter (DPF).			

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DEF Level

Value group	Engine	Related FW	2.1.0
Units	%		
Comm object	14522	Related applications	MINT, SPtM
Description			
The level of diesel exhaust fluid tank.			

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Group: Generator

Earth Fault Current

Value group	Generator	Related FW	2.1.0
Units	A		
Comm object	14325	Related applications	MINT, SPtM
Description			
Measured value of fault for evaluation of earth fault protection.			

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Generator Frequency

Value group	Generator	Related FW	2.1.0
Units	Hz		
Comm object	8210	Related applications	MINT, SPtM
Description			
Frequency of generator.			

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Generator Voltage

Value group	Generator	Related FW	2.1.0
Units	V		
Comm object	10645	Related applications	MINT, SPtM
Description			
Average value of all voltage phases of the Generator			

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Generator Voltage L1-L2

Value group	Generator	Related FW	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
Units	V		
Comm object	8194	Related applications	MINT, SPtM
Description			
Generator voltage on phase 3.			

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Generator V Unbalance Ph-N

Value group	Generator	Related FW	2.1.0
Units	V		
Comm object	10548	Related applications	MINT, SPtM
Description			

This value contains the maximum difference of values **Generator Voltage L1-N (page 640)**, **Generator Voltage L2-N (page 640)**, **Generator Voltage L3-N (page 641)** at a given moment.

> ***Note:*** *Difference of the values and the evaluation of the protection is influenced by the setpoint* ***Connection type (page 314)****.*

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Generator V Unbalance Ph-Ph

Value group	Generator	Related FW	2.1.0
Units	V		
Comm object	17336	Related applications	MINT, SPtM
Description			

This value contains the maximum difference of values **Generator Voltage L1-L2 (page 640)**, **Generator Voltage L2-L3 (page 640)**, **Generator Voltage L3-L1 (page 641)** at a given moment.

> ***Note:*** *Difference of the values and the evaluation of the protection is influenced by the setpoint* ***Connection type (page 314)****.*

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Generator Voltage THD L1

Value group	Generator	**Related FW**	2.1.0
Units	%		
Comm object	16052	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Voltage L1-N (page 640)**.			

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Generator Voltage THD L2

Value group	Generator	**Related FW**	2.1.0
Units	%		
Comm object	16053	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Voltage L2-N (page 640)**.			

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Generator Voltage THD L3

Value group	Generator	**Related FW**	2.1.0
Units	%		
Comm object	16054	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Voltage L3-N (page 641)**.			

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Generator Current THD L1

Value group	Generator	**Related FW**	2.1.0
Units	%		
Comm object	16056	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Current L1 (page 644)**.			

back to List of values

Generator Current THD L2

Value group	Generator	**Related FW**	2.1.0
Units	%		
Comm object	16057	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Generator Load Current L2 (page 644)**.			

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Generator Current THD L3

Value group	Generator	Related FW	2.1.0
Units	%		
Comm object	16058	Related applications	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Load Current L3 (page 644)**.			

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Nominal Current

Value group	Generator	Related FW	2.1.0
Units	A		
Comm object	9978	Related applications	MINT, SPtM
Description			

Generator nominal current.

Calculation of value Nominal Current in Autodetect:

- For Connection Type: SplPhL1L2 and SplPhL1L3 power factor 1 is used in the formula of calculation of value Nominal Current.

For the other types: High Leg Delta, 3Ph Low Y, 3Ph High Y, Mono Phase power factor 0.8 is used.

Note: *Visible only when **Connection type (page 314)** = Autodetect.*

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Nominal Power

Value group	Generator	Related FW	2.1.0
Units	V		
Comm object	9018	Related applications	MINT, SPtM
Description			

Generator nominal power.

Note: *Visible only when **Connection type (page 314)** = Autodetect.*

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Nominal Voltage

Value group	Generator	Related FW	2.1.0
Units	V		
Comm object	9917	Related applications	MINT, SPtM
Description			

Generator nominal voltage.

Note: *Visible only when **Connection type (page 314)** = Autodetect.*

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Slip Angle

Value group	Generator	Related FW	2.1.0
Units	°		
Comm object	8225	Related applications	MINT, SPtM
Description			
Slip angle during synchronization.			

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Slip Frequency

Value group	Generator	Related FW	2.1.0
Units	Hz		
Comm object	8224	Related applications	MINT, SPtM
Description			
Slip frequency during synchronization.			

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Generator Current L1

Value group	Generator	Related FW	2.1.0
Units	A		
Comm object	8198	Related applications	MINT, SPtM
Description			
Current phase L1 of Generator .			

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Generator Load Current L2

Value group	Generator	Related FW	2.1.0
Units	A		
Comm object	8199	Related applications	MINT, SPtM
Description			
Current phase L2 of Generator .			

back to List of values

Load Current L3

Value group	Generator	Related FW	2.1.0
Units	A		
Comm object	8200	Related applications	MINT, SPtM
Description			
Current phase L3 of Generator .			

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Generator Current Unbalance

Value group	Generator	Related FW	2.1.0
Units	A		
Comm object	10550	Related applications	MINT, SPtM
Description			
This value contains the maximum difference of values **Generator Current L1 (page 644)**, **Generator Load Current L2 (page 644)** and **Load Current L3 (page 644)**. ***Note:*** *Difference of the values and the evaluation of the protection is influenced by the setpoint* ***Connection type (page 314)****.*			

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Generator P

Value group	Generator	Related FW	2.1.0
Units	kW		
Comm object	8202	Related applications	MINT, SPtM
Description			
Generator active power.			

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Generator P L1

Value group	Generator	Related FW	2.1.0
Units	kW		
Comm object	8524	Related applications	MINT, SPtM
Description			
Generator active power in phase L1.			

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Generator P L2

Value group	Generator	Related FW	2.1.0
Units	kW		
Comm object	8525	Related applications	MINT, SPtM
Description			
Generator active power in phase L2.			

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Generator P L3

Value group	Generator	Related FW	2.1.0
Units	kW		
Comm object	8526	Related applications	MINT, SPtM
Description			
Generator active power in phase L3.			

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Generator Q

Value group	Generator	Related FW	2.1.0
Units	kVAr		
Comm object	8203	Related applications	MINT, SPtM
Description			
Generator reactive power.			

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Generator Q L1

Value group	Generator	Related FW	2.1.0
Units	kVAr		
Comm object	8527	Related applications	MINT, SPtM
Description			
Generator reactive power in phase L1.			

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Generator Q L2

Value group	Generator	Related FW	2.1.0
Units	kVAr		
Comm object	8528	Related applications	MINT, SPtM
Description			
Generator reactive power in phase L2.			

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Generator Q L3

Value group	Generator	Related FW	2.1.0
Units	kVAr		
Comm object	8529	Related applications	MINT, SPtM
Description			
Generator reactive power in phase L3.			

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Generator S

Value group	Generator	Related FW	2.1.0
Units	kVA		
Comm object	8565	Related applications	MINT, SPtM
Description			
Apparent power of Generator.			

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Generator S L1

Value group	Generator	Related FW	2.1.0
Units	kVA		
Comm object	8530	Related applications	MINT, SPtM
Description			
Generator apparent power L1.			

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Generator S L2

Value group	Generator	Related FW	2.1.0
Units	kVA		
Comm object	8531	Related applications	MINT, SPtM
Description			
Generator apparent power L2.			

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Generator S L3

Value group	Generator	Related FW	2.1.0
Units	kVA		
Comm object	8532	Related applications	MINT, SPtM
Description			
Generator apparent power L3.			

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Generator Power Factor

Load	Generator	Related FW	2.1.0
Units	[-]		
Comm object	8204	Related applications	MINT, SPtM
Description			
Generator power factor. ***Note:*** *This value stands for Load Power Factor as well.*			

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Generator Power Factor L1

Value group	Generator	Related FW	2.1.0
Units	[-]		
Comm object	8533	Related applications	MINT, SPtM
Description			
Generator power factor in phase L1.			

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Generator Power Factor L2

Value group	Generator	Related FW	2.1.0
Units	[-]		
Comm object	8534	Related applications	MINT, SPtM
Description			
Generator power factor in phase L2.			

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Generator Power Factor L3

Value group	Generator	Related FW	2.1.0
Units	[-]		
Comm object	8535	Related applications	MINT, SPtM
Description			
Generator power factor in phase L3.			

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Generator Load Character

Value group	Generator	Related FW	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
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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Group: Load

Load P

Value group	Load	Related FW	2.1.0
Units	kW		
Comm object	10601	Related applications	MINT, SPtM
Description			
Load active power.			

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Load Q

Value group	Load	Related FW	2.1.0
Units	kVAr		
Comm object	10644	Related applications	MINT, SPtM
Description			
Load reactive power.			

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Load Power Factor

Load	Load	**Related FW**	2.1.0
Units	[-]		
Comm object	9025	**Related applications**	MINT, SPtM
Description			
Load power factor.			

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Load Character

Value group	Load	**Related FW**	2.1.0
Units	[-]		
Comm object	9026	**Related applications**	MINT, SPtM
Description			
Character of the load. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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Group: Mains

Mains Frequency

Value group	Mains	**Related FW**	2.1.0
Units	Hz		
Comm object	8211	**Related applications**	MINT, SPtM
Description			
Frequency of Mains.			

back to List of values

Mains Voltage L1-N

Value group	Mains	**Related FW**	2.1.0
Units	V		
Comm object	8195	**Related applications**	MINT, SPtM
Description			
Mains voltage on phase 1.			

back to List of values

Mains Voltage L2-N

Value group	Mains	Related FW	2.1.0
Units	V		
Comm object	8196	Related applications	MINT, SPtM
Description			
Mains voltage on phase 2.			

back to List of values

Mains Voltage L3-N

Value group	Mains	Related FW	2.1.0
Units	V		
Comm object	8197	Related applications	MINT, SPtM
Description			
Mains voltage on phase 3.			

back to List of values

Mains Voltage L1-L2

Value group	Mains	Related FW	2.1.0
Units	V		
Comm object	9631	Related applications	MINT, SPtM
Description			
Mains phase to phase voltage between L1 and L2 phases.			

back to List of values

Mains Voltage L2-L3

Value group	Mains	Related FW	2.1.0
Units	V		
Comm object	9632	Related applications	MINT, SPtM
Description			
Mains phase to phase voltage between L2 and L3 phases.			

back to List of values

Mains Voltage L3-L1

Value group	Mains	Related FW	2.1.0
Units	V		
Comm object	9633	Related applications	MINT, SPtM
Description			
Mains phase to phase voltage between L3 and L1 phases.			

back to List of values

Mains/Bus Voltage

Value group	Mains	Related FW	2.1.0
Units	V		
Comm object	10666	Related applications	MINT, SPtM
Description			
Average value of all Mains/BusVoltage phases.			

back to List of values

Mains/Bus V Unabalance Ph-N

Value group	Mains	Related FW	2.1.0
Units	V		
Comm object	10549	Related applications	MINT, SPtM
Description			
This value contains the maximum difference of values **Mains Voltage L1-N (page 650)**, **Mains Voltage L2-N (page 651)**, **Mains Voltage L3-N (page 651)** at a given moment. ***Note:*** *Difference of the values and the evaluation of the protection is influenced by the setpoint* ***Connection type (page 314)****.*			

back to List of values

Mains/Bus V Unbalance Ph-Ph

Value group	Mains	Related FW	2.1.0
Units	V		
Comm object	17337	Related applications	MINT, SPtM
Description			
This value contains the maximum difference of values **Mains Voltage L1-L2 (page 651)**, **Mains Voltage L2-L3 (page 651)**, **Mains Voltage L3-L1 (page 651)** at a given moment. ***Note:*** *Difference of the values and the evaluation of the protection is influenced by the setpoint* ***Connection type (page 314)****.*			

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Mains L1 Current

Value group	Mains	Related FW	2.1.0
Units	A		
Comm object	8208	Related applications	MINT, SPtM
Description			
Mains current in phase L1.			

back to List of values

Mains Current THD L1

Value group	Mains/Bus	**Related FW**	2.1.0
Units	%		
Comm object	16064	**Related applications**	MINT, SPtM
Description			
Total Harmonic Distortion (THD) of **Mains L1 Current (page 652)**.			

back to List of values

Max Vector Shift

Value group	Mains	**Related FW**	2.1.0
Units	Hz		
Comm object	9847	**Related applications**	SPtM
Description			
This is maximal measured value of vector shift of the generator voltage. It is set to zero always when Controller goes to parallel to mains operation (When Vector Shift Protection = PARALLEL ONLY) or when MCB gets closed (when Vector shift protection = ENABLED).			

back to List of values

Mains Import P

Value group	Mains	**Related FW**	2.1.0
Units	kW		
Comm object	8703	**Related applications**	SPtM
Description			
Imported P from Mains.			

back to List of values

Mains Import Q

Value group	Mains	**Related FW**	2.1.0
Units	kVAr		
Comm object	8704	**Related applications**	SPtM
Description			
Imported Q from Mains.			

back to List of values

Mains PF

Value group	Mains	**Related FW**	2.1.0
Units	Hz		
Comm object	8705	**Related applications**	SPtM
Description			
Mains power factor.			

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Mains Load Character

Value group	Mains	Related FW	2.1.0
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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Mains Load Character L1

Value group	Mains	Related FW	2.1.0
Units	Hz		
Comm object	8818	Related applications	SPtM
Description			
Character of Mains load in phase L1. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

back to List of values

Mains Load Character L2

Value group	Mains	Related FW	2.1.0
Units	Hz		
Comm object	8819	Related applications	SPtM
Description			
Character of Mains load in phase L2. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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Mains Load Character L3

Value group	Mains	Related FW	2.1.0
Units	Hz		
Comm object	8820	Related applications	SPtM
Description			
Character of Mains load in phase L3. "L" means inductive load, "C" is capacitive and "R" is resistive load (power factor = 1).			

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ROCOF

Value group	Mains	**Related FW**	2.1.0
Units	Hz/s		
Comm object	9848	**Related applications**	SPtM
Description			
This value show actual measured value of ROCOF.			

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Max ROCOF

Value group	Mains	**Related FW**	2.1.0
Units	Hz/s		
Comm object	10049	**Related applications**	SPtM
Description			
This value show maximal measured value of ROCOF.			

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Group: User Buttons

User Button 1

Value group	User Buttons	**Related FW**	2.1.0
Units	[-]		
Comm object	20743	**Related applications**	MINT, SPtM
Description			
State of User Button 1. ***Note:*** *For more information* ***see User Buttons on page 240****.*			

back to List of values

Group: Controller I/O

Battery Volts

Value group	Controller I/O	**Related FW**	2.1.0
Units	V		
Comm object	8213	**Related applications**	MINT, SPtM
Description			
Controller supply voltage.			

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D+

Value group	Controller I/O	Related FW	2.1.0
Units	V		
Comm object	10603	Related applications	MINT, SPtM
Description			
D+ terminal voltage.			

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Analog Input 1

Value group	Controller I/O	Related FW	2.1.0
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	Controller I/O	Related FW	2.1.0
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	Controller I/O	Related FW	2.1.0
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	Controller I/O	Related FW	2.1.0
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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Binary Inputs

Value group	Controller I/O	Related FW	2.1.0
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	Controller I/O	Related FW	2.1.0
Units	[-]		
Comm object	8239	Related applications	MINT, SPtM
Description			
State of the binary outputs of the controller.			

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E-Stop

Value group	Controller I/O	Related FW	2.1.0
Units	%		
Comm object	15780	Related applications	MINT, SPtM
Description			

Shows number of E-STOP input – the same principle of visualization like binary inputs.
Principle of value (principle of normally close binary input):

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

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Group: Power Management

Actual Power Band

Value group	Power Management	Related FW	2.1.0
Units	-		
Comm object	8974	Related applications	MINT
Description			

State of all Gen-sets in actual power band of power management. 1 means that Gen-set is running, 0 means that Gen-set is stopped.

Note: *This value is evaluated only in controller with the lowest CAN address.*

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Next Power Band

Value group	Power Management	Related FW	2.1.0
Units	-		
Comm object	8975	Related applications	MINT
Description			
State of all Gen-sets in next higher power band of power management. 1 means that Gen-set is running, 0 means that Gen-set is stopped. ***Note:*** *This value is evaluated only in controller with the lowest CAN address.*			

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Actual Relative Reserve

Value group	Power Management	Related FW	2.1.0
Units	%		
Comm object	10788	Related applications	MINT
Description			
Actual relative reserve in power management.			

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Actual Reserve

Value group	Power Management	Related FW	2.1.0
Units	kW		
Comm object	15805	Related applications	MINT
Description			
Actual absolute reserve in power management.			

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Start Relative Reserve

Value group	Power Management	Related FW	2.1.0
Units	%		
Comm object	10786	Related applications	MINT
Description			
Actual relative reserve for start.			

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Start Reserve

Value group	Power Management	**Related FW**	2.1.0
Units	kW		
Comm object	15806	**Related applications**	MINT
Description			
Actual absolute reserve for start.			

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Stop Relative Reserve

Value group	Power Management	**Related FW**	2.1.0
Units	%		
Comm object	10787	**Related applications**	MINT
Description			
Actual relative reserve – when the relative reserve is higher than this value the last started Gen-set (the Gen-set with the highest priority) is stopped.			

back to List of values

Stop Reserve

Value group	Power Management	**Related FW**	2.1.0
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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Dynamic Spinning Reserve

Value group	Power Management	**Related FW**	2.1.0
Units	kW		
Comm object	15673	**Related applications**	MINT
Description			

Dynamic Spinning Reserve – DSR is a value, which is used to influence standard power management operation by adding DSR to currently used starting and stopping thresholds given by parameters **#Starting Load Reserve 1 (page 419)**, **#Starting Load Reserve 2 (page 421)** and **#Stopping Load Reserve 1 (page 420)**, **#Stopping Load Reserve 2 (page 422)**.

Actual thresholds used by power management are then values **Start Reserve (page 659)** and **Stop Reserve (page 659)**. DSR is used by power management, if **Dynamic Spinning Reserve (page 417)** is set to ENABLED and valid value is received from the IS-NTC HYBRID controller. DSR is 0, if **Dynamic Spinning Reserve (page 417)** is set to DISABLED or the value received from the IS-NTC HYBRID controller is invalid (#####).

> **Example:** Power management operates with **#Starting Load Reserve 1 (page 419)** = 100 kW and **#Stopping Load Reserve 1 (page 420)** = 200 kW. DSR value received from the IS-NTC HYBRID controller is 50 kW. It means that actual starting threshold **Start Reserve (page 659)** is 150 kW and actual stopping threshold **Stop Reserve (page 659)** is 250 kW.

Note: *DSR is used by power management only when it operates in the absolute mode (**#Power Management Mode (page 416)** is set to ABS (kW)).*

Note: *DSR is received automatically from the IS-NTC HYBRID controller via CAN2 bus.*

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Dynamic Spinning Reserve Offset

Value group	Power Management	**Related FW**	2.1.0
Units	kW		
Comm object	15674	**Related applications**	MINT
Description			

Dynamic Spinning Reserve Offset – DSRO is a value, which is used to influence standard power management operation by adding DSRO together with **Dynamic Spinning Reserve (page 660)** to currently used stopping threshold given by parameter **#Stopping Load Reserve 1 (page 420)**, **#Stopping Load Reserve 2 (page 422)**, #LoadResStop 3 or #LoadResStop 4.

Actual threshold used by power management is then value **Stop Reserve (page 659)**. DSRO is used by power management, if **Dynamic Spinning Reserve (page 417)** is set to ENABLED and valid value is received from the IS-NTC HYBRID controller. DSRO is 0, if **Dynamic Spinning Reserve (page 417)** is set to DISABLED or the value received from the IS-NTC HYBRID controller is invalid (#####).

> **Example:** Power management operates with **#Stopping Load Reserve 1 (page 420)** = 200 kW. DSRO received from the IS-NTC HYBRID controller is 20 kW and DSR value received from the IS-NTC HYBRID controller is 50 kW. It means that actual stopping threshold **Stop Reserve (page 659)** is 270 kW (**#Stopping Load Reserve 1 (page 420)** + **Dynamic Spinning Reserve (page 660)** + **Dynamic Spinning Reserve Offset (page 661)** = 200 + 50 + 20 = 270).

Note: *DSRO is used by power management only when it operates in the absolute mode (**#Power Management Mode (page 416)** is set to ABS (kW)).*

Note: *DSRO is received automatically from the IS-NTC HYBRID controller via CAN2 bus.*

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Engine Priority

Value group	Power Management	**Related FW**	2.1.0
Units	-		
Comm object	8624	**Related applications**	MINT
Description			

This value shows current priority number. It corresponds to the setpoint **Priority (page 417)** except following situations:

- If at least one of binary inputs **TOP PRIORITY (PAGE 758)** is configured on some source and is active
- **#Priority Auto Swap (page 418)** is active

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Minimal Running Power

Value group	Power Management	**Related FW**	2.1.0
Units	kW		
Comm object	10012	**Related applications**	MINT
Description			

Actual minimal nominal power of all Gen-sets, which are running.

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Total Running Q

Value group	Power Management	Related FW	2.1.0
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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Total Running P

Value group	Power Management	Related FW	2.1.0
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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Total Running S

Value group	Power Management	Related FW	2.1.0
Units	kVA		
Comm object	16424	Related applications	MINT, SPtM
Description			
Actual value of apparent power from all Gen-sets running in **Power management (page 203)**.			

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Running Nominal Power In PM

Value group	Power Management	Related FW	2.1.0
Units	kW		
Comm object	10999	Related applications	MINT
Description			
Actual nominal power of all Gen-sets, which are running.			

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Running Nominal Power Of All

Value group	Power Management	Related FW	2.1.0
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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Available Nominal Power In PM

Value group	Power Management	Related FW	2.1.0
Units	kW		
Comm object	10998	Related applications	MINT
Description			
Available nominal power of all Gen-sets in power management.			

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Group: Speed/Load Control

Required P Target

Value group	Speed/Load Control	Related FW	2.1.0
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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Loadsharing Output

Value group	Speed/Load Control	Related FW	2.1.0
Units	%		
Comm object	10924	Related applications	MINT, SPtM
Description			
Load sharing regulation loop output.			

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Required P

Value group	Voltage/PF Control	Related FW	2.1.0
Units	kW		
Comm object	13105	Related applications	MINT, SPtM
Description			
Requested active power.			

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Requested RPM

Value group	Engine	Related FW	2.1.0
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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Speed Regulator Output

Value group	Speed/Load Control	Related FW	2.1.0
Units	Hz		
Comm object	9052	Related applications	MINT, SPtM
Description			
This is the actual voltage on the speed governor output of the controller. In case the output is switched to PWM mode, the relation is 10 V ~ 100 % PWM. -10 V is 0 % PWM			

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System Load Control

Value group	Speed/Load Control	Related FW	2.1.0
Units	[-]		
Comm object	10792	Related applications	MINT, SPtM
Description			

This value contains the actual LoadControl mode that the Gen-set is currently using. This value may differ from setpoint **Load Control PTM Mode (page 294)** which contains requested Load Control mode.

List of possible states:

None	The system is not operating.
Island	The system operates in the Island mode.
Baseload	The system operates in Baseload mode.
Baseload with I/E Limit	The system operates in Baseload mode with import/export limitation.
Import/Export	The system operates in Import/Export mode which is adjusted by the setpoint **Import Load (page 299)**.

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Group: Voltage/PF Control

Reactive Q

Value group	Voltage/PF Control	**Related FW**	2.1.0
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**	2.1.0
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**	2.1.0
Units	%		
Comm object	14997	**Related applications**	MINT, SPtM
Description			
Internal Voltage request of internal Voltage regulator.			

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Group: Remote Control

RemoteControl2B 1

Value group	Remote Control	**Related FW**	2.1.0
Units	-		
Comm object	16671	**Related applications**	MINT, SPtM
Description			
This value contains user data written over MODBUS-RTU or MODBUS-TCP. Data type of this value is Int16.			

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RemoteControl2B 2

Value group	Remote Control	Related FW	2.1.0
Units	-		
Comm object	16672	Related applications	MINT, SPtM
Description			
This value contains user data written over MODBUS-RTU or MODBUS-TCP. Data type of this value is Int16.			

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RemoteControl2B 3

Value group	Remote Control	Related FW	2.1.0
Units	-		
Comm object	16673	Related applications	MINT, SPtM
Description			
This value contains user data written over MODBUS-RTU or MODBUS-TCP. Data type of this value is Int16.			

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RemoteControl2B 4

Value group	Remote Control	Related FW	2.1.0
Units	-		
Comm object	16674	Related applications	MINT, SPtM
Description			
This value contains user data written over MODBUS-RTU or MODBUS-TCP. Data type of this value is Int16.			

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RemoteControl4B 1

Value group	Remote Control	Related FW	2.1.0
Units	-		
Comm object	16679	Related applications	MINT, SPtM
Description			
This value contains user data written over MODBUS-RTU or MODBUS-TCP. Data type of this value is Int32.			

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RemoteControl4B 2

Value group	Remote Control	Related FW	2.1.0
Units	-		
Comm object	16680	Related applications	MINT, SPtM
Description			
This value contains user data written over MODBUS-RTU or MODBUS-TCP. Data type of this value is Int32.			

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RemoteControlBin

Value group	Remote Control	Related FW	2.1.0
Units	-		
Comm object	16683	Related applications	MINT, SPtM
Description			
This value contains user data written over MODBUS-RTU or MODBUS-TCP. Data type of this value is Binary16.			

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Group: Statistics

Genset kWh

Value group	Statistics	Related FW	2.1.0
Units	kWh		
Comm object	8205	Related applications	MINT, SPtM
Description			
Counter of Gen-set active power.			

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Genset kVArh

Value group	Statistics	Related FW	2.1.0
Units	kVArh		
Comm object	8539	Related applications	MINT, SPtM
Description			
Counter of Gen-set reactive power.			

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Mains kWh

Value group	Statistics	Related FW	2.1.0
Units	kWh		
Comm object	11025	Related applications	MINT, SPtM
Description			
Counter of mains active power .			

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Mains kVArh

Value group	Statistics	Related FW	2.1.0
Units	kVArh		
Comm object	11026	Related applications	MINT, SPtM
Description			
Counter of mains reactive power.			

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Conditioned Hours Counter 1

Value group	Statistics	Related FW	2.1.0
Units	[h]		
Comm object	20292	Related applications	MINT, SPtM
Description			
This value contains counted hours of running the engine while LBI CONDITIONED HOURS COUNTER 1 (PAGE 719) is active. ***Note:*** *The engine has to be also running although it is not required to be excited.*			

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Conditioned Hours Counter 2

Value group	Statistics	Related FW	2.1.0
Units	[h]		
Comm object	20293	Related applications	MINT, SPtM
Description			
This value contains counted hours of running the engine while LBI CONDITIONED HOURS COUNTER 2 (PAGE 719) is active. ***Note:*** *The engine has to be also running although it is not required to be excited.*			

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Maintenance Timer 1 RunHours

Value group	Statistics	Related FW	2.1.0
Units	hours		
Comm object	11616	Related applications	MINT, SPtM
Description			
Countdown until next maintenance 1. Statistic value for **Maintenance Timer 1 RunHours (page 365)**.			

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Maintenance Timer 1 Interval

Value group	Statistics	Related FW	2.1.0
Units	days		
Comm object	16387	Related applications	MINT, SPtM
Description			
Countdown until next maintenance 1. Statistic value for **Maintenance Timer 1 Interval (page 365)**.			

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Maintenance Timer 2 RunHours

Value group	Statistics	Related FW	2.1.0
Units	hours		
Comm object	11617	Related applications	MINT, SPtM
Description			
Countdown until next maintenance 2. Statistic value for **Maintenance Timer 2 RunHours (page 366)**.			

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Maintenance Timer 2 Interval

Value group	Statistics	Related FW	2.1.0
Units	days		
Comm object	16388	Related applications	MINT, SPtM
Description			
Countdown until next maintenance 2. Statistic value for **Maintenance Timer 2 Interval (page 367)**.			

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Maintenance Timer 3 RunHours

Value group	Statistics	Related FW	2.1.0
Units	hours		
Comm object	11618	Related applications	MINT, SPtM
Description			
Countdown until next maintenance 3. Statistic value for **Maintenance Timer 3 RunHours (page 368)**.			

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Maintenance Timer 3 Interval

Value group	Statistics	Related FW	2.1.0
Units	days		
Comm object	16389	Related applications	MINT, SPtM
Description			
Countdown until next maintenance 3. Statistic value for **Maintenance Timer 3 Interval (page 368)**.			

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Maintenance Timer 4 RunHours

Value group	Statistics	Related FW	2.1.0
Units	hours		
Comm object	11619	Related applications	MINT, SPtM
Description			
Countdown until next maintenance 4. Statistic value for **Maintenance Timer 4 RunHours (page 369)**.			

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Maintenance Timer 4 Interval

Value group	Statistics	Related FW	2.1.0
Units	days		
Comm object	20288	Related applications	MINT, SPtM
Description			
Countdown until next maintenance 4. Statistic value for **Maintenance Timer 4 Interval (page 370)**.			

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Rental 1

Value group	Statistics	Related FW	2.1.0
Units	hours		
Comm object	14328	Related applications	MINT, SPtM
Description			
Remaining hours of **Rental Timer 1 (page 548)**.			

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Rental 2

Value group	Statistics	Related FW	2.1.0
Units	days		
Comm object	14369	Related applications	MINT, SPtM
Description			
Remaining days of **Rental Timer 2 (page 550)**.			

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Num E-Stops

Value group	Statistics	Related FW	2.1.0
Units	[-]		
Comm object	11195	Related applications	MINT, SPtM
Description			
Emergency stop alarms counter. ***Note:*** *This value counts only in case that Gen-set was stopped due to E-Stop or Emergency Stop.*			

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Shutdowns

Value group	Statistics	Related FW	2.1.0
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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Total Fuel Consumption

Value group	Statistics	Related FW	2.1.0
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 351)** setpoint)

Note: *The accuracy of Total Fuel Consumption depends on the precision of ECU values or precision of **Fuel Tank Volume (page 351)** and fuel level sensor.*

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Time Till Empty 1

Value group	Statistics	Related FW	2.1.0
Units	days		
Comm object	13770	Related applications	MINT, SPtM
Description			

Assessment in days when the fuel tank will be empty.

Note: *This value is based on setpoint **Fuel Tank Volume (page 351)** 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 2

Value group	Statistics	Related FW	2.1.0
Units	hours		
Comm object	13771	Related applications	MINT, SPtM
Description			

Assessment in hours when the fuel tank will be empty.

Note: *This value is based on setpoint **Fuel Tank Volume (page 351)** and value from ECU Fuel Rate. For correct calculation of this value is necessary to have configured ECU which send Fuel Rate value, otherwise this value can't be calculated.*

back to List of values

Time Till Empty 3

Value group	Statistics	Related FW	2.1.0
Units	minutes		
Comm object	13772	Related applications	MINT, SPtM
Description			
Assessment in minutes when the fuel tank will be empty. ***Note:*** *This value is based on setpoint* ***Fuel Tank Volume (page 351)*** *and value from ECU Fuel Rate. For correct calculation of this value is necessary to have configured ECU which send Fuel Rate value, otherwise this value can't be calculated.*			

back to List of values

Num Starts

Value group	Statistics	Related FW	2.1.0
Units	[-]		
Comm object	8207	Related applications	MINT, SPtM
Description			
Engine start commands counter. The counter is increased by 1 even if the particular start command will take more than one attempt.			

back to List of values

Pulse Counter 1

Value group	Statistics	Related FW	2.1.0
Units	-		
Comm object	10986	Related applications	MINT, SPtM
Description			
This is the value of **Pulse Counter 1 (page 747)** function. ***Note:*** *Maximum value is 1000000.*			

back to List of values

Pulse Counter 2

Value group	Statistics	Related FW	2.1.0
Units	-		
Comm object	10987	Related applications	MINT, SPtM
Description			
This is the value of **Pulse Counter 2 (page 748)** function. ***Note:*** *Maximum value is 1000000.*			

back to List of values

Running Hours

Value group	Statistics	Related FW	2.1.0
Units	hours		
Comm object	8206	Related applications	MINT, SPtM
Description			
Engine operation hours counter. The engine hours are incremented in the controller while the engine is running. ***Note:*** *If an ECU is configured and it provides engine hours value, the value is taken from the ECU.*			

back to List of values

Group: Info

Active Application

Value group	Info	Related FW	2.1.0
Units	[-]		
Comm object	14446	Related applications	MINT, SPtM
Description			
This Value mirrors the active application in the controller. **Example:** MINT or SPtM.			

back to List of values

Application

Value group	IL Info Info	Related FW	2.1.0
Units	[-]		
Comm object	8480	Related applications	MINT, SPtM
Description			
The value contains actual application in controller. **Example:** GC or AGC (Gen-set controller or advanced Gen-set controller).			

back to List of values

Breaker State

Value group	IL Info Info	Related FW	2.1.0
Units	[-]		
Comm object	9245	Related applications	MINT, SPtM
Description			
The value contains actual "breaker state" message which is shown on the main screen of the controller.			

back to List of values

Connection Type

Value group	IL Info Info	**Related FW**	2.1.0
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 314)**.			

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Controller Mode

Value group	Info	**Related FW**	2.1.0
Units	[-]		
Comm object	9887	**Related applications**	MINT, SPtM
Description			
Controller mode.			

back to List of values

Engine State

Value group	IL Info Info	**Related FW**	2.1.0
Units	[-]		
Comm object	9244	**Related applications**	MINT, SPtM
Description			
The value contains actual "engine state" message which is shown on the main screen of the controller.			

back to List of values

SW Key Feature List

Value group	IL Info	**Related FW**	2.1.0
Units	[-]		
Comm object	20591	**Related applications**	MINT, SPtM
Description			
This value is used to fill SW Key in the controller.			

back to List of values

CAN Intercontroller Comm Mode

Value group	IL Info	Related FW	2.1.0
Units	[-]		
Comm object	23969	Related applications	MINT, SPtM
Description			
This value contains actual mode of CAN Intercontroller communication.			

back to List of values

CAN16

Value group	IL Info	Related FW	2.1.0
Units	[-]		
Comm object	8546	Related applications	MINT, SPtM
Description			
Bits of this value show "1" if the controller receives messages from the controller which has address corresponding with the bit position. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16.			

back to List of values

CAN32

Value group	IL Info	Related FW	2.1.0
Units	[-]		
Comm object	8827	Related applications	MINT, SPtM
Description			
Bits of this value show "1" if the controller receives messages from the controller which has address corresponding with the bit position. Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32.			

back to List of values

Reg16

Value group	IL Info	Related FW	2.1.0
Units	-		
Comm object	11081	Related applications	MINT, SPtM
Description			
Bits of this value show "1" if the controller which has address corresponding with the bit position plays active role in the power management. Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16.			

back to List of values

Reg32

Value group	IL Info	Related FW	2.1.0
Units	-		
Comm object	11082	Related applications	MINT, SPtM
Description			
Bits of this value show "1" if the controller which has address corresponding with the bit position plays active role in the power management. Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32.			

back to List of values

HW Version

Value group	Info	Related FW	2.1.0
Units	[-]		
Comm object	23887	Related applications	MINT, SPtM
Description			
Major and minor hardware version number. ***Note:*** *This value is invisible in standard configuration.*			

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FW Branch

Value group	IL Info Info	Related FW	2.1.0
Units	[-]		
Comm object	8707	Related applications	MINT, SPtM
Description			
The value contains actual branch of firmware in controller.			

back to List of values

FW Version

Value group	IL Info Info	Related FW	2.1.0
Units	[-]		
Comm object	24339	Related applications	MINT, SPtM
Description			
Major and minor firmware version number.			

back to List of values

Forced Value Status

Value group	Info	**Related FW**	2.1.0
Units	[-]		
Comm object	20544	**Related applications**	MINT, SPtM
Description			
This value contains list of all 32 LBIs for Forced Value. Logical 1 means that the respective LBI is currently activated. ***Note:*** *For more information* ***see Forced Value on page 159****.*			

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Gen Loaded 16

Value group	IL Info	**Related FW**	2.1.0
Units	[-]		
Comm object	10196	**Related applications**	MINT, SPtM
Description			
Bits of this value show "1" if the controller which has address corresponding with the bit position is loaded (GCB closed). Bit 0 represents address 1 etc. This value contains information about controllers with addresses 1-16.			

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Gen Loaded 32

Value group	IL Info	**Related FW**	2.1.0
Units	[-]		
Comm object	10197	**Related applications**	MINT, SPtM
Description			
Bits of this value show "1" if the controller which has address corresponding with the bit position is loaded (GCB closed). Bit 0 represents address 17 etc. This value contains information about controllers with addresses 17-32.			

back to List of values

ID String

Value group	IL Info Info	**Related FW**	2.1.0
Units	[-]		
Comm object	24501	**Related applications**	MINT, SPtM
Description			
Name of controller which is used in InteliConfig in command bar.			

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Load Shedding Status

Value group	IL Info Info Load shedding	**Related FW**	2.1.0
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 52, where 0 means no load shedding stage is active and 1, 2, 3, 4 or 5 means that the corresponding load shedding stage is active.			

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SPI Module A

Value group	IL Info Info	**Related FW**	2.1.0
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 Info	**Related FW**	2.1.0
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 Text

Value group	IL Info Info	**Related FW**	2.1.0
Units	[-]		
Comm object	10040	**Related applications**	MINT, SPtM
Description			
The value contains the numeric code of the "Current process timer" text which is shown on the main screen of the controller. The assignment of texts to the codes can be obtained using InteliConfig. Open any connection (also offline with a previously saved archive) and go to the Tools ribbon -> Generate CFG image (all). The resulting file will contain the assignment of texts to the codes.			

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Timer Value

Value group	IL Info Info	**Related FW**	2.1.0
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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Group: Log Bout

Log Bout 1

Value group	Log Bout	**Related FW**	2.1.0
Units	[-]		
Comm object	9143	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 2

Value group	Log Bout	**Related FW**	2.1.0
Units	[-]		
Comm object	9144	**Related applications**	MINT, SPtM
Description			
State of binary outputs.			

back to List of values

Log Bout 3

Value group	Log Bout	Related FW	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
Units	[-]		
Comm object	11896	Related applications	MINT, SPtM
Description			
State of binary outputs.			

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Group: Fixed Protection States

Fixed Protections States 1

Value group	Fixed Protection States	Related FW	2.1.0
Units	[-]		
Comm object	20744	Related applications	MINT, SPtM
Description			
Values of LBO Fixed Protections State.			

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Fixed Protections States 2

Value group	Fixed Protection States	Related FW	2.1.0
Units	[-]		
Comm object	20745	Related applications	MINT, SPtM
Description			
Values of LBO Fixed Protections State.			

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Fixed Protections States 3

Value group	Fixed Protection States	**Related FW**	2.1.0
Units	[-]		
Comm object	20746	**Related applications**	MINT, SPtM
Description			
Values of LBO Fixed Protections State.			

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Fixed Protections States 4

Value group	Fixed Protection States	**Related FW**	2.1.0
Units	[-]		
Comm object	20747	**Related applications**	MINT, SPtM
Description			
Values of LBO Fixed Protections State.			

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Fixed Protections States 5

Value group	Fixed Protection States	**Related FW**	2.1.0
Units	[-]		
Comm object	20748	**Related applications**	MINT, SPtM
Description			
Values of LBO Fixed Protections State.			

back to List of values

Fixed Protections States 6

Value group	Fixed Protection States	**Related FW**	2.1.0
Units	[-]		
Comm object	20749	**Related applications**	MINT, SPtM
Description			
Values of LBO Fixed Protections State.			

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Group: User Protection States

User Protections States 1

Value group	User Protection States	**Related FW**	2.1.0
Units	[-]		
Comm object	20759	**Related applications**	MINT, SPtM
Description			
Values of LBO User Protections State.			

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Group: CM-4G-GPS

Signal Strength

Value group	CM-4G-GPS	**Related FW**	2.1.0
Units	%		
Comm object	24302	**Related applications**	MINT, SPtM
Description			
This value contains information about relative strength of the cellular signal received by the CM2-4G-GPS module. It is a relative value helping to find the best signal and for troubleshooting cases.			

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Network Status

Value group	CM-4G-GPS	**Related FW**	2.1.0
Units	[-]		
Comm object	23972	**Related applications**	MINT, SPtM
Description			

The text of this value represents the status of the GSM modem.

Code	Description
Not availab	Not available
Available	Available
Attached	Attached

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Last Email Result

Value group	CM-4G-GPS	Related FW	2.1.0
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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Network Name

Value group	CM-4G-GPS	**Related FW**	2.1.0
Units	[-]		
Comm object	24147	**Related applications**	MINT, SPtM
Description			
The name of operator which to SIM card is connected. ***Note:*** *If roaming service is used then prefix "R" is added before the name of operator.*			

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Network Mode

Value group	CM-4G-GPS	**Related FW**	2.1.0
Units	[-]		
Comm object	24146	**Related applications**	MINT, SPtM
Description			
The type of data connection.			

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GPS Status

Value group	CM-4G-GPS	**Related FW**	2.1.0
Units	[-]		
Comm object	23973	**Related applications**	MINT, SPtM
Description			

Value describing the GPS signal.

Code	Description
Undefined	GPS signal is not available. Check antenna connection.
Searching	Looking up for signal from available satellites.
Fixed	GPS signal available.

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Latitude

Value group	CM-4G-GPS	**Related FW**	2.1.0
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	**Related FW**	2.1.0
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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Active Satellites

Value group	CM-4G-GPS	**Related FW**	2.1.0
Units	[-]		
Comm object	24265	**Related applications**	MINT, SPtM
Description			
Number of available satellites for GPS location.			

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Speed

Value group	CM-4G-GPS	**Related FW**	2.1.0
Units	km/h		
Comm object	24264	**Related applications**	MINT, SPtM
Description			
Actual speed of the controller calculated from the GPS coordinates.			

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HomePosDist

Value group	CM-4G-GPS	**Related FW**	2.1.0
Units	km		
Comm object	11680	**Related applications**	MINT, SPtM
Description			
Actual distance from home position. Home position is adjusted via setpoints **Home Latitude (page 553)** and **Home Longitude (page 554)** or by binary input **GEO HOME POSITION (PAGE 736)**.			

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AirGate Status

Value group	CM-4G-GPS	Related FW	2.1.0
Units	[-]		
Comm object	23967	Related applications	MINT, SPtM
Description			
Diagnostic code for AirGate connection. Helps in troubleshooting.			

AirGate Status

Code	Description
Not defined	Setpoint AirGate Connection is Disabled
Wait to connect	Waiting to connect
Resolving	Resolving
Connecting	Connecting
Creat sec chan	Creating secure channel
Registering	Registering
Conn inoperable	Connected, inoperable
Conn operable	Connected, operable
Susp AGkeyEmpty	AirGate is not set in the controller

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AirGate ID

Value group	CM-GPRS; CM-4G-GPS	Related FW	2.1.0
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 Servicing Node

Value group	CM-4G-GPS	Related FW	2.1.0
Units	[-]		
Comm object	23991	Related applications	MINT, SPtM
Description			
IP address of AirGate 2 node to which the module is currently attached.			

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Current IP Address

Value group	CM-4G-GPS	Related FW	2.1.0
Units	[-]		
Comm object	23971	Related applications	MINT, SPtM
Description			
Current IP address of the controller.			

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Primary DNS

Value group	CM-4G-GPS	Related FW	2.1.0
Units	[-]		
Comm object	23984	Related applications	MINT, SPtM
Description			
Primary domain name server.			

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Secondary DNS

Value group	CM-4G-GPS	Related FW	2.1.0
Units	[-]		
Comm object	23983	Related applications	MINT, SPtM
Description			
Secondary domain name server.			

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Modem Status

Value group	CM-4G-GPS	Related FW	2.1.0
Units	[-]		
Comm object	24288	Related applications	MINT, SPtM
Description			
The text of this value represents the status of the modem.			

Modem Status

Code	Description
OK	Module successfully initialized and connected to the cellular network
E01	Unsuccessful restore to the factory settings
E02	Modem configuration error
E SIM	SIM not inserted or locked by PIN. › Use another device (e.g. mobile phone) to disable the option for SIM to be locked by PIN

E04	It is not possible to set manually chosen network mode 2G/3G/4G/Automatic
E registration	It is not possible to register into cellular network. Possible reasons: › No signal (no coverage, broken or unconnected antenna) › Manually chosen network mode 2G/3G/4G is not available
E context	It is not possible to set PDP (Packet Data Protocol) context for defined APN (Access Point Name). Possible reasons: › Setpoint Access Point Name is not correctly set (format) › Wrong PDP context number
E connect	It is not possible to connect to cellular network (ATD*99***context) Possible reasons: › Setpoint Access Point Name is not correctly set (wrong text)
E08	Modem configuration error
E09	It is not possible to get signal strength
E10	It is not possible to get operator name
E11	Loss of registration into cellular network was detected
E12	Data error
E13	Data error
E14	Modem was restarted
E SMS send	It is not possible to send SMS. Possible reasons: › Wrong number › SIM doesn't support SMS
E18	Modem hardware configuration error
E conn lost	Loss of connection with cellular network
E19	Modem configuration error
Restart-config	Modem was restarted due to the change of controller setpoint
Restart-app	Modem was restarted due to the performed cellular connection check

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Modem FW Version

Value group	CM-4G-GPS	**Related FW**	2.1.0
Units	[-]		
Comm object	24149	**Related applications**	MINT, SPtM
Description			
FW version of the modem.			

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Group: CM-Ethernet

AirGate Status

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	23910	Related applications	MINT, SPtM
Description			

Diagnostic code for AirGate connection. Helps in troubleshooting.

Code	Description
Not defined	Setpoint AirGate Connection is Disabled
Wait to connect	Waiting to connect
Resolving	Resolving
Connecting	Connecting
Creat sec chan	Creating secure channel
Registering	Registering
Conn inoperable	Connected, inoperable
Conn operable	Connected, operable

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AirGate Servicing Node

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	23915	Related applications	MINT, SPtM
Description			

IP address of AirGate 2 node to which the module is currently attached.

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AirGate ID

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	23926	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 IP Address

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	23931	Related applications	MINT, SPtM
Description			
Current IP address of the controller.			

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Current Gateway

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	23929	Related applications	MINT, SPtM
Description			
Current gateway address.			

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Current Subnet Mask

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	23930	Related applications	MINT, SPtM
Description			
Current subnet mask.			

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Primary DNS

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	23928	Related applications	MINT, SPtM
Description			
Current domain name server.			

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Secondary DNS

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	23927	Related applications	MINT, SPtM
Description			
Backup domain name server.			

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Last Email Results

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	23925	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	Cannot resolve SMTP server's IP address.
32	Error while reading email content data (24327).

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MAC Address

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	23932	Related applications	MINT, SPtM
Description			

Current MAC address of the controller ethernet interface.

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ETH Interface Status

Value group	CM-Ethernet	**Related FW**	2.1.0
Units	[-]		
Comm object	23916	**Related applications**	MINT, SPtM
Description			
Current status of ethernet communication.			

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Ethernet PHY Mode

Value group	CM-Ethernet	**Related FW**	2.1.0
Units	[-]		
Comm object	23916	**Related applications**	MINT, SPtM
Description			

Ethernet interface mode:

10- HD	10 Mbit Half-Duplex
10- FD	10 Mbit Full-Duplex
100- HD	100 Mbit Half-Duplex
10- FD	100 Mbit Full-Duplex

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Group: Ethernet

ETH Interface Status

Value group	CM-Ethernet	**Related FW**	2.1.0
Units	[-]		
Comm object	24180	**Related applications**	MINT, SPtM
Description			
Current status of ethernet communication.			

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Current IP Address

Value group	CM-Ethernet	**Related FW**	2.1.0
Units	[-]		
Comm object	24184	**Related applications**	MINT, SPtM
Description			
Current IP address of the controller.			

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Current Subnet Mask

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	24183	Related applications	MINT, SPtM
Description			
Current subnet mask.			

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Current Gateway

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	24182	Related applications	MINT, SPtM
Description			
Current gateway address.			

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Primary DNS

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	24181	Related applications	MINT, SPtM
Description			
Current domain name server.			

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Secondary DNS

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	24100	Related applications	MINT, SPtM
Description			
Backup domain name server.			

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AirGate ID

Value group	CM-EthernetInfo	Related FW	2.1.0
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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AirGate Servicing Node

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	24010	**Related applications**	MINT, SPtM
Description			
IP address of AirGate 2 node to which the module is currently attached.			

back to List of values

AirGate Status

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	24007	**Related applications**	MINT, SPtM
Description			

Diagnostic code for AirGate connection. Helps in troubleshooting.

Code	Description
Not defined	Setpoint AirGate Connection is Disabled
Wait to connect	Waiting to connect
Resolving	Resolving
Connecting	Connecting
Creat sec chan	Creating secure channel
Registering	Registering
Conn inoperable	Connected, inoperable
Conn operable	Connected, operable

back to List of values

Last Email Results

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	24332	Related applications	MINT, SPtM
Description			

Result of last email, which was sent by controller.

Code	Description
0	Email was successfully sent.
2	It is not possible to establish connection with SMTP server.
3	SMTP server is not ready for communication.
8	HELO command was refused.
9	EHLO command was refused.
11	AUTH LOGIN command was refused.
12	Wrong user name.
13	Wrong password.
14	MAIL FROM command was refused.
15	RCPT TO command was refused.
16	DATA command was refused.
17	Sending of email failed.
20	QUIT command was refused.
25	It is impossible to create data for command DATA.
26	It is impossible to read data for command DATA.
27	Email address can’t be read.
30	SMTP server address translation error (from DNS server).
31	Error reading email content data (24327).

back to List of values

MAC Address

Value group	CM-Ethernet	Related FW	2.1.0
Units	[-]		
Comm object	24333	Related applications	MINT, SPtM
Description			

Current MAC address of the controller ethernet interface.

back to List of values

Ethernet PHY Mode

Value group	CM-Ethernet	**Related FW**	2.1.0
Units	[-]		
Comm object	24088	**Related applications**	MINT, SPtM
Description			

Ethernet interface mode:

10- HD	10 Mbit Half-Duplex
10- FD	10 Mbit Full-Duplex
100- HD	100 Mbit Half-Duplex
10- FD	100 Mbit Full-Duplex

back to List of values

Group: SH Modules

SHAIN-1 1

Value group	SH Modules	**Related FW**	2.1.0
Units	[-]		
Comm object	10584	**Related applications**	MINT, SPtM
Description			

This value contains data of first shared analog input from SHAOUT module 1.

> **IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".**

back to List of values

SHAIN-1 2

Value group	SH Modules	**Related FW**	2.1.0
Units	[-]		
Comm object	10585	**Related applications**	MINT, SPtM
Description			

This value contains data of second shared analog input from SHAOUT module 1.

> **IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".**

back to List of values

SHAIN-1 3

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	10586	Related applications	MINT, SPtM
Description			
This value contains data of third shared analog input from SHAOUT module 1. **IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".**			

back to List of values

SHAIN-1 4

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	10587	Related applications	MINT, SPtM
Description			
This value contains data of fourth shared analog input from SHAOUT module 1. **IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".**			

back to List of values

SHAIN-2 1

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	11390	Related applications	MINT, SPtM
Description			
This value contains data of first shared analog input from SHAOUT module 2. **IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".**			

back to List of values

SHAIN-2 2

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	11391	Related applications	MINT, SPtM
Description			
This value contains data of second shared analog input from SHAOUT module 2. **IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".**			

back to List of values

SHAIN-2 3

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	11392	Related applications	MINT, SPtM
Description			

This value contains data of third shared analog input from SHAOUT module 2.

> **IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".**

back to List of values

SHAIN-2 4

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	11393	Related applications	MINT, SPtM
Description			

This value contains data of fourth shared analog input from SHAOUT module 2.

> **IMPORTANT: This value is received (and visible) only when it is configured with sensor type "Electronic".**

back to List of values

SHBIN-1

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	10572	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary inputs from SHBIN module 1.

1. SHBIN-1 1
2. SHBIN-1 2
3. SHBIN-1 3
4. SHBIN-1 4
5. SHBIN-1 5
6. SHBIN-1 6
7. SHBIN-1 7
8. SHBIN-1 8

back to List of values

SHBIN-2

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	10573	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary inputs from SHBIN module 2.

1. SHBIN-2 1
2. SHBIN-2 2
3. SHBIN-2 3
4. SHBIN-2 4
5. SHBIN-2 5
6. SHBIN-2 6
7. SHBIN-2 7
8. SHBIN-2 8

back to List of values

SHBIN-3

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	10574	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary inputs from SHBIN module 3.

1. SHBIN-3 1
2. SHBIN-3 2
3. SHBIN-3 3
4. SHBIN-3 4
5. SHBIN-3 5
6. SHBIN-3 6
7. SHBIN-3 7
8. SHBIN-3 8

back to List of values

SHBIN-4

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	10575	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary inputs from SHBIN module 4.

1. SHBIN-4 1
2. SHBIN-4 2
3. SHBIN-4 3
4. SHBIN-4 4
5. SHBIN-4 5
6. SHBIN-4 6
7. SHBIN-4 7
8. SHBIN-4 8

back to List of values

SHBIN-5

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	11341	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary inputs from SHBIN module 5.

1. SHBIN-5 1
2. SHBIN-5 2
3. SHBIN-5 3
4. SHBIN-5 4
5. SHBIN-5 5
6. SHBIN-5 6
7. SHBIN-5 7
8. SHBIN-5 8

back to List of values

SHBIN-6

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	11342	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary inputs from SHBIN module 6.

1. SHBIN-6 1
2. SHBIN-6 2
3. SHBIN-6 3
4. SHBIN-6 4
5. SHBIN-6 5
6. SHBIN-6 6
7. SHBIN-6 7
8. SHBIN-6 8

back to List of values

SHBOUT-1

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	10576	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary outputs from SHBOUT module 1.

1. SHBOUT-1 1
2. SHBOUT-1 2
3. SHBOUT-1 3
4. SHBOUT-1 4
5. SHBOUT-1 5
6. SHBOUT-1 6
7. SHBOUT-1 7
8. SHBOUT-1 8

back to List of values

SHBOUT-2

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	10577	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary outputs from SHBOUT module 2.

1. SHBOUT-2 1
2. SHBOUT-2 2
3. SHBOUT-2 3
4. SHBOUT-2 4
5. SHBOUT-2 5
6. SHBOUT-2 6
7. SHBOUT-2 7
8. SHBOUT-2 8

back to List of values

SHBOUT-3

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	10578	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary outputs from SHBOUT module 3.

1. SHBOUT-3 1
2. SHBOUT-3 2
3. SHBOUT-3 3
4. SHBOUT-3 4
5. SHBOUT-3 5
6. SHBOUT-3 6
7. SHBOUT-3 7
8. SHBOUT-3 8

back to List of values

SHBOUT-4

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	10579	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary outputs from SHBOUT module 4.

1. SHBOUT-4 1
2. SHBOUT-4 2
3. SHBOUT-4 3
4. SHBOUT-4 4
5. SHBOUT-4 5
6. SHBOUT-4 6
7. SHBOUT-4 7
8. SHBOUT-4 8

back to List of values

SHBOUT-5

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	11343	Related applications	MINT, SPtM
Description			

This value contains Binary Inputs of shared binary outputs from SHBOUT module 5.

1. SHBOUT-5 1
2. SHBOUT-5 2
3. SHBOUT-5 3
4. SHBOUT-5 4
5. SHBOUT-5 5
6. SHBOUT-5 6
7. SHBOUT-5 7
8. SHBOUT-5 8

back to List of values

SHBOUT-6

Value group	SH Modules	Related FW	2.1.0
Units	[-]		
Comm object	11344	Related applications	MINT, SPtM
Description			
This value contains Binary Inputs of shared binary outputs from SHBOUT module 6. 1. SHBOUT-6 1 2. SHBOUT-6 2 3. SHBOUT-6 3 4. SHBOUT-6 4 5. SHBOUT-6 5 6. SHBOUT-6 6 7. SHBOUT-6 7 8. SHBOUT-6 8			

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Group: Scheduler

Date

Value group	Scheduler	Related FW	2.1.0
Units	DD.MM.YYYY		
Comm object	24553	Related applications	MINT, SPtM
Description			
Shows setup date.			

back to List of values

Time

Value group	Scheduler	Related FW	2.1.0
Units	HH:MM:SS		
Comm object	24554	Related applications	MINT, SPtM
Description			
Shows setup time.			

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Time Mode

Value group	Date/Time	Related FW	2.1.0
Units	HH:MM:SS		
Comm object	20252	Related applications	MINT, SPtM
Description			
Indicates actual time mode. STD – Standard zone time (e.g GMT+1 for Prague). DST – Daylight Saving Time = STD+1 (e.g. GMT+2 for Prague).			

back to List of values

Exercise Timer

Value group	Scheduler	Related FW	2.1.0
Units	HH:MM:SS		
Comm object	19664	Related applications	MINT, SPtM
Description			
Shows actual value of timer in format HH:MM:SS.			

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Group: Plug-In I/O

EM BIO A

Value group	Plug-In I/O	Related FW	2.1.0
Units	[-]		
Comm object	14291	Related applications	MINT, SPtM
Description			
Binary inputs from extension module in slot A.			

back to List of values

EM BIO B

Value group	Plug-In I/O	Related FW	2.1.0
Units	[-]		
Comm object	14292	Related applications	MINT, SPtM
Description			
Binary inputs from extension module in slot B.			

back to List of values

Group: PLC

PLC-BOUT 1

Value group	PLC	**Related FW**	2.1.0
Units	[-]		
Comm object	10424	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 2

Value group	PLC	**Related FW**	2.1.0
Units	[-]		
Comm object	10425	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 3

Value group	PLC	**Related FW**	2.1.0
Units	[-]		
Comm object	10426	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 4

Value group	PLC	**Related FW**	2.1.0
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**	2.1.0
Units	[-]		
Comm object	10428	**Related applications**	MINT, SPtM
Description			
State of binary outputs of PLC.			

back to List of values

PLC-BOUT 6

Value group	PLC	Related FW	2.1.0
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	2.1.0
Units	[-]		
Comm object	10430	Related applications	MINT, SPtM
Description			
State of binary outputs of PLC.			

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PLC Resource 1

Value group	PLC	Related FW	2.1.0
Units	[-]		
Comm object	10504	Related applications	MINT, SPtM
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

PLC Resource 2

Value group	PLC	Related FW	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
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	2.1.0
Units	[-]		
Comm object	10511	Related applications	MINT, SPtM
Description			
Internal state of PLC countdowns (e.g. state of block Timer etc.).			

back to List of values

8.1.4 Logical binary inputs

What Logical binary inputs are:

Logical binary inputs are inputs for binary values and functions.

Alphabetical groups of Logical binary inputs

LBI: A 714
LBI: B 719
LBI: C 719
LBI: D 720
LBI: E 720
LBI: F 725
LBI: G 734
LBI: H 737
LBI: I 737
LBI: L 738
LBI: M 739
LBI: N 744
LBI: O 744
LBI: P 745
LBI: R 748
LBI: S 754
LBI: T 758
LBI: V 759

For a full list of Logical binary inputs go to the chapter **Logical binary inputs alphabetically (page 712)**.

Logical binary inputs alphabetically

Access Lock 714
AMF Start Block 714
Application MINT 714
Application SPTM 714
ATT DEF Level Lamp Blink 715
ATT DEF Level Lamp Fast Blink 715
ATT DEF Level Lamp Solid 715
ATT DPF Lamp Blink 715
ATT DPF Lamp Fast Blink 715
ATT DPF Lamp Solid 716
ATT Force Regen 716
ATT HEST Lamp Blink ... 716
ATT HEST Lamp Fast Blink 716
ATT HEST Lamp Solid ... 716
ATT Inhibit Regen 717
ATT Inhibited Lamp Blink 717
ATT Inhibited Lamp Fast Blink 717
ATT Inhibited Lamp Solid 717
ATT Interlock 718
ATT SCR Error Lamp Blink 718
ATT SCR Error Lamp Fast Blink 718
ATT SCR Error Lamp Solid 718
Battery Charger 719
Conditioned Hours Counter 1 719
Conditioned Hours Counter 2 719
Dark Mode* 720
ECU Key Switch 722
ECU Red Lamp Blink 722
ECU Red Lamp Fast Blink .....
ECU Red Lamp Solid 723
ECU Wait To Start Blink ..723
ECU Wait To Start Fast Blink 723
ECU Wait To Start Solid . 723
ECU Yellow Lamp Blink ..724
ECU Yellow Lamp Fast Blink 724
ECU Yellow Lamp Solid ..724
Emergency MAN 724
Emergency Stop 725
External Mains Fail Relay 725
Fault Reset Button 725
Force Droop Oper 726
Force Island 728
Force Parallel 728
Forced Value Input 01 728
Forced Value Input 02 728
Forced Value Input 03 729
Forced Value Input 04 729
Forced Value Input 05 729
Forced Value Input 06 729
Forced Value Input 07 729
Forced Value Input 08 730
Forced Value Input 09 730
Forced Value Input 10 730
Forced Value Input 11 730
Forced Value Input 12 730
Forced Value Input 13 731
Forced Value Input 14 731
Forced Value Input 15 731
Forced Value Input 16 731
Forced Value Input 17 731
Forced Value Input 18 732
Forced Value Input 19 732
Forced Value Input 20 732
Forced Value Input 21 732
Forced Value Input 22 732
Forced Value Input 23 733
Forced Value Input 24 733
Fuel Pump On/Off 733
GCB Button 734
GCB Disable 734
GCB Feedback 735
GCB Feedback Negative* 736
Geo Home Position 736
Geo-Fencing Enable 737
Group Link 737
Horn Reset Button 737
Idle Speed 737
Idle Bypass 737
Load Res 2 Active 738
Load Res 3 Active* 738
Load Res 4 Active* 739
Mains Fail Block 739
Manual Load Reconnection 739
MCB Button 740
MCB Disable 740
MCB Feedback 741
MCB Feedback Negative* 742
Min Run Power Act 742
Min Run Power Act 2* 743
Min Run Power Act 3* 743
NCB Feedback 744
Oil Pressure 744
Open Transfer Mains To Gen 744
Open Transfer Gen To Mains 744
Prestart Bypass 745
Protection Force Disable 1 745
Pulse Counter 1 747
Pulse Counter 2 748

Rem TEST On Load 748
Remote AUTO 749
Remote Ctrl Lock 749
Remote MAN 750
Remote OFF 750
Remote Start/Stop 751
Remote TEST 752
Run Indication 1* 752
Run Indication 2* 753
Run Indication 3* 753
Sd Override 754
Start Blocking 754
Start Button 754
Starter 1 Disabled 755
Starter 2 Disabled 755
Starter Priority 755
Stop Button 755
SUS Excitation Block 755
SUS Min Power 2 756
SUS Min Power 3 756
Switch To AUT 757
Switch To MAN 757
Switch To OFF 758
Synchronization Disabled* 758
Top Priority 758
Total Emergency Stop 759
Voltage Droop* 759

back to Controller objects

LBI: A

Access Lock

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1		
Description			

When this input is active, no setpoints can be adjusted from controller's front panel and controller mode (OFF / MAN / AUTO / TEST) cannot be changed. The front panel buttons can not be used as well.

Note: *Access Lock does not protect setpoints and mode changing from InteliConfig. To avoid unqualified changes the selected setpoints have to be password protected.*
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

AMF Start Block

Related FW	2.1.0	**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

Application MINT

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1007		
Description			

Activation of this binary input switches the controller **Active Application (page 674)** to MINT.

Note: *This binary input has lower priority than LBI* ***APPLICATION SPTM (PAGE 714)****.*

back to Logical binary inputs alphabetically

Application SPTM

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1006		
Description			

Activation of this binary input switches the controller **Active Application (page 674)** to SPTM.

Note: *This binary input has higher priority than LBI* ***APPLICATION MINT (PAGE 714)****.*

back to Logical binary inputs alphabetically

ATT DEF Level Lamp Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1076		
Description			
When this LBI is active, there is active alarm Wrn ATT DEF Level Lamp (page 867) in alarmlist and DEF Level Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT DEF Level Lamp Fast Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1077		
Description			
When this LBI is active, there is active alarm Wrn ATT DEF Level Lamp (page 867) in alarmlist and ATT DEF Level Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT DEF Level Lamp Solid

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1075		
Description			
When this LBI is active, there is active alarm Wrn ATT DEF Level Lamp (page 867) in alarmlist and ATT DEF Level Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT DPF Lamp Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1067		
Description			
When this LBI is active, there is active alarm Wrn ATT DPF Lamp (page 867) in alarmlist and ECU DPF Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT DPF Lamp Fast Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1068		
Description			
When this LBI is active, there is active alarm Wrn ATT DPF Lamp (page 867) in alarmlist and ATT DPF Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT DPF Lamp Solid

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1066		
Description			
When this LBI is active, there is active alarm Wrn ATT DPF Lamp (page 867) in alarmlist and ATT DPF Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT Force Regen

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	680		
Description			
Aftertreatment Regeneration Force Switch › User manually activates regeneration function › Push-button control – function activated by pulse (signals longer than 5 seconds will be carried as long as the input is active)			

back to Logical binary inputs alphabetically

ATT HEST Lamp Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1070		
Description			
When this LBI is active, there is active alarm Wrn ATT HEST Lamp (page 868) in alarmlist and ECU HEST Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT HEST Lamp Fast Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1071		
Description			
When this LBI is active, there is active alarm Wrn ATT HEST Lamp (page 868) in alarmlist and ATT HEST Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT HEST Lamp Solid

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1069		
Description			
When this LBI is active, there is active alarm Wrn ATT HEST Lamp (page 868) in alarmlist and ATT HEST Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT Inhibit Regen

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	679		
Description			
Aftertreatment Regeneration Inhibit Switch › User blocks automatic regeneration function › 2 state switch control – function activated by still signal			

back to Logical binary inputs alphabetically

ATT Inhibited Lamp Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1079		
Description			
When this LBI is active, there is active alarm Wrn ATT Inhibited Lamp (page 868) in alarmlist and Inhibited Lamp icon in Aftertreatment HMI screen is blinking.			

back to Logical binary inputs alphabetically

ATT Inhibited Lamp Fast Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1080		
Description			
When this LBI is active, there is active alarm Wrn ATT Inhibited Lamp (page 868) in alarmlist and Inhibited Lamp icon in Aftertreatment HMI screen is blinking fast.			

back to Logical binary inputs alphabetically

ATT Inhibited Lamp Solid

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1078		
Description			
When this LBI is active, there is active alarm Wrn ATT Inhibited Lamp (page 868) in alarmlist and ATT Inhibited Lamp icon in Aftertreatment HMI screen is shown.			

back to Logical binary inputs alphabetically

ATT Interlock

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	956		
Description			
ATT Regeneration Interlock › acts as acknowledgment for the ECU that everything is prepared for the DPF regeneration › User manually allows the regeneration (not same as Regen Force) › 2-state switch control – function activated by still signal › Interlock activates Regeneration State after set of conditions is met, only after that the signal is activated			

back to Logical binary inputs alphabetically

ATT SCR Error Lamp Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1073		
Description			
When this LBI is active, there is active alarm Wrn ATT SCR Error Lamp (page 869) in alarmlist and SCR Error Lamp icon in Aftertreatment HMI screen is blinking.			

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ATT SCR Error Lamp Fast Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1074		
Description			
When this LBI is active, there is active alarm Wrn ATT SCR Error Lamp (page 869) in alarmlist and SCR Error Lamp icon in Aftertreatment HMI screen is blinking fast.			

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ATT SCR Error Lamp Solid

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1072		
Description			
When this LBI is active, there is active alarm Wrn ATT SCR Error Lamp (page 869) in alarmlist and SCR Error Lamp icon in Aftertreatment HMI screen is shown.			

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LBI: B

Battery Charger

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	623		
Description			
When binary input is active and its delay **Battery Charger Fail Delay (page 356)** is out of time then alarm **Wrn Battery Charger Fail (page 869)** is activated.			

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LBI: C

Conditioned Hours Counter 1

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1094		
Description			
This LBI enables incrementation of statistic value **CONDITIONED HOURS COUNTER 1 (PAGE 668)**.			

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Conditioned Hours Counter 2

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1095		
Description			
This LBI enables incrementation of statistic value **CONDITIONED HOURS COUNTER 2 (PAGE 668)**.			

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Coolant Temp

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	625		
Description			
Binary input for **COOLANT TEMP (PAGE 832)** protection.			

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LBI: D

Dark Mode*

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	930		
Description			
This binary input activates function of dark mode. This LBI switches off all LEDs and ICD. On the HMI Display->Administration->Settings->Backlight Control=LBI Dark Mode has to be set. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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LBI: E

ECU Communication Fail Block

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	141		
Description			
Activation of this binary input blocks all protections (including user protections) for every single configured ECU.			

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ECU Communication Fail Block 1

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1020		
Description			
Activation of this binary input blocks all protections (including user protections) for ECU configured in ECU slot 1. Alarm **Wrn ECU 1 Comm Fail (page 871)** is deactivated while this LBI is active.			

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ECU Communication Fail Block 2

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1021		
Description			
Activation of this binary input blocks all protections (including user protections) for ECU configured in ECU slot 2. Alarm **Wrn ECU 2 Comm Fail (page 871)** is deactivated while this LBI is active.			

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ECU Communication Fail Block 3

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1022		
Description			
Activation of this binary input blocks all protections (including user protections) for ECU configured in ECU slot 3. Alarm **Wrn ECU 3 Comm Fail (page 872)** is deactivated while this LBI is active.			

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ECU Communication Fail Block 4

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1023		
Description			
Activation of this binary input blocks all protections (including user protections) for ECU configured in ECU slot 4. Alarm **Wrn ECU 4 Comm Fail (page 872)** is deactivated while this LBI is active.			

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ECU Communication Fail Block 5

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1024		
Description			
Activation of this binary input blocks all protections (including user protections) for ECU configured in ECU slot 5. Alarm **Wrn ECU 5 Comm Fail (page 872)** is deactivated while this LBI is active. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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ECU Communication Fail Block 6

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1025		
Description			
Activation of this binary input blocks all protections (including user protections) for ECU configured in ECU slot 6. Alarm **Wrn ECU 6 Comm Fail (page 872)** is deactivated while this LBI is active. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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ECU Communication Fail Block 7

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1026		
Description			
Activation of this binary input blocks all protections (including user protections) for ECU configured in ECU slot 7. Alarm **Wrn ECU 7 Comm Fail (page 873)** is deactivated while this LBI is active. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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ECU Communication Fail Block 8

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1027		
Description			
Activation of this binary input blocks all protections (including user protections) for ECU configured in ECU slot 8. Alarm **Wrn ECU 8 Comm Fail (page 873)** is deactivated while this LBI is active. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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ECU Key Switch

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	951		
Description			
This binary input is used to switch on **ECU Power Relay (page 782)**, when engine start is not requested. It is intended to enable engine values reading, when engine doesn't run. When this binary input is active, binary output **ECU Power Relay (page 782)** is active too. When this binary input is inactive, function of **ECU Power Relay (page 782)** is not affected.			

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ECU Red Lamp Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1061		
Description			
When this LBI is active, there is active alarm **Wrn ECU Red Lamp (page 873)** in alarmlist and ECU Red Lamp icon in Aftertreatment HMI screen is blinking.			

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ECU Red Lamp Fast Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1062		
Description			
When this LBI is active, there is active alarm Wrn ECU Red Lamp (page 873) in alarmlist and ECU Red Lamp icon in Aftertreatment HMI screen is blinking fast.			

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ECU Red Lamp Solid

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1060		
Description			
When this LBI is active, there is active alarm Wrn ECU Red Lamp (page 873) in alarmlist and ECU Red Lamp icon in Aftertreatment HMI screen is shown.			

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ECU Wait To Start Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1064		
Description			
When this LBI is active, there is active alarm Wrn ECU Wait To Start (page 874) in alarmlist and ECU Wait To Start Lamp icon in Aftertreatment HMI screen is blinking.			

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ECU Wait To Start Fast Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1065		
Description			
When this LBI is active, there is active alarm Wrn ECU Wait To Start (page 874) in alarmlist and ECU Wait To Start Lamp icon in Aftertreatment HMI screen is blinking fast.			

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ECU Wait To Start Solid

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1063		
Description			
When this LBI is active, there is active alarm Wrn ECU Wait To Start (page 874) in alarmlist and ECU Wait to Start Lamp icon in Aftertreatment HMI screen is shown.			

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ECU Yellow Lamp Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1058		
Description			
When this LBI is active, there is active alarm Wrn ECU Yellow Lamp (page 874) in alarmlist and ECU Yellow Lamp icon in Aftertreatment HMI screen is blinking.			

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ECU Yellow Lamp Fast Blink

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1059		
Description			
When this LBI is active, there is active alarm Wrn ECU Yellow Lamp (page 874) in alarmlist and ECU Yellow Lamp icon in Aftertreatment HMI screen is blinking fast.			

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ECU Yellow Lamp Solid

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1057		
Description			
When this LBI is active, there is active alarm Wrn ECU Yellow Lamp (page 874) in alarmlist and ECU Yellow Lamp icon in Aftertreatment HMI screen is shown.			

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Emergency MAN

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	45		
Description			

This input is designed to allow the Gen-set system or breakers to be controlled externally, not by the controller. This feature can be useful in case of some failure, which disables the Gen-set or breakers to be controlled by the controller, but the Gen-set itself is operational.

The controller behaves in the following way:

- Shows the text EmergMan in the engine status on the main screen.
- Stops all functions regarding the Gen-set or breaker control, deactivates all outputs related to it.
- Stop Fail alarm is not being evaluated and stop solenoid is not activated if nonzero speed is detected.
- When the input is deactivated, the controller takes control according to the situation in the moment of deactivation, i.e. the Gen-set remains running loaded if it was running and GCB was closed in the moment the input was deactivated.

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Emergency Stop

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	40		
Description			

The shutdown procedure will start immediately when this input is activated. Input is inverted (NC = normally closed) in default configuration.

> ***Note:*** *In case of controller hardware or software fail, safe stop of the engine doesn't have to be guaranteed. To back-up the Emergency Stop function it is recommended to connect separate circuit for disconnection of Fuel Solenoid and Starter signals.*

For more detail see chapter Recommended wiring.

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External Mains Fail Relay

Related FW	2.1.0	Related applications	SPtM
Comm object	197		
Description			

Binary input for external mains fail indication.

When the LBI: External Mains Fail Relay is active:

- Controller accepts that MCB was opened by an external mains fail relay, it means that it does not try to close MCB
- It behaves like in case of a standard mains failure, which is evaluated from the mains voltages measurement (the front panel mains icon is red, LBO: **AL MAINS FAIL (PAGE 772)** is active, Gen-set is started when controller is in the AUT mode etc.)
- Controller displays alarm **ALI External Mains Fail (page 878)**

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 878)** automatically disappears

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LBI: F

Fault Reset Button

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	191		
Description			

Binary input has the same function as Fault Reset button on the InteliGen 500 G2 front panel.

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Force Droop Oper

Related FW	2.1.0	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 457)** = Droop).			

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Force Idle

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	604		

Description

Activation of this LBI activates the Force Idle function.

Activation of Force Idle

Mode	Reaction	
OFF	No reaction	
MAN+AUTO	Engine starts	Engine is running
	1. Engine starts 2. Idle state is active 3. after the idle state is counted down there is checked whether the LBI: Force Idle is active 4. In case of active LBI: Force Idle the engine stays in Idle – the AHI Manual Idle is present in alarm list and history record issued 5. LBO **IDLE/NOMINAL (PAGE 798)** stays switched to idle state and value **Requested RPM (page 664)** stays to Idle RPM value	1. Controller is in running state 2. In case of active LBI: Force Idle the engine goes in Idle – the AHI Manual Idle is present in alarm list and history record issued 3. LBO **IDLE/NOMINAL (PAGE 798)** is switched to idle state and value **Requested RPM (page 664)** goes to Idle RPM value 4. Underfrequency protection and undervoltage protection are not evaluated (other protections are evaluated) 5. Controller is in Manual Idle state until deactivation of this LBI

Deactivation of Force Idle

Mode	Reaction
OFF	No reaction
MAN	1. Controller goes to MinStab state (then Max stab, etc.) 2. AHI Manual Idle is not present in alarm list 3. LBO **IDLE/NOMINAL (PAGE 798)** is switched to nominal state and value **Requested RPM (page 664)** goes to nominal value 4. Controller is in Running state 5. Underfrequency protection and undervoltage protection are evaluated 6. GCB stays open
AUTO	1. Controller goes to MinStab state (then Max stab, etc.) 2. AHI Manual Idle is not present in alarm list 3. LBO **Requested RPM (page 664)** is switched to nominal state and value **Requested RPM (page 664)** goes to nominal value

	4. Controller is in Running state 5. Underfrequency protection and undervoltage protection are evaluated 6. GCB is closed

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Force Island

Related FW	2.1.0	**Related applications**	SPtM
Comm object	787		
Description			
Activation of this logical binary input start the Gen-set system and go to island operation. Transition of load from mains is adjusted via setpoint **Transfer Mains To Gen (page 444)**.			

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Force Parallel

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	786		
Description			
Activation of this logical binary input start the Gen-set system and go to parallel operation if mains is healthy. Island operation is not allowed.			

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Forced Value Input 01

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	19		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 02

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	20		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 03

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	21		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 04

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	22		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 05

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	23		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 06

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	24		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 07

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	25		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 08

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	26		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 09

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	27		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 10

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	28		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 11

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	29		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 12

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	30		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 13

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	31		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 14

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	32		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 15

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	33		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 16

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	34		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 17

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	839		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 18

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	840		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 19

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	841		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 20

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	842		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 21

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	843		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 22

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	844		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 23

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	845		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Forced Value Input 24

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	846		
Description			
This LBI is used for activation of preconfigured Forced Value to setpoint. ***Note:*** *This LBI can be renamed during configuration.*			

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Fuel Level

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	626		
Description			
Binary input for **FUEL LEVEL (PAGE 832)** protection.			

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Fuel Pump On/Off

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	694		
Description			
This binary input is used for manual control of binary output **FUEL PUMP (PAGE 786)**. 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 733) is configured then binary output FUEL PUMP (PAGE 786) is control by this binary input.** **IMPORTANT: It is necessary to configure analog input FUEL LEVEL (PAGE 832) for proper function of this binary input.**			

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LBI: G

GCB Button

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	193		
Description			
Binary input has the same function as the GCB button on the InteliGen 500 G2 front panel. It is evaluated in MAN mode only.			

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GCB Disable

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	62		
Description			
When this LBI is active, it is not possible to close GCB – LBO GCB Close/Open, GCB ON Coil cannot be activated by panel GCB close button, or close command or by auto command.			

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GCB Feedback

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	63		

Description

Use this input for indication whether the generator circuit breaker is open or closed.

- If the feedback does not respond to a change of the control output **GCB CLOSE/OPEN (PAGE 788)** within 2 or 5 seconds (2 sec if synchro is used, 5 sec if synchro is not used – open transfer, dead bus, etc.), the specific alarm based on current breaker position is issued.
- If the feedback changes it's position unexpectedly without any command given by the control output, the alarm **Stp GCB Fail (page 941)** will be issued immediately.

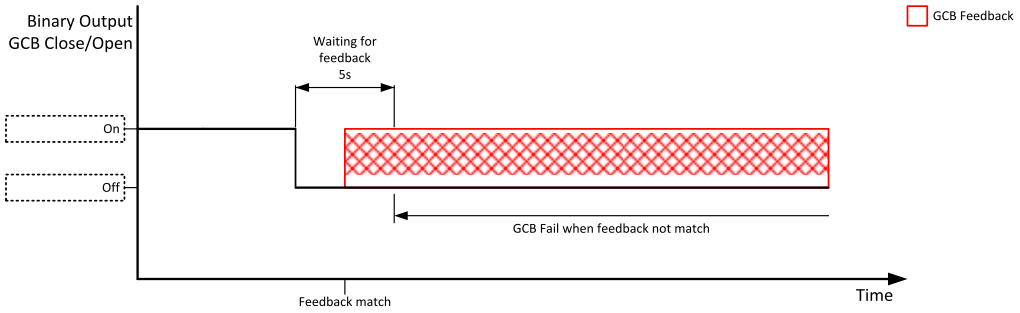


Image 8.47 GCB Feedback 1

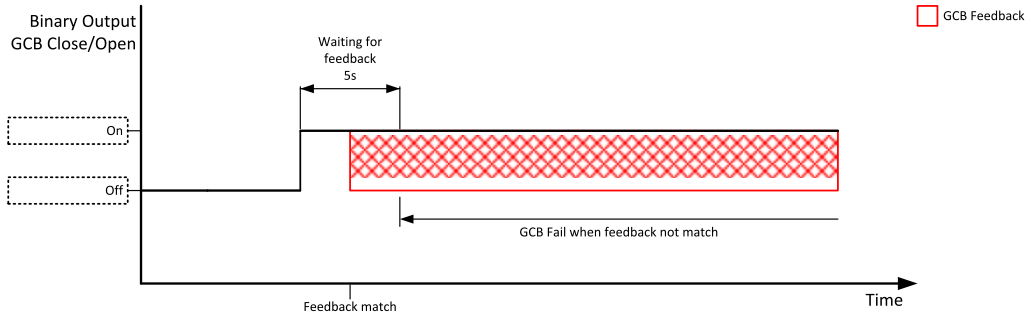


Image 8.48 GCB Feedback 2

Note: *InteliGen 500 G2 controllers require the breaker feedback to be configured.*

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GCB Feedback Negative*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	64		

Description

Use this input to indicate whether the generator circuit breaker is opened or closed.

Maximal allowed time the both inputs are in the same position is 500 ms, after this time the alarm **Stp GCB Fail (page 941)** is issued.

This input is logically inverted against LBI **GCB FEEDBACK (PAGE 735)**.

Note: *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

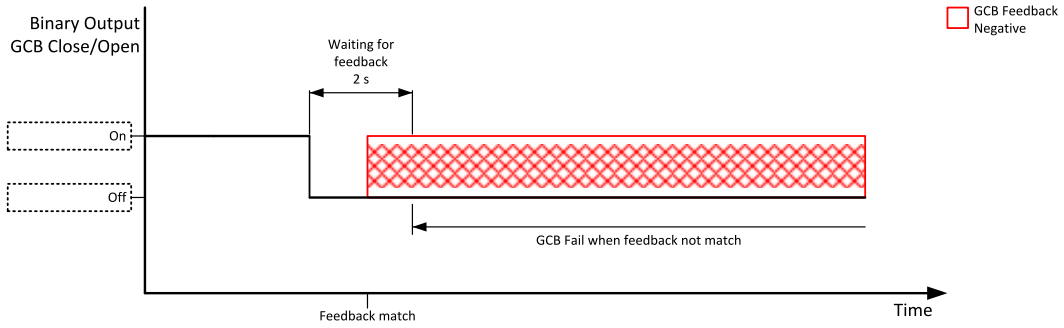


Image 8.49 GCB Feedback Negative 1

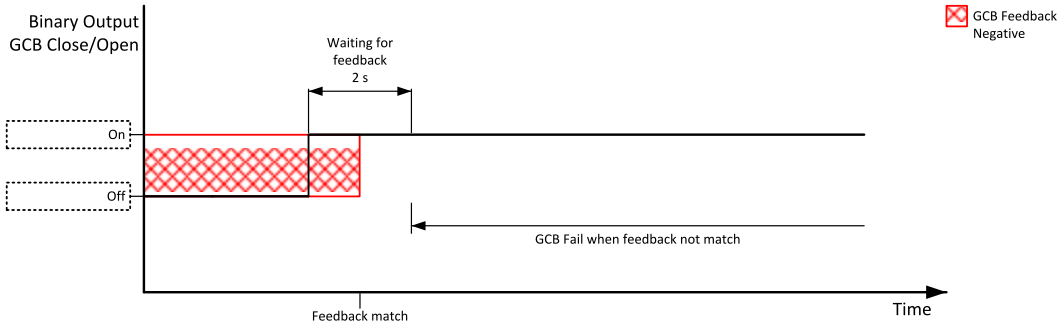


Image 8.50 GCB Feedback Negative 2

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Geo Home Position

Related FW	2.1.0	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 553)** and **Home Longitude (page 554)** are adjusted automatically from actual coordinates from GPS signal.

Note: *Input has to be activated for at least 2 seconds.*

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Geo-Fencing Enable

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	218		
Description			
This binary input enables or disables **Fence 1 Protection (page 555)** and **Fence 2 Protection (page 557)** if **Group: Geo-Fencing (page 553)** is adjusted to value "LBI Enable".			

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Group Link

Related FW	2.1.0	**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 435)** and **Group Link R (page 436)**. If the input is active, then the two selected groups will perform power management, load sharing and kVAr sharing together as one large group. ***Note:*** *This function is independent on the group which the particular controller belongs to, i.e. the controller can provide linking function e.g. for groups 3,4 although it belongs to group 2.*			

back to Logical binary inputs alphabetically

LBI: H

Horn Reset Button

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	192		
Description			
Binary input has the same function as Horn reset button on the InteliGen 500 G2 front panel.			

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LBI: I

Idle Speed

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	624		
Description			
This binary input changes cooling speed from nominal to idle.			

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Idle Bypass

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1216		
Description			
This LBI skip the Idle phase.			

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LBI: L

Load Res 2 Active

Related FW	2.1.0	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 203)**. This input is used to activate the load reserve set 2 instead of the set 1, which is active by default.			

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Load Res 3 Active*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	50		
Description			

This input is used to activate the load reserve set #3 (learn more about load reserve in the chapter **Power management (page 203)**) instead of the set #1, which is active by default. The set #3 is adjusted by setpoints:

- **#Starting Load Reserve 3* (page 423)** and **#Stopping Load Reserve 3* (page 424)** if the power management is switched to absolute mode
- **#Starting Rel Load Reserve 3* (page 425)** and **#Stopping Rel Load Reserve 3* (page 425)** if the power management is switched to relative mode.

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

> ***Note:*** *It is possible to use virtual peripheries for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus.*

> ***Note:*** *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

back to Logical binary inputs alphabetically

Load Res 4 Active*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	51		
Description			

This input is used to activate the load reserve set #4 (learn more about load reserve in the chapter **Power management (page 203)**) instead of the set #1, which is active by default. The set #4 is adjusted by setpoints:

- **#Starting Load Reserve 4* (page 426)** and **#Stopping Load Reserve 4* (page 427)** if the power management is switched to absolute mode
- **#Starting Rel Load Reserve 4* (page 428)** and **#Stopping Rel Load Reserve 4* (page 428)** if the power management is switched to relative mode.

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

Note: *It is possible to use virtual peripheries for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus.*

Note: *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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LBI: M

Mains Fail Block

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	622		
Description			

If the input is active, the automatic start of the Gen-set at Mains failure is blocked. In case of running Gen-set in AUTO mode, timer **Mains Return Delay (page 393)** 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 443)** the MCB is closed.

Note: *This input simulates healthy Mains.*

back to Logical binary inputs alphabetically

Manual Load Reconnection

Related FW	2.1.0	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 414)**. This works only if automatic reconnection is disabled, i.e. the setpoint **Auto Load Reconnection (page 415)** = Disabled.

back to Logical binary inputs alphabetically

MCB Button

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	194		
Description			
This binary input has the same function as MCB button on the InteliGen 500 G2 front panel. It is evaluated in MAN mode only.			

back to Logical binary inputs alphabetically

MCB Disable

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	124		
Description			
When this LBI is active, it is not possible to close MCB – LBO MCB Close/Open, MCB ON Coil cannot be activated by panel MCB close button, or close command or by auto command.			

back to Logical binary inputs alphabetically

MCB Feedback

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	65		

Description

Use this input for indication whether the mains circuit breaker is open or closed.

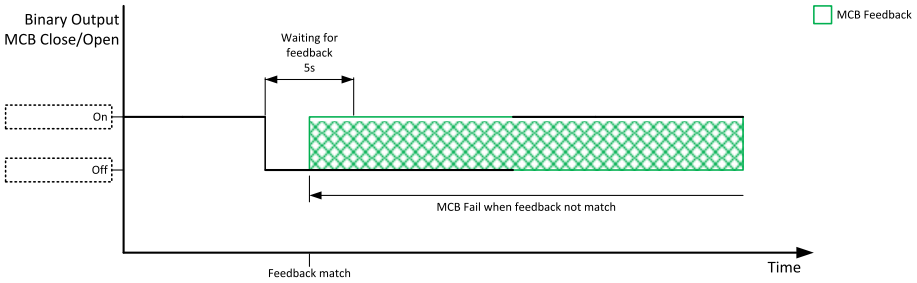


Image 8.51 MCB Feedback 1

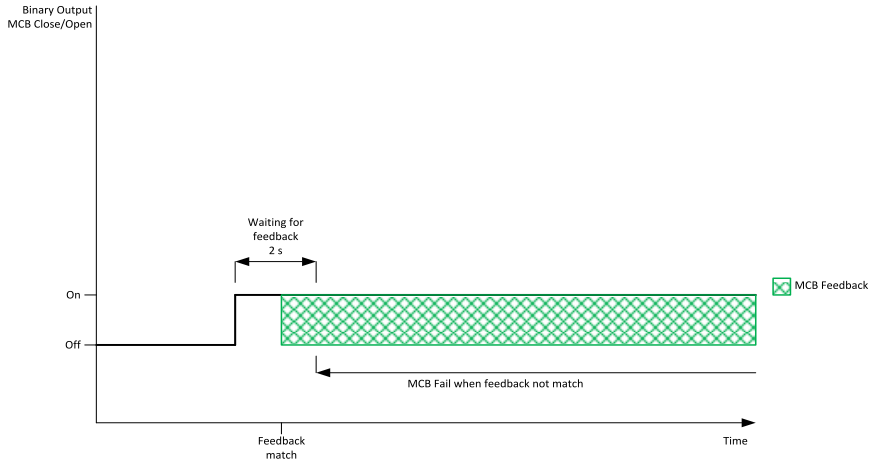


Image 8.52 MCB Feedback 2

Note: *InteliGen 500 G2 controllers require the breaker feedback to be configured.*

back to Logical binary inputs alphabetically

MCB Feedback Negative*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	66		

Description

Use this input to indicate whether the mains circuit breaker is opened or closed.

This input is logically inverted against LBI **MCB FEEDBACK (PAGE 741)**.

Note: *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

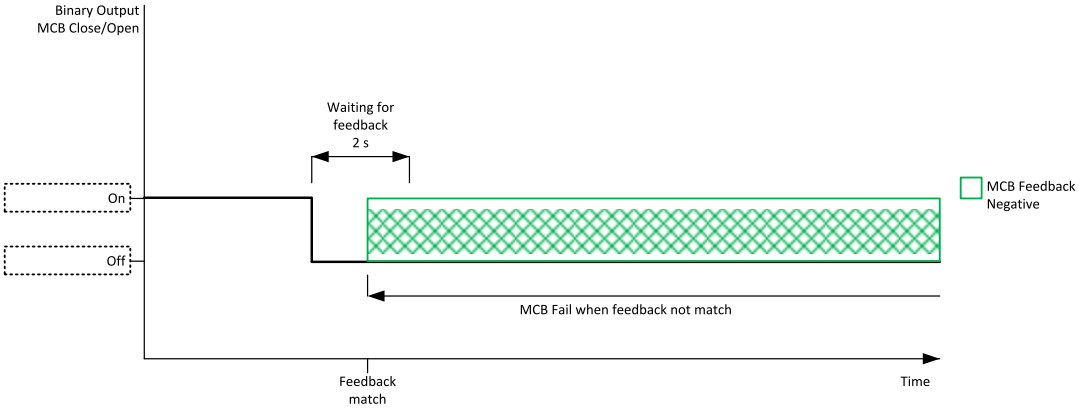


Image 8.53 MCB Feedback 1

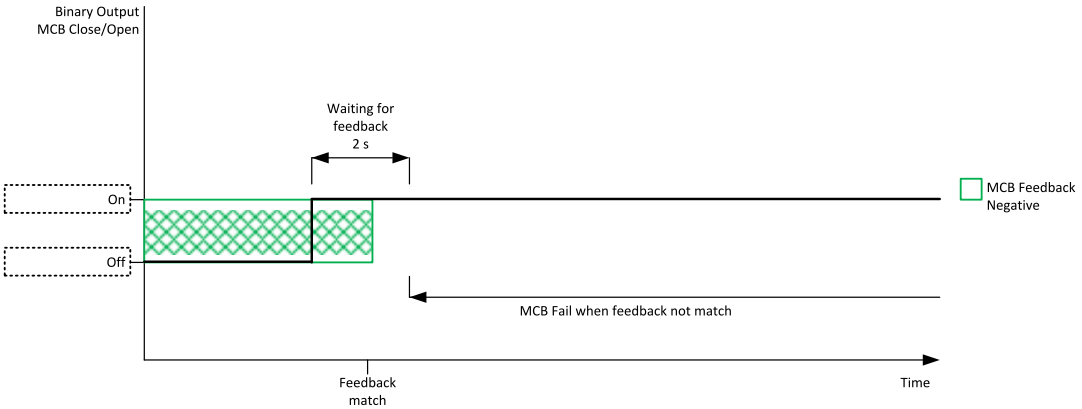


Image 8.54 MCB Feedback 2

back to Logical binary inputs alphabetically

Min Run Power Act

Related FW	2.1.0	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 1 (page 429)**.

back to Logical binary inputs alphabetically

Min Run Power Act 2*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	53		
Description			

This input is used to activate the function Minimal running power #2, which is adjusted by setpoint **#Min Run Power 2* (page 429)**.

Note: *The default value of minimal running power, which takes place while none of the inputs Min Run Power x Act, is 0 kW.*

Note: *If more then one binary input for Min Run Power is activated, the one with the higher index has higher priority and it is used.*

> **IMPORTANT: All controllers cooperating together in Power management must have the same minimal running power selected.**

Note: *It is possible to use virtual peripheries for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus. See the diagram of such distribution in the description of the input* ***Load Res 2 Active (page 738)****.*

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to Logical binary inputs alphabetically

Min Run Power Act 3*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	54		
Description			

This input is used to activate the function Minimal running power #3, which is adjusted by setpoint **#Min Run Power 3* (page 430)**.

Note: *The default value of minimal running power, which takes place while none of the inputs Min Run Power x Act, is 0 kW.*

Note: *If more then one binary input for Min Run Power is activated, the one with the higher index has higher priority and it is used.*

> **IMPORTANT: All controllers cooperating together in Power management must have the same minimal running power selected.**

Note: *It is possible to use virtual peripheries for distribution of the binary signal from one physical switch connected to one controller to all other controllers over the CAN bus. See the diagram of such distribution in the description of the input* ***Load Res 2 Active (page 738)****.*

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to Logical binary inputs alphabetically

LBI: N

NCB Feedback

Related FW	2.1.0	**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 302)**.			

back to Logical binary inputs alphabetically

LBI: O

Oil Pressure

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	43		
Description			

Binary input for Oil Pressure indication.

> **IMPORTANT: This binary input is also used for evaluating engine running condition.**

> **Example:** Normally close connection – when LBI is active then oil pressure is OK and is higher than starting oil pressure.

Note: *In case that you want to use binary input Oil Pressure just for protection please create new binary input with User protection.*

back to Logical binary inputs alphabetically

Open Transfer Mains To Gen

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	988		
Description			
Setpoint Transfer Mains To Gen option Open is used when the LBI: OPEN TRANSFER MAINS TO GEN function is active. Actual Transfer Mains To Gen setting is used only if the LBI: OPEN TRANSFER MAINS TO GEN is not active.			

back to Logical binary inputs alphabetically

Open Transfer Gen To Mains

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	989		
Description			
Setpoint Transfer Gen To Mains option Open is used when the LBI: OPEN TRANSFER GEN TO MAINS function is active. Actual Transfer Gen To Mains setting is used only if the LBI: OPEN TRANSFER GEN TO MAINS is not active.			

back to Logical binary inputs alphabetically

LBI: P

Prestart Bypass

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	42		
Description			
While this LBI is active, Gen-set skips prestart phase.			

back to Logical binary inputs alphabetically

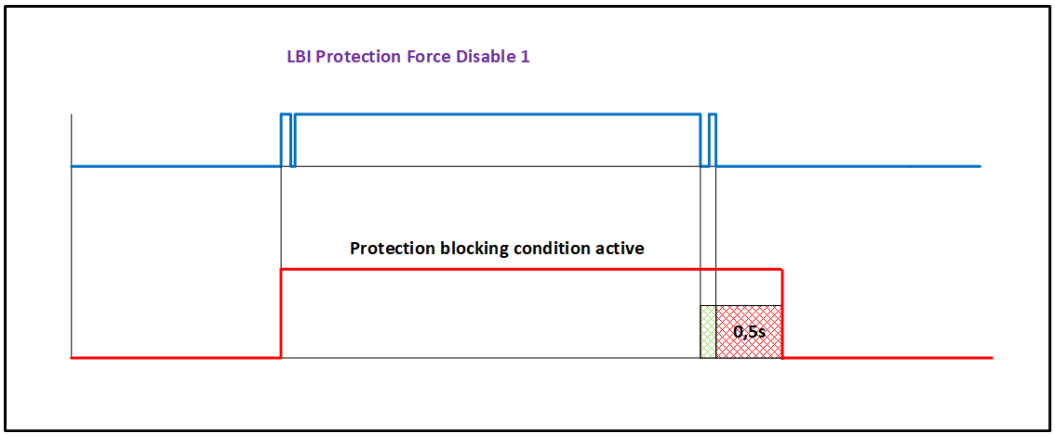
Protection Force Disable 1

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	16		
Description			

Activation of this LBI disables selected protections.

Proper history record is written to the history log.

- Protection Force Disable active
- Protection Force Disable inactive



Note: *Some of the fixed protections has possibility to turn off. These protections has dedicated setpoints located in setpoint group Protections. Setpoints have options: Enabled, Disabled (protection is turned off), ExtDisabled (protection is turned off by LBI).*

back to Logical binary inputs alphabetically

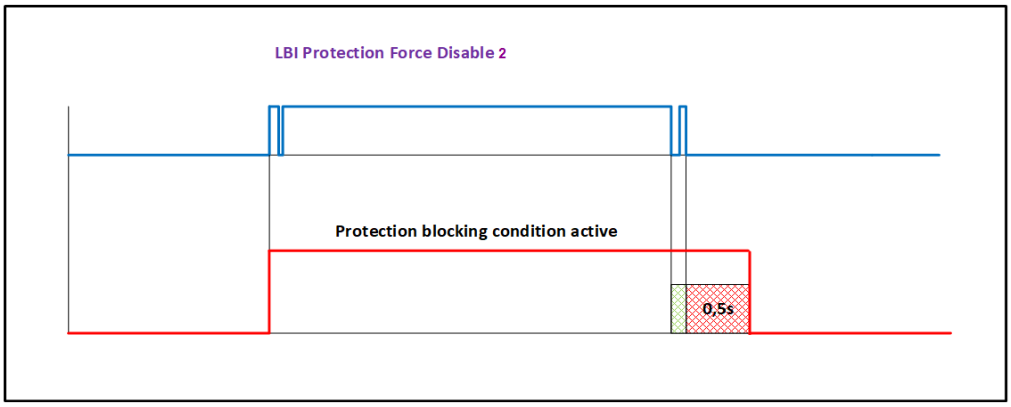
Protection Force Disable 2*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	17		
Description			

Activation of this LBI disables selected protections.

Proper history record is written to the history log.

- Protection Force Disable 2 active
- Protection Force Disable 2 inactive



Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to Logical binary inputs alphabetically

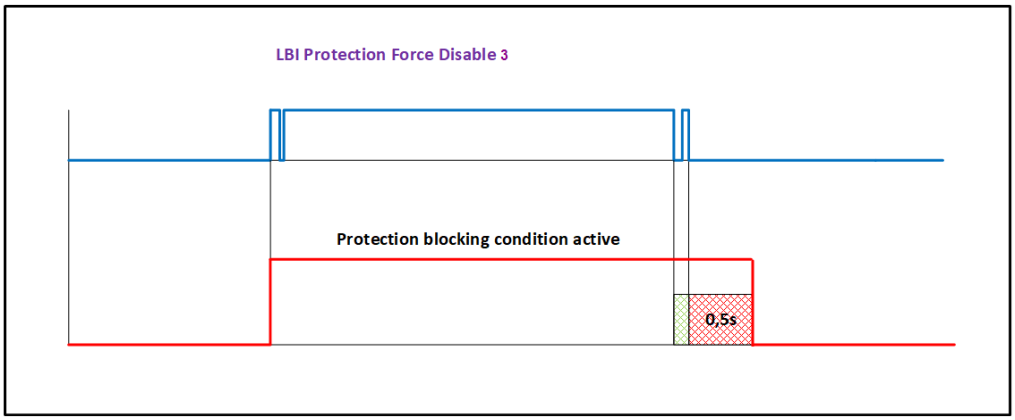
Protection Force Disable 3*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	18		
Description			

Activation of this LBI disables selected protections.

Proper history record is written to the history log.

- Protection Force Disable 3 active
- Protection Force Disable 3 inactive



Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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Pulse Counter 1

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	87		
Description			

This is the input of the Pulse Counter 1 function. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint **Conversion Coefficient Pulse 1 (page 357)** the counter value **Pulse Counter 1 (page 673)** is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.

Note: *Recommended length of the pulse is 500 ms.*

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Pulse Counter 2

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	88		
Description			

This is the input of the Pulse Counter 2 function. The module counts pulses at the input and if the input pulses counter reaches value given by the setpoint **Conversion Coefficient Pulse 2 (page 357)** the counter value **Pulse Counter 2 (page 673)** is increased by 1 and input pulses counter is reset to 0. Both counter value and input pulses counter are stored in the nonvolatile memory.

Note: *Recommended length of the pulse is 500 ms.*

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LBI: R

Rem TEST On Load

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	61		
Description			

Closing of the GCB in SPtM and MINT or transferring of the load from the mains to Gen-set in SPtM and MINT.

Application	TEST	Remote TEST On Load
SPtM	Gen-set started and running until the TEST mode deactivated.	**Active:** Gen-set is put to TEST mode. On the top of it the load is transferred to the Gen-set. The same behavior like the **FORCE ISLAND (PAGE 728)**. The load transfer according to the settings is performed. ***Note:*** *Whenever the **REMOTE START/STOP (PAGE 751)** is active, the LBI **REM TEST ON LOAD (PAGE 748)** has higher priority because it takes the same action like LBI **FORCE ISLAND (PAGE 728)**.* **Inactive:** Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions. (the load can be transfered back to the mains (OFF, AUTO) or stay on the Gen-set (MAN).
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 GCB is closed. The same behavior like the **REMOTE START/STOP (PAGE 751)**. **Inactive:** Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions.
MINT	Gen-set started and running until the TEST mode deactivated.	**Active:** Gen-set is put to TEST mode. On the top of it the GCB is closed (synchronized if the common bus bar is not dead). The same behaviour like the **REMOTE START/STOP (PAGE 751)**. **Inactive:** Gen-set comes back to the original mode and behaves

Application	TEST	Remote TEST On Load
		accordingly to this mode and other conditions.
MINT	Gen-set started and running until the TEST mode deactivated.	**Active:** Gen-set is put to TEST mode. On the top of it the load is transferred to the Gen-set. The open load transfer is performed. **Inactive:** Gen-set comes back to the original mode and behaves accordingly to this mode and other conditions. (the load can be transferred back to the mains (OFF, AUTO) or stay on the Gen-set (MAN).

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Remote AUTO

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	620		
Description			

The controller is switched to the AUTO mode (there are fourthree modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode.

This binary input has the lowest priority from Remote OFF / MAN / AUTO / TEST binary inputs

Remote control priority:

- Remote OFF (Highest priority)
- Remote TEST
- Remote MAN
- Remote AUTO (Lowest Priority)

back to Logical binary inputs alphabetically

Remote Ctrl Lock

Related FW	2.1.0	**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	2.1.0	Related applications	MINT, SPtM
Comm object	618		
Description			
The controller is switched to the MAN mode (there are fourthree modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode. Remote control priority: › Remote OFF (Highest priority) › Remote TEST › Remote MAN › Remote AUTO (Lowest Priority)			

back to Logical binary inputs alphabetically

Remote OFF

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	617		
Description			
The controller is switched to the OFF mode (there are fourthree modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode. Remote control priority: › Remote OFF (Highest priority) › Remote TEST › Remote MAN › Remote AUTO (Lowest Priority)			

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Remote Start/Stop

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	38		
Description			

Use this input to start and stop the Gen-set in AUTO and TEST mode.

Note: *If the binary input Remote Start/Stop is active and engine is running and mains failure occurs, the MCB breaker opens, after* ***Open Transfer Min Break (page 443)*** *Transfer Delay the GCB breaker is closed. Once the mains is OK, the* ***Mains Return Delay (page 393)*** *elapses and the GCB breaker is opened. Then after* ***Open Transfer Min Break (page 443)*** *Transfer Delay is MCB breaker closed. Gen-set remains running as long as binary input Rem Start/Stop is active. For more details see timing diagram below.*

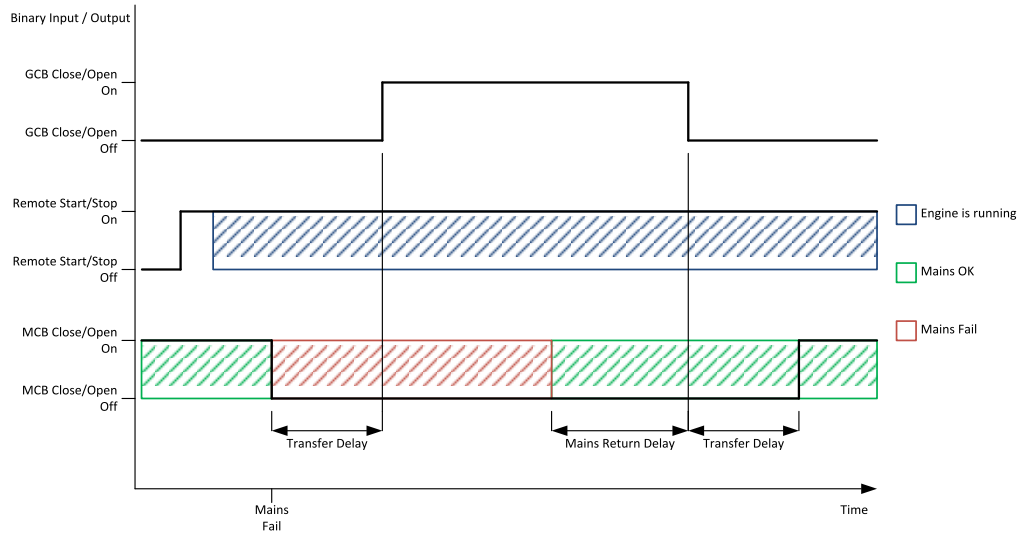


Image 8.55 Remote Start/Stop

Taken action in SPtM application (AUTO Mode)	
Active	Start Gen-set, synchronization, parallel operation (Baseload/Imp/Exp), Regardless the Mains params OK. › Start the Gen-set to Island if Mains Not OK › Reverse synchronisation when mains gets restored
Inactive	Unloading of the Gen-set if it is running in Parallel, stop the Gen-set

Taken action in MINT application (AUTO Mode)	
Active	Start the Gen-set, after #System Start Delay elapses, the system is activated and started by Power management.
Inactive	Stop the Gen-set, after #System Stop Delay, the system is deactivated and a Gen-set is stopped.

back to Logical binary inputs alphabetically

Remote TEST

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	621		
Description			
The controller is switched to the TEST mode (there are fourthree modes OFF / MAN / AUTO / TEST) when this binary input is active. When opens controller is switched back to previous mode. Remote control priority: › Remote OFF (Highest priority) › Remote TEST › Remote MAN › Remote AUTO (Lowest Priority)			

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Run Indication 1*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	46		
Description			
This binary input is used to indicate running Gen-set. › If this LBI gets active while cranking, Gen-set is considered as started and starting procedure continues to a next phase. › If this LBI gets active when Gen-set is expected to be stopped, alarm **Wrn Stop Fail (page 901)** is activated. ***Note:*** *This LBI has two equivalents – LBI RUN INDICATION 2* (PAGE 753) and LBI RUN INDICATION 3* (PAGE 753).* ***Note:*** *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*			

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Run Indication 2*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	47		
Description			

This binary input is used to indicate running Gen-set.

- If this LBI gets active while cranking, Gen-set is considered as started and starting procedure continues to a next phase.
- If this LBI gets active when Gen-set is expected to be stopped, alarm Wrn Stop Fail (page 901) is activated.

Note: *This LBI has two equivalents – LBI RUN INDICATION 1* (PAGE 752) and LBI RUN INDICATION 3* (PAGE 753).*

Note: *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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Run Indication 3*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	48		
Description			

This binary input is used to indicate running Gen-set.

- If this LBI gets active while cranking, Gen-set is considered as started and starting procedure continues to a next phase.
- If this LBI gets active when Gen-set is expected to be stopped, alarm Wrn Stop Fail (page 901) is activated.

Note: *This LBI has two equivalents – LBI RUN INDICATION 1* (PAGE 752) and LBI RUN INDICATION 2* (PAGE 753).*

Note: *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*

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LBI: S

Sd Override

Related FW	2.1.0	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 754) is indicated in the alarm list if Sd Override mode is active to inform the operator that the engine is not protected.*

IMPORTANT: MISUSE OF THIS INPUT CAN CAUSE DAMAGE TO THE GEN-SET!

Note: *User protection Sd Override is not blocked*

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Soft Unload Enable

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1049		
Description			

In case the communication with other controllers is lost, the soft unload is being proceeded only if this logical binary input is active. If this input is not active the GCB is opened immediately after the stop request is detected or the GCB button is pressed.

Note: *This function is used when there is any non-detected unit which is able to take over the load of the Gen-set which is being unloaded.*

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Start Blocking

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	68		
Description			

Start of the Gen-set is blocked if this binary input gets active before Start command is issued. While start is blocked, alarm ALI Start Blocking is active.

Activation of this LBI while Gen-set is already running (or is about to be started) has no effect.

When LBI is active before Start command, the LBO **READY (PAGE 813)** is not active.

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Start Button

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	189		
Description			

Binary input has the same function as Start Button on the InteliGen 500 G2 front panel. It is evaluated in MAN mode only.

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Starter 1 Disabled

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1011		
Description			
When Gen-set has two starters available this LBI is used to disable starter 1.			

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Starter 2 Disabled

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1012		
Description			
When Gen-set has two starters available this LBI is used to disable starter 2.			

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Starter Priority

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1010		
Description			
By activating this LBI, **STARTER 2 (PAGE 819)** has higher priority in dual starter operation.			

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Stop Button

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	190		
Description			
Binary input has the same function as Stop Button on the InteliGen 500 G2 front panel. It is evaluated in MAN Mode only.			

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SUS Excitation Block

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	140		
Description			
When this LBI is active, LBO **SUS EXCITATION (PAGE 823)** is blocked. This LBI takes an effect during the SUS start sequence only when the setpoint **Excitation Control (page 362)** = External.			

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SUS Min Power 2

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	983		
Description			

This LBI is for switching between setpoints #SUS Min Power 1-3.

LBI SUS Min Power 2	LBI **SUS MIN POWER 3 (PAGE 756)**	Active Setpoint Setpoint
0	0	**#SUS Min Power 1 (page 360)**
1	0	**#SUS Min Power 2 (page 361)**
0	1	**#SUS Min Power 3 (page 362)**
1	1	**#SUS Min Power 3 (page 362)**

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SUS Min Power 3

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	984		
Description			

This LBI is for switching between setpoints #SUS Min Power 1-3.

LBI **SUS MIN POWER 2 (PAGE 756)**	LBI SUS Min Power 3	Active Setpoint Setpoint
0	0	**#SUS Min Power 1 (page 360)**
1	0	**#SUS Min Power 2 (page 361)**
0	1	**#SUS Min Power 3 (page 362)**
1	1	**#SUS Min Power 3 (page 362)**

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Switch To AUT

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1112		
Description			

When the first rising edge appears on the binary input, the MODE is changed to AUTO. Falling edge has no effect and controller stays in AUTO MODE.

There is no blocking between these "Switch To" LBIs.

> **Example:** CU is in OFF mode. LBI Switch To AUTO is activated – CU goes to AUTO Mode (LBI stays active). Then LBI **SWITCH TO MAN (PAGE 757)** is activated – CU goes to MAN Mode (at this moment, LBIs Switch To OFF and Switch To AUTO are active – CU reacts only on rising edges).

When more rising edges from "Switch To" LBIs are detected at the same time, mode is selected according to priorities in the table below.

"GO to" control priority	
Highest	OFF
	MAN
Lowest	AUTO

back to Logical binary inputs alphabetically

Switch To MAN

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1111		
Description			

When the first rising edge appears on the binary input, the MODE is changed to MAN. Falling edge has no effect and controller stays in MAN MODE.

There is no blocking between these "Switch To" LBIs.

> **Example:** CU is in OFF mode. LBI Switch To MAN is activated – CU goes to MAN Mode (LBI stays active). Then LBI **SWITCH TO AUT (PAGE 757)** is activated – CU goes to AUTO Mode (at this moment, LBIs Switch To MAN and Switch To AUTO are active – CU reacts only on rising edges).

When more rising edges from "Switch To" LBIs are detected at the same time, mode is selected according to priorities in the table below.

"GO to" control priority	
Highest	OFF
	MAN
Lowest	AUTO

back to Logical binary inputs alphabetically

Switch To OFF

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1110		
Description			

When the first rising edge appears on the binary input, the MODE is changed to OFF. Falling edge has no effect and controller stays in OFF MODE.

There is no blocking between these "Switch To" LBIs.

> **Example:** CU is in MAN mode. LBI Switch To OFF is activated – CU goes to OFF Mode (LBI stays active). Then LBI **SWITCH TO AUT (PAGE 757)** is activated – CU goes to AUTO Mode (at this moment, LBIs Switch To OFF and Switch To AUTO are active – CU reacts only on rising edges).

When more rising edges from "Switch To" LBIs are detected at the same time, mode is selected according to priorities in the table below.

"GO to" control priority	
Highest	OFF
	MAN
Lowest	AUTO

back to Logical binary inputs alphabetically

Synchronization Disabled*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	277		
Description			

This binary input is used to disable the forward and reverse synchronization process so the controller won't attempt to close breaker(s) if synchronization would be needed.This LBI is useful if user want to set the additional condition for start of the synchronization.

> ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to Logical binary inputs alphabetically

LBI: T

Top Priority

Related FW	2.1.0	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 417)**.

> **IMPORTANT: This binary input can be used only if setpoint #Priority Auto Swap (page 418) = Disabled.**

back to Logical binary inputs alphabetically

Total Emergency Stop

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	995		
Description			
This binary input is used for stopping the engine and opening all breakers. Activation of Total Emergency Stop leads to: › Alarm Total Emergency Stop is activated and history record TOTAL EMERGENCY STOP is created › Controller will open MCB and GCB › Controller will keep MCB and GCB open as long as alarm is present in alarm list › Engine is stopped			

back to Logical binary inputs alphabetically

LBI: V

Voltage Droop*

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	595		
Description			
If this LBI is active, Voltage regulation is forced to Droop regardless of the setpoint Load/VAr Sharing Regulation Type. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

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8.1.5 Logical binary outputs

What Logical binary outputs are:

Logical binary outputs are outputs for binary values and functions.

Alphabetical groups of Logical binary outputs

LBO: A 763
LBO: B 775
LBO: C 776
LBO: D 778
LBO: E 779
LBO: F 785
LBO: G 788
LBO: H 796
LBO: I 797
LBO: K 800
LBO: L 801
LBO: M 802
LBO: N 809
LBO: O 811
LBO: P 811
LBO: R 813
LBO: S 816
LBO: T 824
LBO: U 824
LBO: V 825

For a full list of Logical binary inputs go to the chapter **Logical binary outputs alphabetically (page 761)**.

Logical binary outputs alphabetically

AIN Switch01 763
AIN Switch02 763
AIN Switch03 764
AIN Switch04 764
AIN Switch05 765
AIN Switch06 765
AIN Switch07 766
AIN Switch08 766
AIN Switch09 767
AIN Switch10 767
Air Valves 768
AL Common BOC 768
AL Common Fls 768
Common Mains Protection 769
AL Common Sd 769
AL Common Stp 770
AL Common Wrn 770
AL Gen Freq Wrn 770
AL GenBus Frequency 770
AL GenBus Voltage 770
AL Gen Voltage Wrn 771
AL Maintenance 1 771
AL Maintenance 2 771
AL Maintenance 3 771
AL Maintenance 4 771
AL Overcurrent 772
Alarm 772
Alarm Flashing 772
AL Mains Fail 772
AL Mains Frequency 772
AL Mains Voltage 773
ATT DEF Level Lamp 773
ATT DPF Lamp 774
ATT HEST Lamp 774
ATT Inhibited Lamp 774
ATT Interlock Status 774
ATT PCD Lamp 774
ATT Regen ACK Lamp 775
ATT SCR Error Lamp 775
AVR Down 775
AVR Up 775
Bus Healthy 775
Common Alarm Active Level 1 776
Common Alarm Active Level 2 776
Common Alarm Level 1 776
Common Alarm Level 2 776
Cooling 777
Cooling Pump 777
Display Fail 778
Dummy Load Stage 1 778
Dummy Load Stage 2 778
Dummy Load Stage 3 778
Dummy Load Stage 4 779
Dummy Load Stage 5 779
ECU Comm OK 781
ECU Comm Error 781
ECU Power Relay 782
ECU Red Lamp 782
ECU Run Stop 783
ECU Wait To Start 783
ECU Yellow Lamp 783
Electrical Alarm 783
Engines Swapped 783
Exercise Timer 1 784
Exercise Timer 2 784
Exercise Timer 3 784
Exercise Timer 4 784
FltRes Button Echo 785
Forward Synchronization 786
Frequency Select 786
Fuel Pump 786
Fuel Solenoid 786
GCB Button Echo 788
GCB Close/Open 788
MGCB OFF Coil 790
GCB ON Coil 791
MGCB UV Coil 791
GeneratorBus Healthy 794
Gen-set Active 794
Glow Plugs 794
Heartbeat 796
Horn 797
HornRes Button Echo 797
Idle/Nominal 798
Idle/Nominal Pulse 798
Ignition 798
Ignition On 799
In Synchronism 800
Initialized 800
kWh Pulse 800
Load Shedding Stage 1 801
Load Shedding Stage 2 801
Load Shedding Stage 3 801
Load Shedding Stage 4 801
Load Shedding Stage 5 802
Mains Healthy 802
Manual Ready 802
MCB Button Echo 803
MCB Close/Open 803
MCB OFF Coil 804
MCB ON Coil 805
MCB UV Coil 807
Mode AUTO 809
Mode MAN 809
Mode OFF 809
Mode TEST 809
NCB Close/Open 809
Nominal/Idle Pulse 810
Not In AUTO 810

Not Used 811
Peak Shaving Active 811
Peripheral Module Comm Fail 811
Prestart 812
Ready 813
Ready To AMF 814
Ready To Load 814
Ready/AUTO 814
RegenerationNeeded 815
Reverse Synchronization 815
ROCOF Active 815
Running 816
Sd Override 816
Soft Unload 817
Speed Down 817
Speed Up 817
Start Button Echo 817
Starter 1 818
Starter 2 819
Still Log 0 820
Still Log 1 820
Stop Button Echo 820
Stop Pulse 821
Stop Solenoid 821
Supplying Load 822
Synchronizing 823
Sys Start/Stop 823
System Ready 824
System Reserve OK 824
User Key 1 State 824
User Key 2 State 825
User Key 3 State 825
User Key 4 State 825
User Key 5 State 825
Ventilation 825
Ventilation Off Pulse 826
Ventilation On Pulse 826

back to Controller objects

LBO: A

AIN Switch01

Related FW	2.1.0	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 **AIN Switch01 On (page 478)** and **AIN Switch01 Off (page 479)**. The value is measured from **AIN SWITCH 01 (PAGE 829)** analog input.

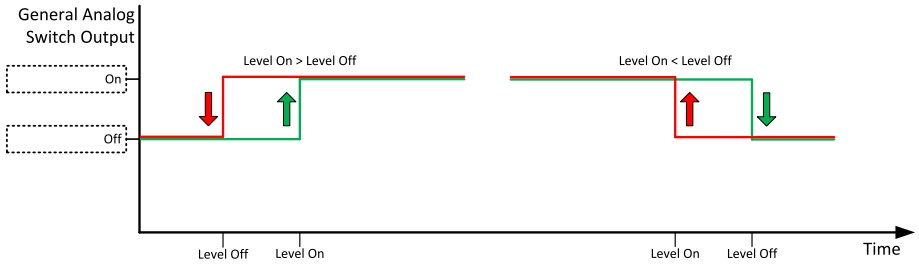


Image 8.56 General analog input 1 switch

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AIN Switch02

Related FW	2.1.0	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 **AIN Switch02 On (page 480)** and **AIN Switch02 Off (page 481)**. The value is measured from **AIN SWITCH 02 (PAGE 829)** analog input.

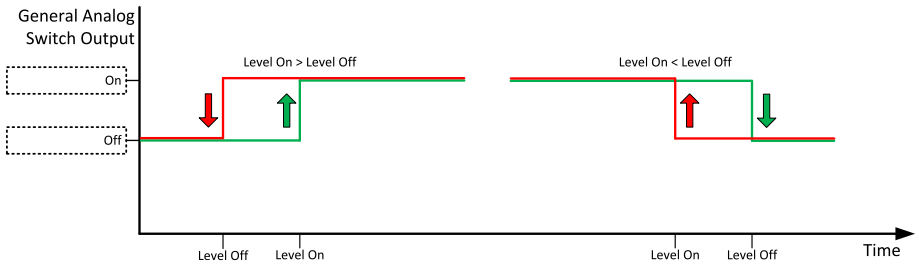


Image 8.57 General analog input 2 switch

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AIN Switch03

Related FW	2.1.0	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 **AIN Switch03 On (page 482)** and **AIN Switch03 Off (page 483)**. The value is measured from **AIN SWITCH 03 (PAGE 829)** analog input.



Image 8.58 General analog input 3 switch

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AIN Switch04

Related FW	2.1.0	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 **AIN Switch04 On (page 484)** and **AIN Switch04 Off (page 485)**. The value is measured from **AIN SWITCH 04 (PAGE 830)** analog input.

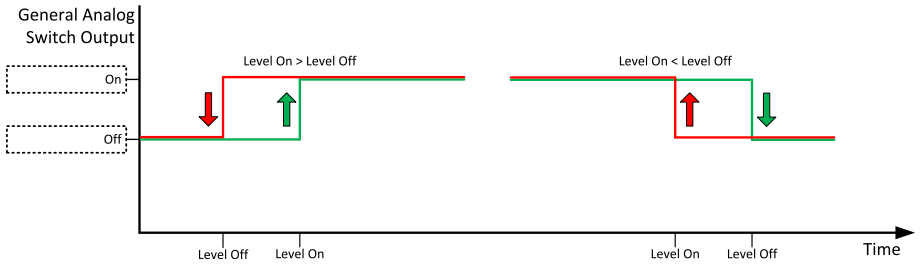


Image 8.59 General analog input 4 switch

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AIN Switch05

Related FW	2.1.0	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 **AIN Switch05 On (page 486)** and **AIN Switch05 Off (page 487)**. The value is measured from **AIN SWITCH 05 (PAGE 830)** analog input.



Image 8.60 General analog input 5 switch

back to Logical binary outputs alphabetically

AIN Switch06

Related FW	2.1.0	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 **AIN Switch06 On (page 488)** and **AIN Switch06 Off (page 489)**. The value is measured from **AIN SWITCH 06 (PAGE 830)** analog input.

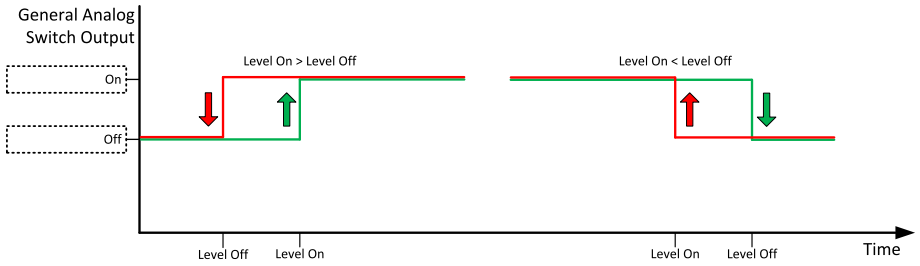


Image 8.61 General analog input 6 switch

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AIN Switch07

Related FW	2.1.0	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 **AIN Switch07 On (page 490)** and **AIN Switch07 Off (page 491)**. The value is measured from **AIN SWITCH 07 (PAGE 831)** analog input.



Image 8.62 General analog input 7 switch

back to Logical binary outputs alphabetically

AIN Switch08

Related FW	2.1.0	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 **AIN Switch08 On (page 492)** and **AIN Switch08 Off (page 493)**. The value is measured from **AIN SWITCH 08 (PAGE 831)** analog input.

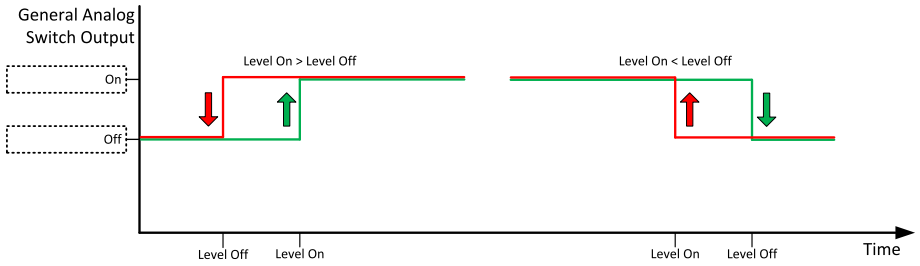


Image 8.63 General analog input 8 switch

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AIN Switch09

Related FW	2.1.0	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 **AIN Switch09 On (page 494)** and **AIN Switch09 Off (page 495)**. The value is measured from **AIN SWITCH 09 (PAGE 831)** analog input.



Image 8.64 General analog input 9 switch

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AIN Switch10

Related FW	2.1.0	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 **AIN Switch10 On (page 496)** and **AIN Switch10 Off (page 497)**. The value is measured from **AIN SWITCH 10 (PAGE 832)** analog input.

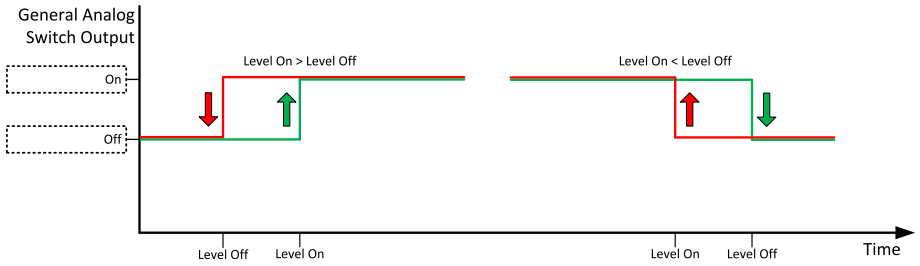


Image 8.65 General analog input 10 switch

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Air Valves

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1247		
Description			

This output is activated together with binary output **PRESTART (PAGE 812)** and opens after the engine is stopped or in case that engine is not ready.

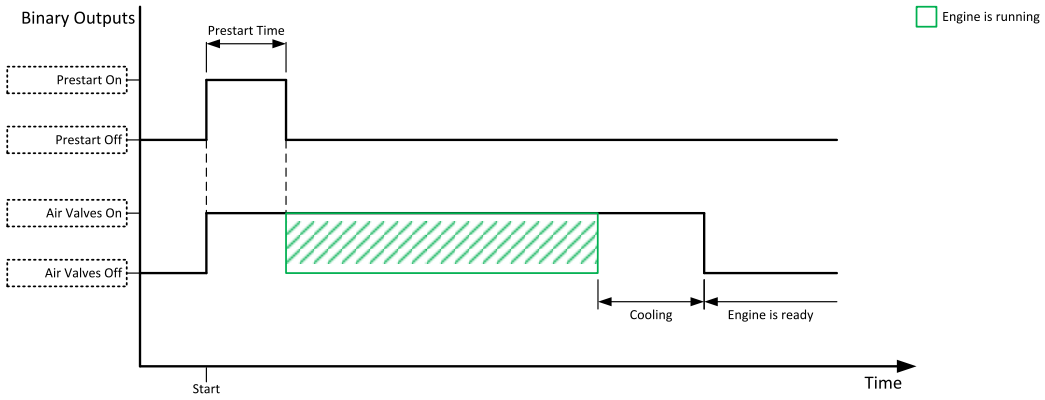


Image 8.66 Air Valves

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AL Common BOC

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	9		
Description			

Output is activated when any BOC alarm appears.

The output opens, if:

- No BOC alarm is active and
- Fault reset button is pressed

back to Logical binary outputs alphabetically

AL Common FIs

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	6		
Description			

Output is activated when any sensor fail alarm appears.

The output opens, if:

- No sensor fail alarm is active and
- Fault reset button is pressed

back to Logical binary outputs alphabetically

Common Mains Protection

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	10		
Description			
Signalization of released common mains protection.			

back to Logical binary outputs alphabetically

AL Common Off Load

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	8		
Description			
This output is closed when there is at least one alarm of type Offload present in the alarmlist. ***Note:*** *When any Off Load alarm is activated the GCB opens immediately. In AUT mode the Gen-set keeps running for 60 s and then stops by standard stopping sequence. In MAN mode the Gen-set keeps running until operator changes the state.*			

back to Logical binary outputs alphabetically

Common Shutdown Override

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	251		
Description			
This output is closed 2 seconds after there is at least one alarm of type *Shutdown Override* present in the alarmlist.			

back to Logical binary outputs alphabetically

AL Common Sd

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	4		
Description			
Output is activated when any shutdown alarm appears . The output opens, if: › No shutdown alarm is active and › Fault reset button is pressed			

back to Logical binary outputs alphabetically

AL Common Stp

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	5		
Description			
Output closes when any slow stop alarm appears. The output opens, if: › No slow stop alarm is active and › Fault reset button is pressed			

back to Logical binary outputs alphabetically

AL Common Wrn

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	3		
Description			
Output is activated when any warning alarm appears. The output opens, if: › No warning alarm is active and › Fault reset button is pressed			

back to Logical binary outputs alphabetically

AL Gen Freq Wrn

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1267		
Description			
This output is active generator frequency warning alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL GenBus Frequency

Related FW	2.1.0	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 GenBus Voltage

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1263		
Description			
This output is active when at least one generator voltage BOC or Sd alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Gen Voltage Wrn

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1289		
Description			
This output is active when at least one generator voltage warning alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

AL Maintenance 1

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2211		
Description			
Alarm is active when **Wrn Maintenance Timer 1 RunHours (page 886)** or **Stp Maintenance Timer 1 RunHours (page 930)** or **Wrn Maintenance Timer 1 Interval (page 886)** or **Stp Maintenance Timer 1 Interval (page 929)** is active.			

back to Logical binary outputs alphabetically

AL Maintenance 2

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2212		
Description			
Alarm is active when **Wrn Maintenance Timer 2 RunHours (page 887)** or **Stp Maintenance Timer 2 RunHours (page 930)** or **Wrn Maintenance Timer 2 Interval (page 886)** or **Stp Maintenance Timer 2 Interval (page 930)** is active.			

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AL Maintenance 3

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2213		
Description			
Alarm is active when **Wrn Maintenance Timer 3 RunHours (page 887)** or **Stp Maintenance Timer 3 RunHours (page 931)** or **Wrn Maintenance Timer 3 Interval (page 887)** or **Stp Maintenance Timer 3 Interval (page 930)** is active.			

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AL Maintenance 4

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2650		
Description			
Alarm is active when **Wrn Maintenance Timer 4 RunHours (page 888)** or **Stp Maintenance Timer 4 RunHours (page 931)** or **Wrn Maintenance Timer 4 Interval (page 888)** or **Stp Maintenance Timer 4 Interval (page 931)** is active.			

back to Logical binary outputs alphabetically

AL Overcurrent

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	109		
Description			
This output is active when the BOC Overcurrent IDMT (page 936) or BOC Short Circuit (page 940) alarm is present in alarmlist or isn't confirm.			

back to Logical binary outputs alphabetically

Alarm

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2		
Description			
The output is designed to be used as external alarm indication such as a red bulb in the control room etc. The output is active when at least one unconfirmed alarm is present in the alarmlist and remains active until confirmation of alarm.			

back to Logical binary outputs alphabetically

Alarm Flashing

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	28		
Description			
This is the flashing alternative of the output Alarm i.e. the output flashes with 1Hz period while the output Alarm is closed.			

back to Logical binary outputs alphabetically

AL Mains Fail

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	197		
Description			
This output is active when at least one mains frequency BOC or SD Alarm is present in alarmlist or in case of Mains undervoltage and Mains underfrequency (doesn’t appear in the alarm list).			

back to Logical binary outputs alphabetically

AL Mains Frequency

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1271		
Description			
This output is active when at least one mains frequency BOC or Sd alarm is present in alarmlist or isn’t confirm. ***Note:*** *Is activated also for Mains/Bus underfrequency (no alarm in the alarm list).*			

back to Logical binary outputs alphabetically

AL Mains Voltage

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1270		
Description			
This output is active when at least one mains voltage BOC or Sd alarm is present in the alarmlist or isn't confirm. ***Note:*** *Is activated also for Mains/Bus undervoltage (no alarm in the alarm list).*			

back to Logical binary outputs alphabetically

All Available Gen-sets Run

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	122		
Description			
This output is closed when all available Gen-sets are loaded.			

back to Logical binary outputs alphabetically

Any GCB Closed

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	222		
Description			
This output is active when a GCB of any controller connected via CAN2A and/or CAN2B is closed.			

back to Logical binary outputs alphabetically

Any Other GCB Closed

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1827		
Description			
This output is active when a GCB of any other controller connected via CAN2 is closed.			

back to Logical binary outputs alphabetically

ATT DEF Level Lamp

Related FW	2.1.0	**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 DPF Lamp

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2152		
Description			
This output is active when ATT DPF Lamp is active.			

back to Logical binary outputs alphabetically

ATT HEST Lamp

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1373		
Description			
This output is closed if ECU send signal HEST Lamp. If ECU stop send HEST LAMP signal binary input will be opened without no matter if alarms in alarmlist are confirmed or not.			

back to Logical binary outputs alphabetically

ATT Inhibited Lamp

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2155		
Description			
This output is active when ATT Inhibited Lamp is active.			

back to Logical binary outputs alphabetically

ATT Interlock Status

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2233		
Description			
This output is active when ATT Interlock Status is active.			

back to Logical binary outputs alphabetically

ATT PCD Lamp

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2446		
Description			
This LBO is active when the engine Particulate Control Diagnostic System detects removal of DPF, loss of DPF function or failure of PCD itself. ***Note:*** *LBO is required in Yanmar engine types*			

back to Logical binary outputs alphabetically

ATT Regen ACK Lamp

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2231		
Description			
This LBO is active when the engine requires to confirm the start of aftertreatment regeneration. ***Note:*** *LBO is required in Yanmar engine types*			

back to Logical binary outputs alphabetically

ATT SCR Error Lamp

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2153		
Description			
This output is active when ATT SCR Error Lamp is active.			

back to Logical binary outputs alphabetically

AVR Down

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	55		
Description			
This output together with the complementary output **AVR Up (page 775)** is designed for voltage and power factor control at Gen-sets, where the AVR does not support analog control.			

back to Logical binary outputs alphabetically

AVR Up

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	54		
Description			
This output together with the complementary output **AVR Down (page 775)** is designed for voltage and power factor control at Gen-sets, where the AVR does not support analog control.			

back to Logical binary outputs alphabetically

LBO: B

Bus Healthy

Related FW	2.1.0	**Related applications**	MINT
Comm object	79		
Description			
This output is active when the bus voltage and frequency are within limits. The limits for under/overvoltage and under/overfrequency are the same as for generator voltage / frequency and can be found in the Generator Settings setpoint group. It works only with **Default Application Select (page 293)**= MINT, the output is always inactive with **Default Application Select (page 293)** = SPTM.			

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LBO: C

Common Alarm Active Level 1

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	13		
Description			
This output is closed when there is at least one **Alarms level 1 (page 861)** in the alarmlis.			

back to Logical binary outputs alphabetically

Common Alarm Active Level 2

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	15		
Description			
This output is closed when there is at least one **Alarms level 2 (page 908)** in the alarmlis.			

back to Logical binary outputs alphabetically

Common Alarm Level 1

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	14		
Description			
This output is closed when there is at least one **unconfirmed Alarms level 1 (page 861)** in the alarmlist.			

back to Logical binary outputs alphabetically

Common Alarm Level 2

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	16		
Description			
This output is closed when there is at least one **unconfirmed Alarms level 2 (page 908)** in the alarmlist.			

back to Logical binary outputs alphabetically

Common Alarm Only

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	11		
Description			
This output is closed when there is at least one alarm of type *Alarm Only* present in the alarmlist.			

back to Logical binary outputs alphabetically

Common History Record

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	12		
Description			
This output is closed for 1 second every time alarm of type *History Record Only* occurs.			

back to Logical binary outputs alphabetically

Cooling

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	74		
Description			
The output is active when Gen-set is in Cooling state.			

back to Logical binary outputs alphabetically

Cooling Pump

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	40		
Description			
LBO is active as long as it's button is pressed or it's LBI is active.			

back to Logical binary outputs alphabetically

Cranking

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	76		
Description			
This output is closed while the engine is cranking.			

back to Logical binary outputs alphabetically

Cranking Procedure

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	64		
Description			
This output is closed when Gen-set enters **Sd Ventilation Time (page 342)** period (GAS) or when the cranking begins and will be closed until the Gen-set is started or **Sd Start Fail (page 941)** is activated.			

back to Logical binary outputs alphabetically

Controller HeartBeat Fail Detect*

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	125		
Description			
This output is used at Controller Redundancy function to disconnect the master controller from CAN1 modules and specific inputs/outputs of Gen-set. Use this LBO on slave controller. Output of this function is closed when slave controller doesn't receive two consequent messages from master controller. Use **Watched Controller* (page 310)** to select which controller's HeartBeat shall be monitored. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

back to Logical binary outputs alphabetically

LBO: D

Display Fail

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2223		
Description			
This output indicates controller display failure.			

back to Logical binary outputs alphabetically

Dummy Load Stage 1

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1439		
Description			
This LBO is used to activate corresponding stage of external load bank.			

back to Logical binary outputs alphabetically

Dummy Load Stage 2

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1440		
Description			
This LBO is used to activate corresponding stage of external load bank.			

back to Logical binary outputs alphabetically

Dummy Load Stage 3

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1441		
Description			
This LBO is used to activate corresponding stage of external load bank.			

back to Logical binary outputs alphabetically

Dummy Load Stage 4

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1442		
Description			
This LBO is used to activate corresponding stage of external load bank.			

back to Logical binary outputs alphabetically

Dummy Load Stage 5

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1443		
Description			
This LBO is used to activate corresponding stage of external load bank.			

back to Logical binary outputs alphabetically

LBO: E

ECU 1 Comm Fail

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1998		
Description			
This output is closed when there is no communication with ECU configured in ECU slot 1.			

back to Logical binary outputs alphabetically

ECU 2 Comm Fail

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1999		
Description			
This output is closed when there is no communication with ECU configured in ECU slot 2.			

back to Logical binary outputs alphabetically

ECU 3 Comm Fail

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2000		
Description			
This output is closed when there is no communication with ECU configured in ECU slot 3.			

back to Logical binary outputs alphabetically

ECU 4 Comm Fail

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2001		
Description			
This output is closed when there is no communication with ECU configured in ECU slot 4.			

back to Logical binary outputs alphabetically

ECU 5 Comm Fail

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2002		
Description			
This output is closed when there is no communication with ECU configured in ECU slot 5. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

back to Logical binary outputs alphabetically

ECU 6 Comm Fail

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2003		
Description			
This output is closed when there is no communication with ECU configured in ECU slot 6. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

back to Logical binary outputs alphabetically

ECU 7 Comm Fail

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2004		
Description			
This output is closed when there is no communication with ECU configured in ECU slot 7. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

back to Logical binary outputs alphabetically

ECU 8 Comm Fail

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2005		
Description			
This output is closed when there is no communication with ECU configured in ECU slot 8. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*			

back to Logical binary outputs alphabetically

ECU Comm OK

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	347		
Description			
This output is active when an ECU is configured, connected and the communication with the ECU is established. ***Note:*** *When* ***ECU POWER RELAY (PAGE 782)*** *is not configured, output is evaluated all the time. If* ***ECU POWER RELAY (PAGE 782)*** *is configured, output is evaluated only when engine is not stop (****ECU POWER RELAY (PAGE 782)*** *is active).*			

back to Logical binary outputs alphabetically

ECU Comm Error

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	114		
Description			
This output is active when an ECU is configured, but the communication with the ECU is not established or has dropped out. ***Note:*** *When* ***ECU POWER RELAY (PAGE 782)*** *is not configured, output is evaluated all the time. If* ***ECU POWER RELAY (PAGE 782)*** *is configured, output is evaluated only when engine is not stop (****ECU POWER RELAY (PAGE 782)*** *is active).*			

back to Logical binary outputs alphabetically

ECU Power Relay

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	116		
Description			

This output is to be used for control of "keyswitch" input of an ECU. If the particular ECU does not have keyswitch or a similar input, it can be used for control of DC power for the ECU.

The output is activated together with **PRESTART (PAGE 812)** and remains active for the entire duration that the engine is running. It is deactivated at the moment that the engine comes to a stop (i.e. together with the **FUEL SOLENOID (PAGE 786)**).

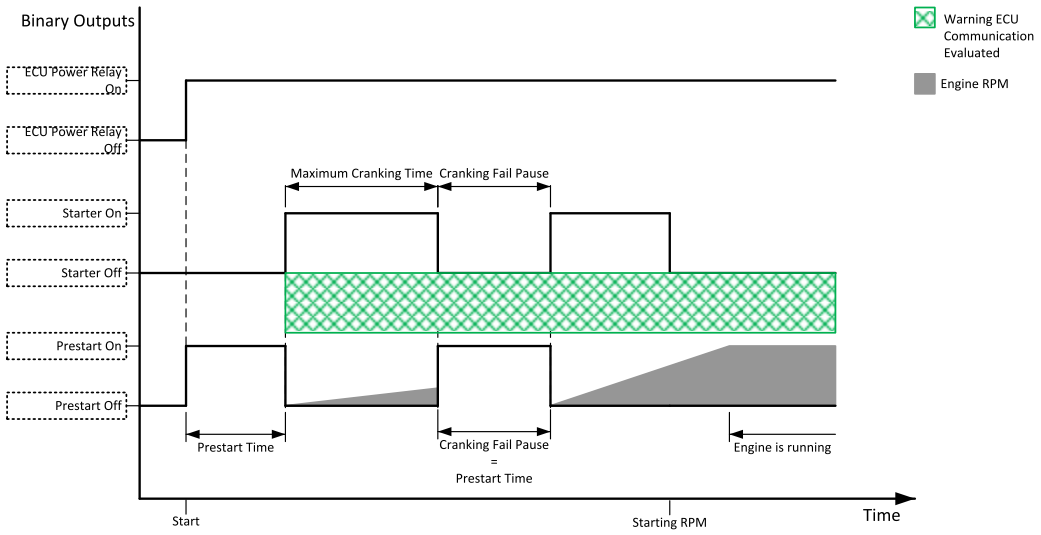


Image 8.67 ECU Power Relay

IMPORTANT: This LBO also affects evaluation of Sd ECU 1 Communication Fail (page 912) or Wrn ECU Communication Fail (page 874) 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.

back to Logical binary outputs alphabetically

ECU Red Lamp

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	350		
Description			

This output is active when the ECU sends an active “red lamp” flag, i.e. it has detected a critical malfunction and the engine should not be operated until a service check is performed. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all.

back to Logical binary outputs alphabetically

ECU Run Stop

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	958		
Description			
Signal for starting and stopping of ECU.			

back to Logical binary outputs alphabetically

ECU Wait To Start

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	959		
Description			
This output is active when ECU Wait To Start Lamp is active.			

back to Logical binary outputs alphabetically

ECU Yellow Lamp

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	349		
Description			
This output is active when the ECU sends an active “yellow lamp” flag, i.e. it has detected a non-critical malfunction. This flag is taken from the DM1 frame on standard J1939 ECUs. Some ECUs provide this flag in their own proprietary frames and some do not provide the flag at all.			

back to Logical binary outputs alphabetically

Electrical Alarm

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2410		
Description			
LBO Electrical Alarm is active when any of generator protections of any alarm level type (Overload, Short Circuit, IDMT Overcurrent, Current Unbalance, Overvoltage, Undervoltage, Voltage Unbalance, Overfrequency, Underfrequency, Reverse Power) is active. LBO Electrical Alarm is deactivated by confirmation of generator protection alarms in alarmlist and simultaneously generator protections alarms has to be inactive.			

back to Logical binary outputs alphabetically

Engines Swapped

Related FW	2.1.0	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 418)** option RunHourEql.			

back to Logical binary outputs alphabetically

Exercise Timer 1

Related FW	2.1.0	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 501)** subgroup. This output is active when Timer 1 is active. ***Note:*** *In the event that both Timers are active at the same time,* ***Subgroup: Timer 1 (page 501)*** *has a higher priority than* ***Subgroup: Timer 2 (page 509)****.*			

back to Logical binary outputs alphabetically

Exercise Timer 2

Related FW	2.1.0	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 509)** 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 501)*** *has a higher priority than* ***Subgroup: Timer 2 (page 509)****.*			

back to Logical binary outputs alphabetically

Exercise Timer 3

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1946		
Description			
This is an output from the Exercise timer 3. This output makes it easy to make periodic tests of the Gen-set and its activation depends on the setpoints in the **Subgroup: Timer 3 (page 517)** subgroup. This output is active when Timer 3 is active. ***Note:*** *In the event that both Timers are active at the same time,* ***Subgroup: Timer 3 (page 517)*** *has a higher priority than* ***Subgroup: Timer 3 (page 517)****.*			

back to Logical binary outputs alphabetically

Exercise Timer 4

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1947		
Description			
This is an output from the Exercise timer 4. This output makes it easy to make periodic tests of the Gen-set and its activation depends on the setpoints in the **Subgroup: Timer 4 (page 525)** subgroup. This output is active when Timer 4 is active. ***Note:*** *In the event that both Timers are active at the same time,* ***Subgroup: Timer 4 (page 525)*** *has a higher priority than* ***Subgroup: Timer 4 (page 525)****.*			

back to Logical binary outputs alphabetically

Exercise Timer 5

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1948		
Description			
This output is closed when the Exercise timer 5 is activated. The output can be used to make periodic tests of the Gen-set, breakers, any external logic etc. and its activation depends on the setpoints in the **Subgroup: Timer 5 (page 533)** subgroup. ***Note:*** *If more than one timer is active at the same time, timer with selected higher priority function is applied.*			

back to Logical binary outputs alphabetically

Exercise Timer 6

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1949		
Description			
This output is closed when the Exercise timer 6 is activated. The output can be used to make periodic tests of the Gen-set, breakers, any external logic etc. and its activation depends on the setpoints in the **Subgroup: Timer 6 (page 541)** subgroup. ***Note:*** *If more than one timer is active at the same time, timer with selected higher priority function is applied.*			

back to Logical binary outputs alphabetically

LBO: F

FltRes Button Echo

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	30		
Description			
This output provides 1s pulse when: › Fault Reset button is pressed on the controller front facia or › Fault Reset button is pressed on any of external local/remote terminals or › Fault Reset command is received via communication line or › The input **Fault Reset Button (page 725)** is activated.			

back to Logical binary outputs alphabetically

Forward Synchronization

Related FW	2.1.0	**Related applications**	MINT, SPtM, SPI
Comm object	68		
Description			
The output is active during forward synchronization and is opened when GCB is closed or forward synchronization is interrupted. ***Note:*** *The output can be used to control of an external synchronizing module.*			

back to Logical binary outputs alphabetically

Frequency Select

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1815		
Description			
The Frequency select output is active when Nominal Frequency (Frequency Settings) is equal to 50 Hz and is deactivated when Nominal Frequency (Frequency Settings) is equal to 60 Hz.			

back to Logical binary outputs alphabetically

Fuel Pump

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1253		
Description			
Output is activated when the value of Fuel Level lies under the value of setpoint **Fuel Pump On (page 353)** and is deactivated when value of **Fuel Pump Off (page 354)** is reached. This output also can be activated by binary input **FUEL PUMP ON/OFF (PAGE 733)**. In this case the binary output is active until the binary input **FUEL PUMP ON/OFF (PAGE 733)** is active or until the value of Fuel Level reaches 100 % or the time set by setpoint **Transfer Wrn Delay (page 355)** elapsed.			

back to Logical binary outputs alphabetically

Fuel Solenoid

Related FW	2.1.0	**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 331)** setpoint in Engine Settings group.			

Diesel:

The output is activated before binary output **STARTER 1 (PAGE 818)**.The lead time is adjusted by setpoint **Fuel Solenoid Lead (page 336)**.

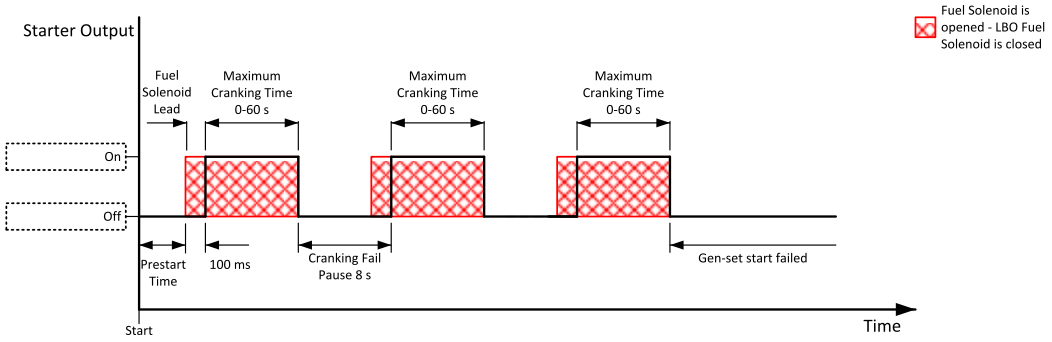


Image 8.68 Fuel Solenoid 1

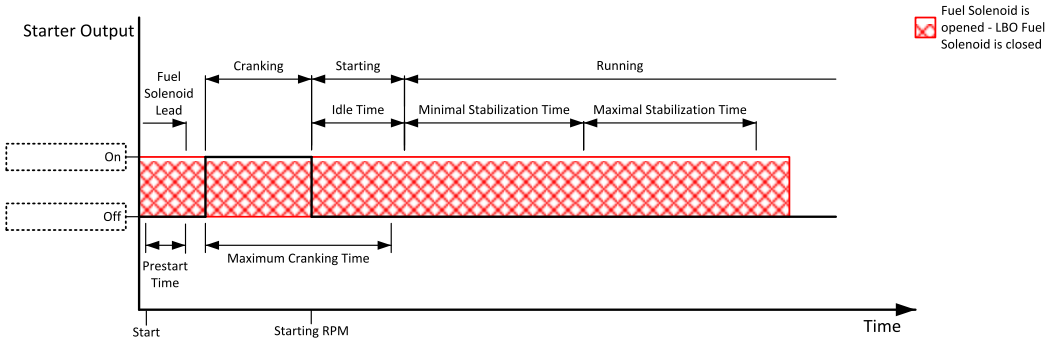


Image 8.69 Fuel Solenoid 2

The output is deactivated when:

- Emergency Stop comes
- Cooled Gen-set is stopped
- In pause between repeated starts

Gas:

The output closes together with binary output **IGNITION (PAGE 798)** when engine RPM exceed 30 RPM (fix value).

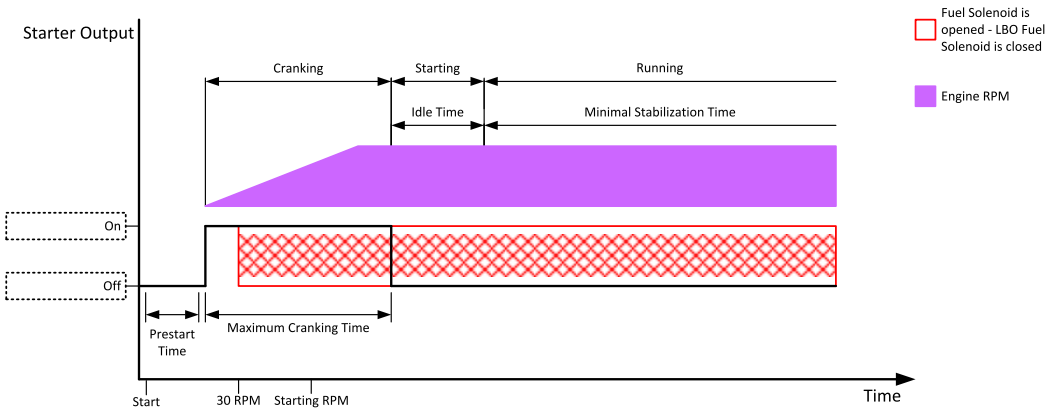


Image 8.70 Fuel Solenoid 3

The output is deactivated when:

- Emergency Stop comes
- Cooled Gen-set is stopped
- In pause between repeated starts

back to Logical binary outputs alphabetically

LBO: G

GCB Button Echo

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	35		
Description			

This output provides 1s pulse when:

- GCB button is pressed on the controller front facia or
- GCB button is pressed on any of external local/remote terminals or
- GCB command is received via communication line or
- the input GCB BUTTON is activated.

back to Logical binary outputs alphabetically

GCB Close/Open

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	41		
Description			

The output controls the generator circuit breaker. Its state represents the breaker position requested by the controller. The breaker must react within 5 seconds to a close or open command, otherwise an alarm is issued.

Note: *InteliGen 500 G2 controllers require the breaker feedback to be configured.*

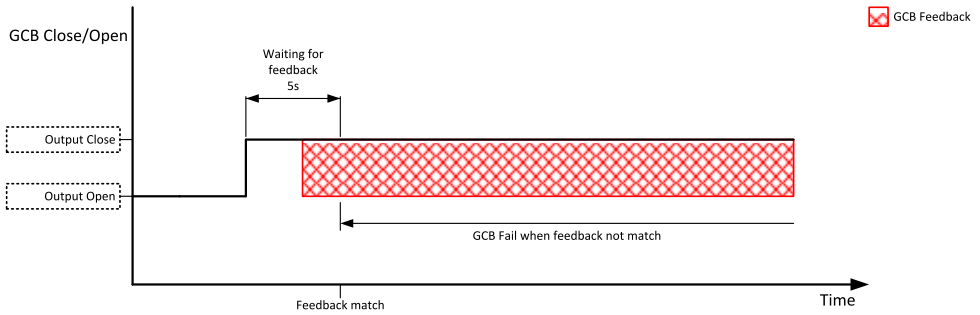


Image 8.71 GCB Close command

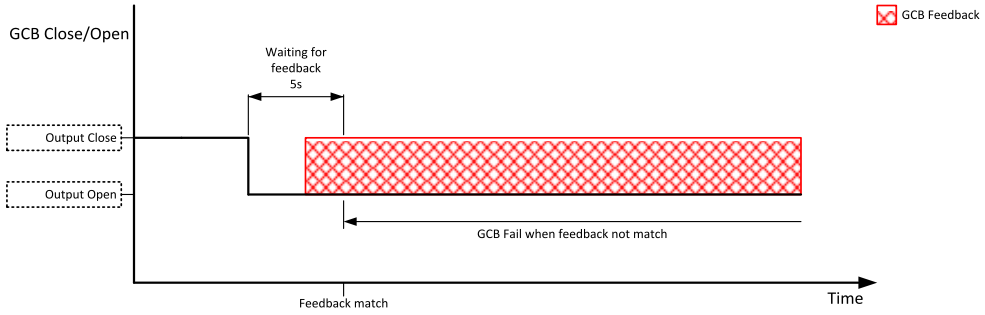


Image 8.72 GCB Open command

back to Logical binary outputs alphabetically

MGCB OFF Coil

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	43		

Description

The output is intended for control of open coil of master 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.

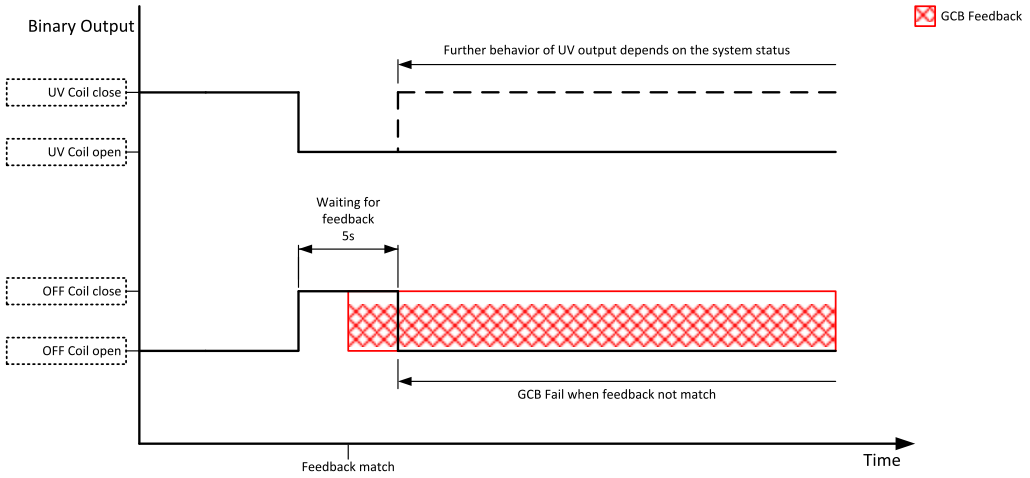


Image 8.73 MGCB OFF Coil command

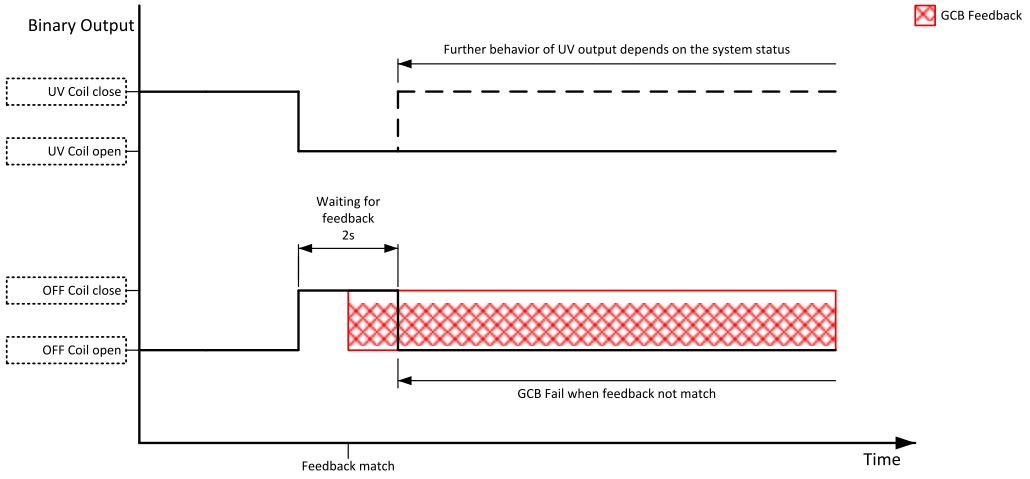


Image 8.74 MGCB OFF Coil command

back to Logical binary outputs alphabetically

GCB ON Coil

Related FW	2.1.0	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.			

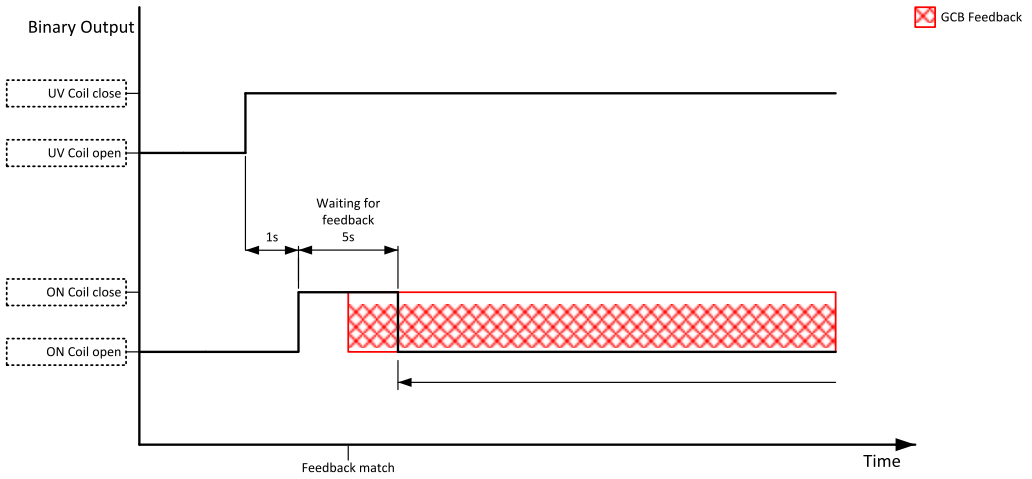


Image 8.75 GCB ON Coil close command

back to Logical binary outputs alphabetically

GCB Status

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	84		
Description			

This output indicates the GCB position as it is internally considered by the controller.

The position is based on **GCB FEEDBACK (PAGE 735)** and **GCB FEEDBACK NEGATIVE* (PAGE 736)**.

- In case that only **GCB FEEDBACK (PAGE 735)** is used, this output mirrors the input.
- In case that both **GCB FEEDBACK (PAGE 735)** and **GCB FEEDBACK NEGATIVE* (PAGE 736)** are used and
  - Feedbacks match – output indicates GCB position according to feedbacks.
  - Feedbacks do not match – output indicates last position when feedbacks matched.

back to Logical binary outputs alphabetically

MGCB UV Coil

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	44		
Description			
The output is intended for control of undervoltage coil of master generator circuit breaker. The output is active the whole time when the generator is running. The output is active in case the bus voltage is present. The output is deactivated for at least 5 seconds in the moment the breaker has to be switched off.			

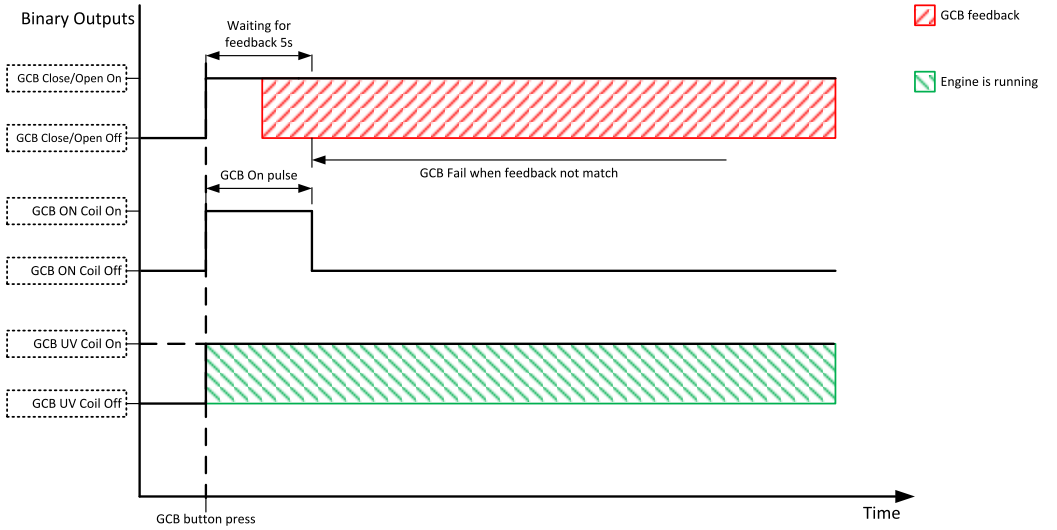


Image 8.76 MGCB UV Coil close command

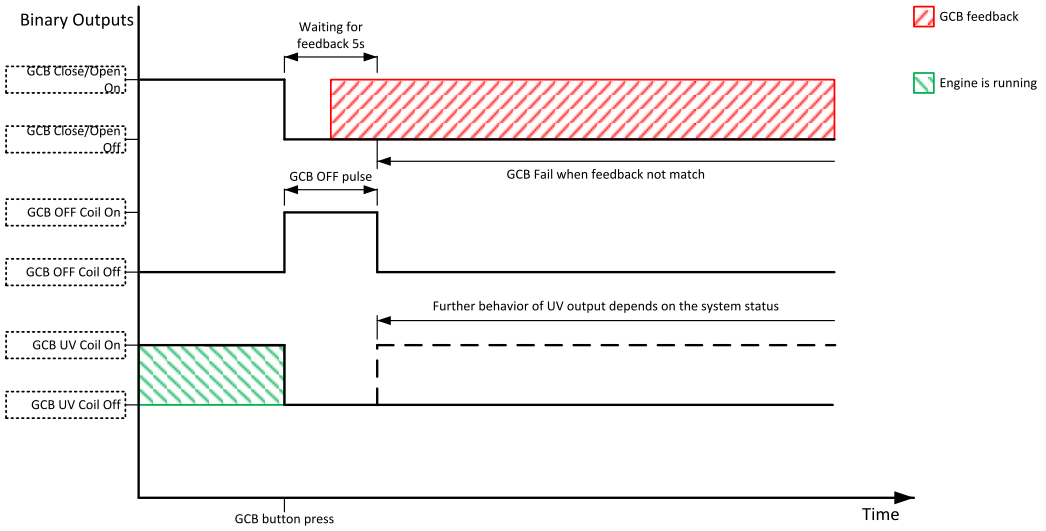


Image 8.77 MGCB UV Coil open command

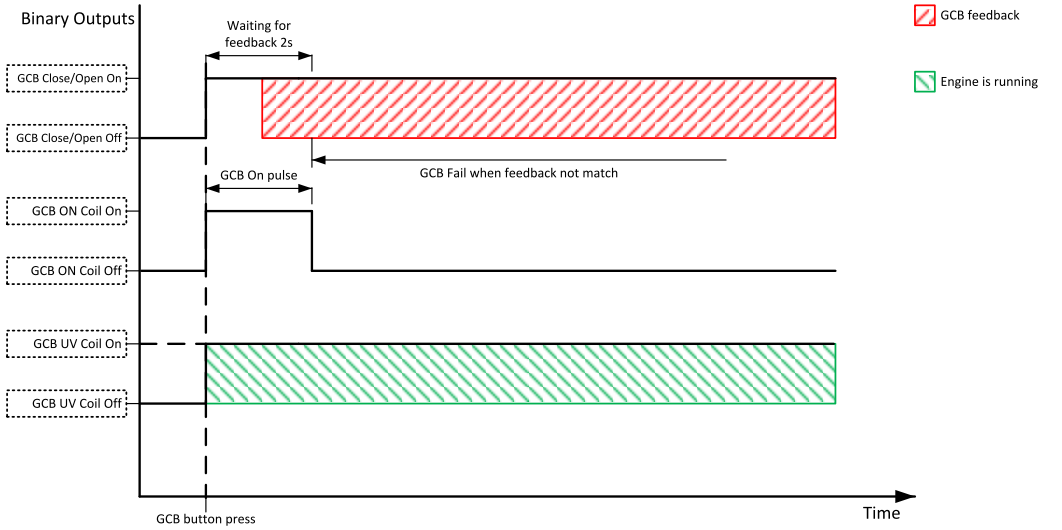


Image 8.78 GCB UV Coil close command

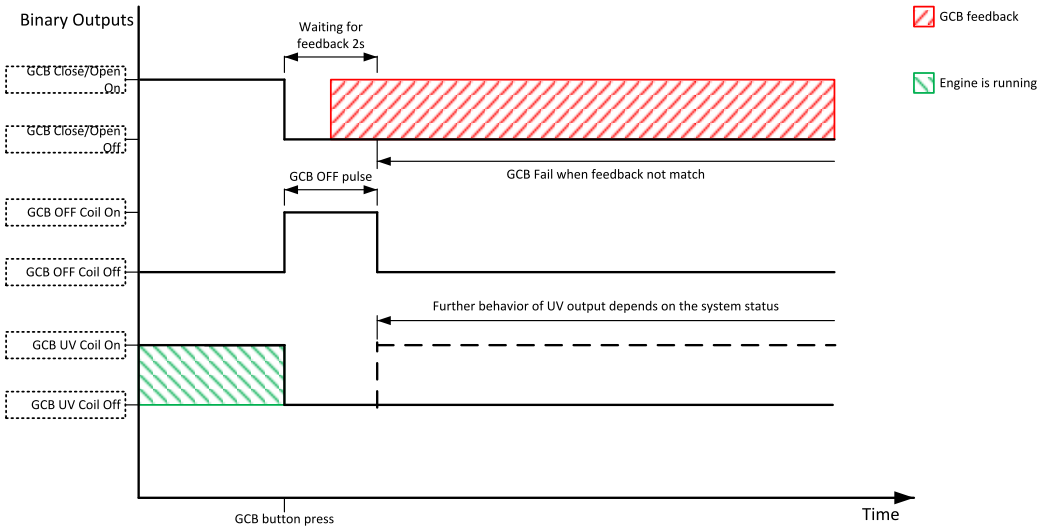


Image 8.79 GCB UV Coil open command

back to Logical binary outputs alphabetically

GeneratorBus Healthy

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	77		
Description			
This output is active when the generatorbus 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

Gen-set Active

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	60		
Description			
The output is closed at the beginning of the Prestart Time period and opens when the Gen-set is fully stopped. If the Gen-set fails to start, then this output is opened after last cranking attempt. The output also closes if the engine begins to rotate spontaneously.			

back to Logical binary outputs alphabetically

Glow Plugs

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	1252		
Description			

This output is dedicated for diesel engine only. This output will be active for exact time pre-set by setpoint **Glow Plugs Time (page 335)** before every starting attempt. The output is deactivated at the same time as the **STARTER 1 (PAGE 818)** output is activated (100 ms after **PRESTART (PAGE 812)** output is deactivated).

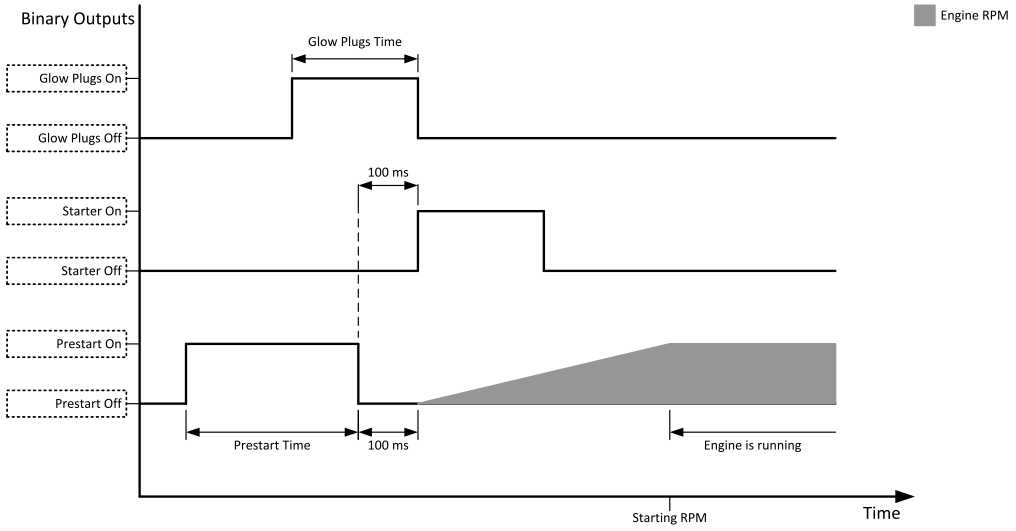


Image 8.80 Glow Plugs

When the **Glow Plugs Time (page 335)** is longer than **Cranking Fail Pause (page 333)** then the **Glow Plugs Time (page 335)** in **Cranking Fail Pause (page 333)** as long as **Cranking Fail Pause (page 333)**.

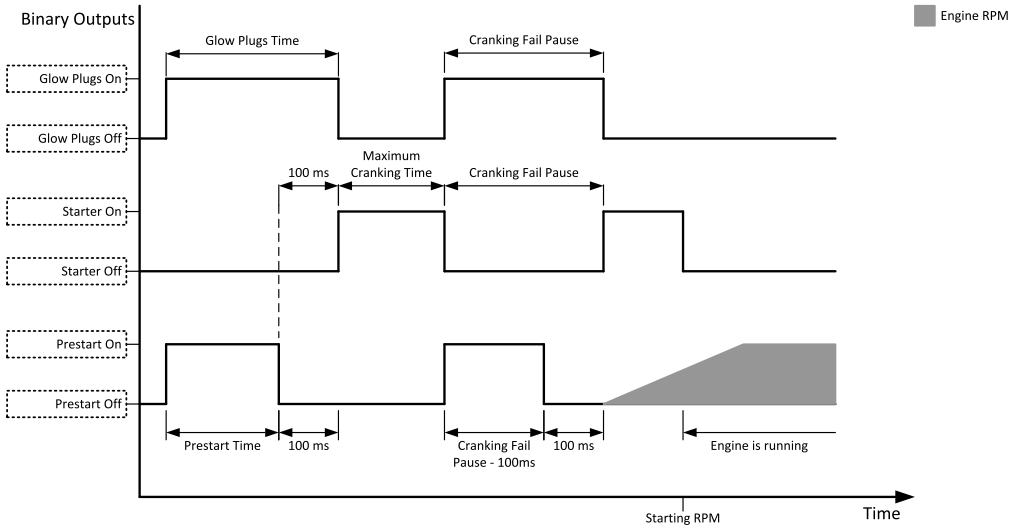


Image 8.81 Glow Plugs in Cranking Fail Pause 1

When the **Glow Plugs Time (page 335)** is shorter than **Cranking Fail Pause (page 333)** then the **Glow Plugs Time (page 335)** in **Cranking Fail Pause (page 333)** as long as the normal **Glow Plugs Time (page 335)**.

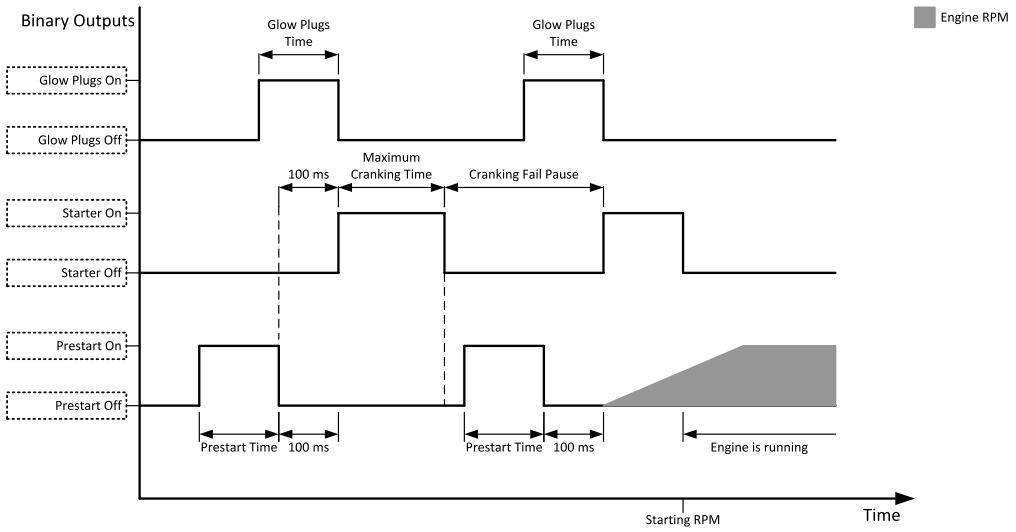


Image 8.82 Glow Plugs in Cranking Fail Pause 2

back to Logical binary outputs alphabetically

LBO: H

Heartbeat

Related FW	2.1.0	**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

History Record Indication

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2762		
Description			

This LBO will trigger a 1 s pulse on each new history record.

- If controller will make more than one history record at the same time: It will still generate only one pulse that is 1 s long
- If controller generates a new record during the period when the LBO is active (during the 1 s pulse) **it will not generate additional pulse** or prolong the active pulse.

back to Logical binary outputs alphabetically

Horn

Related FW	2.1.0	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 324)** has elapsed			

back to Logical binary outputs alphabetically

Horn Flashing

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	29		
Description			
This is the flashing alternative of the output DESCRIPTION (PAGE 797), i.e. the output flashes with 1 Hz period while the output Horn is closed.			

back to Logical binary outputs alphabetically

HornRes Button Echo

Related FW	2.1.0	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 Run

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	66		
Description			
This output is closed during **Idle Time (page 337)** period which begins to count down when the engine is considered as started.			

back to Logical binary outputs alphabetically

Idle/Nominal

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	39		
Description			

This output is used for switching between idle speed and nominal speed of the engine during the startup phase, if this feature (input) is available on the particular engine. In the case of some EFI engines, the idle/nominal switching is performed over the communication bus.

The output Idle/Nominal is activated after the timer **Idle Time (page 337)** elapses. The **Idle Time (page 337)** starts to countdown when **Starting RPM (page 334)** reached. The underspeed protection is not evaluated during fixed 5 seconds period after reaching **Starting RPM (page 334)**. A Start Fail protection occurs if the RPM drop below 2RPM during idle.

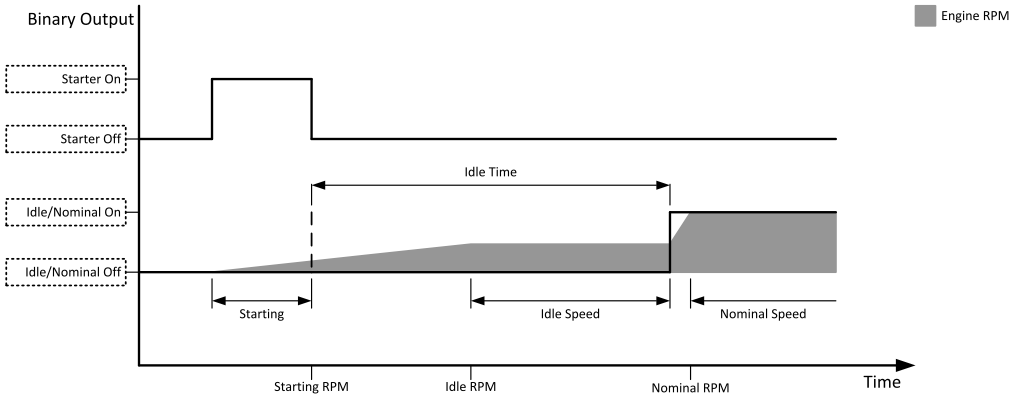


Image 8.83 Idle/Nominal

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	2.1.0	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 798)** is activated.

back to Logical binary outputs alphabetically

Ignition

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	37		
Description			

This output is dedicated to controlling the ignition at a gas engine. The output is active together with binary

output **FUEL SOLENOID (PAGE 786)** in the moment when the timer **Sd Ventilation Time (page 342)** elapsed and the Gen-set reaches at least 30 RPM during cranking. The output is deactivated 500 ms after all **Additional running engine indications (page 116)** will be inactive. the output is deactivated when the Gen-set has to be stopped or in pause during repeated starts.

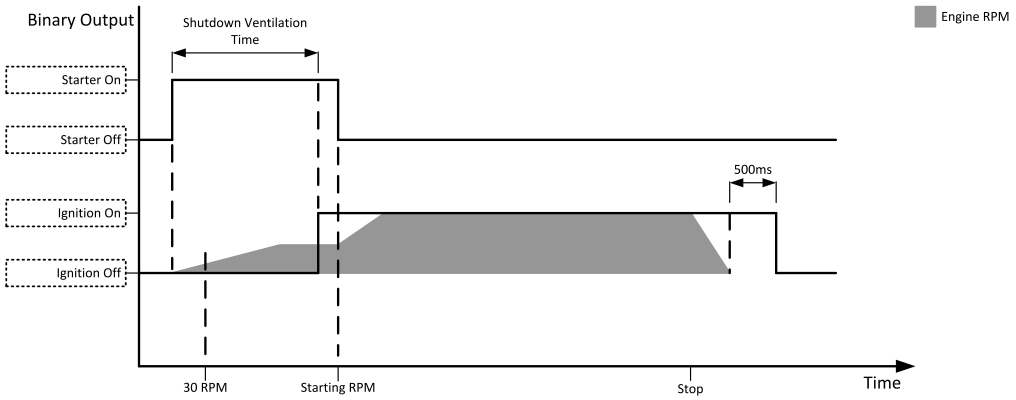


Image 8.84 Ignition 1

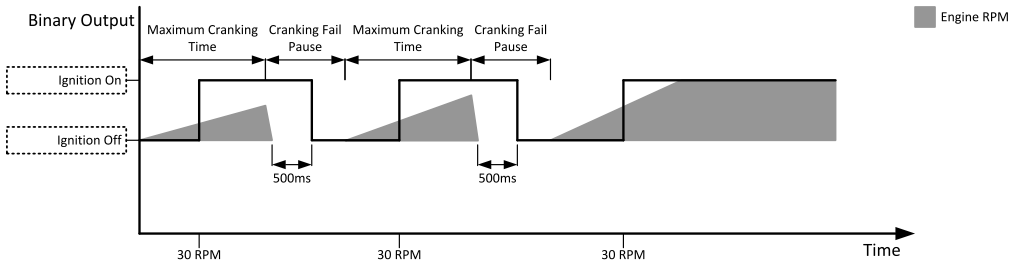


Image 8.85 Ignition 2

back to Logical binary outputs alphabetically

Ignition On

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1257		
Description			
This output is on since start button is pressed till the unit is completely stopped (or the engine doesn't start or Sd or E-Stop is active) ***Note:*** *This function is the same as* ***ECU POWER RELAY (PAGE 782)****. Ignition ON stays there from historical reasons.*			

back to Logical binary outputs alphabetically

In Synchronism

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	80		
Description			
This output is closed **during synchronization** when all synchro conditions have been fulfilled. The output is deactivated either when: › The synchro conditions are lost **or** › The corresponding breaker has been closed **or** › The sychronizing was interrupted or timed out. Synchro conditions are following: › Phase shift between generator and mains (bus) voltage must be within range of **±Phase Window (page 455)** for period longer than **Dwell Time (page 455)**. › Voltage difference between generator and mains (bus) voltage (in all phases) must be lower or equal to **Voltage Window (page 454)** for period longer than **Dwell Time (page 455)**.			

back to Logical binary outputs alphabetically

Initialized

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1222		
Description			
This output is activated when the engine proceeded through initialization phase. (Initialization phase is restart or power up of the controller.)			

back to Logical binary outputs alphabetically

LBO: K

kWh Pulse

Related FW	2.1.0	**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	2.1.0	**Related applications**	MINT, SPtM
Comm object	51		
Description			
Particular instances of the load shedding functionality The load shedding outputs are activated (load is being shedd) in the order 1, 2, 3, 4, 5. The load shedding outputs are deactivated (load is being reconnected) in the order 5, 4, 3, 2, 1. The load disconnected by the LBO Nr.1 is the less essential load of these three possible loads instances.			

back to Logical binary outputs alphabetically

Load Shedding Stage 2

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	52		
Description			
Particular instances of the load shedding functionality The load shedding outputs are activated (load is being shedd) in the order 1, 2, 3, 4, 5. The load shedding outputs are deactivated (load is being reconnected) in the order 5, 4, 3, 2, 1. The load disconnected by the LBO Nr.1 is the less essential load of these three possible loads instances.			

back to Logical binary outputs alphabetically

Load Shedding Stage 3

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	53		
Description			
Particular instances of the load shedding functionality The load shedding outputs are activated (load is being shedd) in the order 1, 2, 3, 4, 5. The load shedding outputs are deactivated (load is being reconnected) in the order 5, 4, 3, 2, 1. The load disconnected by the LBO Nr.1 is the less essential load of these three possible loads instances.			

back to Logical binary outputs alphabetically

Load Shedding Stage 4

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	452		
Description			
Particular instances of the load shedding functionality The load shedding outputs are activated (load is beeing shedd) in the order 1, 2, 3, 4, 5. The load shedding outputs are deactivated (load is beeing reconnected) in the order 5, 4, 3, 2, 1. The load disconnected by the LBO Nr.1 is the less essential load of these three possible loads instances.			

back to Logical binary outputs alphabetically

Load Shedding Stage 5

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	453		
Description			
Particular instances of the load shedding functionality The load shedding outputs are activated (load is beeing shedd) in the order 1, 2, 3, 4, 5. The load shedding outputs are deactivated (load is beeing reconnected) in the order 5, 4, 3, 2, 1. The load disconnected by the LBO Nr.1 is the less essential load of these three possible loads instances.			

back to Logical binary outputs alphabetically

LBO: M

Mains Healthy

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	78		
Description			

This output is active while mains failure is not detected and mains voltage and frequency is within limits.

- Mains Healthy is active when mains f and V are within the protection limits
- Mains Healthy deactivates when there is active mains protection level 2
- Mains Healthy cannot be activated when there is inactive not confirmed alarm **Sd Emergency Stop (page 916)** in the alarmlist

Note: *Mains Healthy cannot be activated when there is active **ALI Mains Ph Rotation Opposite (page 885)** or **ALI Mains Ph L1 Inverted (page 884)**, **ALI Mains Ph L2 Inverted (page 885)** or **ALI Mains Ph L3 Inverted (page 885)**.*

back to Logical binary outputs alphabetically

Manual Ready

Related FW	2.1.0	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 754)** is active (Output **READY (PAGE 813)** is active).			

back to Logical binary outputs alphabetically

MCB Button Echo

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	34		
Description			

This output provides 1s pulse when:

- MCB button is pressed on the controller front facia or
- MCB button is pressed on any of external local/remote terminals or
- MCB command is received via communication line or
- the input MCB BUTTON is activated.

back to Logical binary outputs alphabetically

MCB Close/Open

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	45		
Description			

The output controls the mains circuit breaker. Its state represents the breaker position requested by the controller. The breaker must react within 5 seconds to a close or open command, otherwise an alarm is issued.

Note: *InteliGen 500 G2 controllers require the breaker feedback to be configured.*

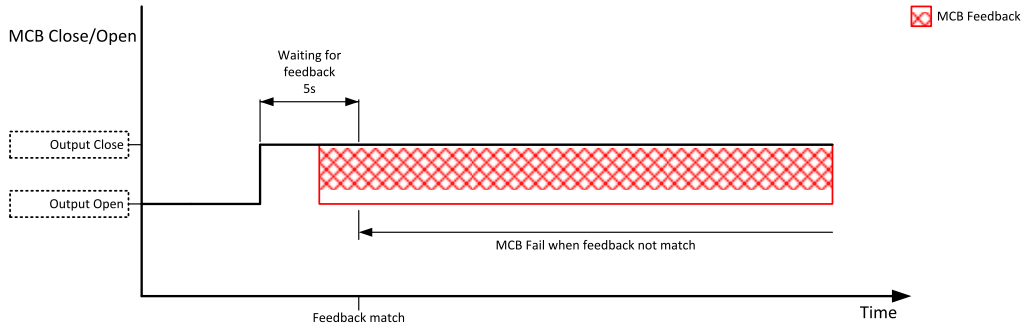


Image 8.86 MCB Close command

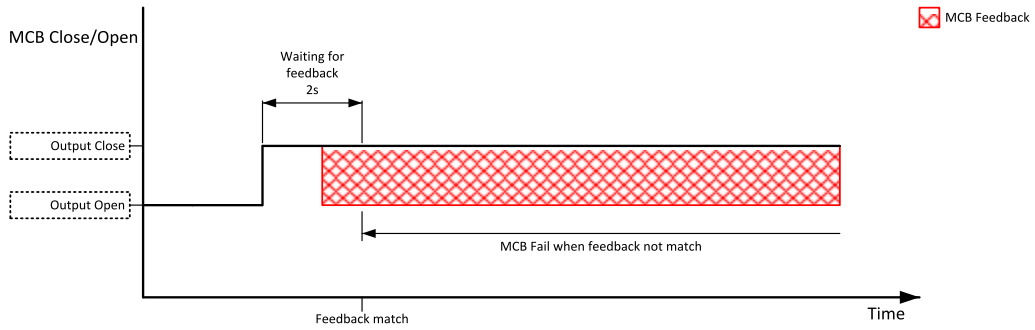


Image 8.87 MCB Close command

back to Logical binary outputs alphabetically

MCB OFF Coil

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	47		

Description

The output is intended for control of open coil of mainsbus 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.

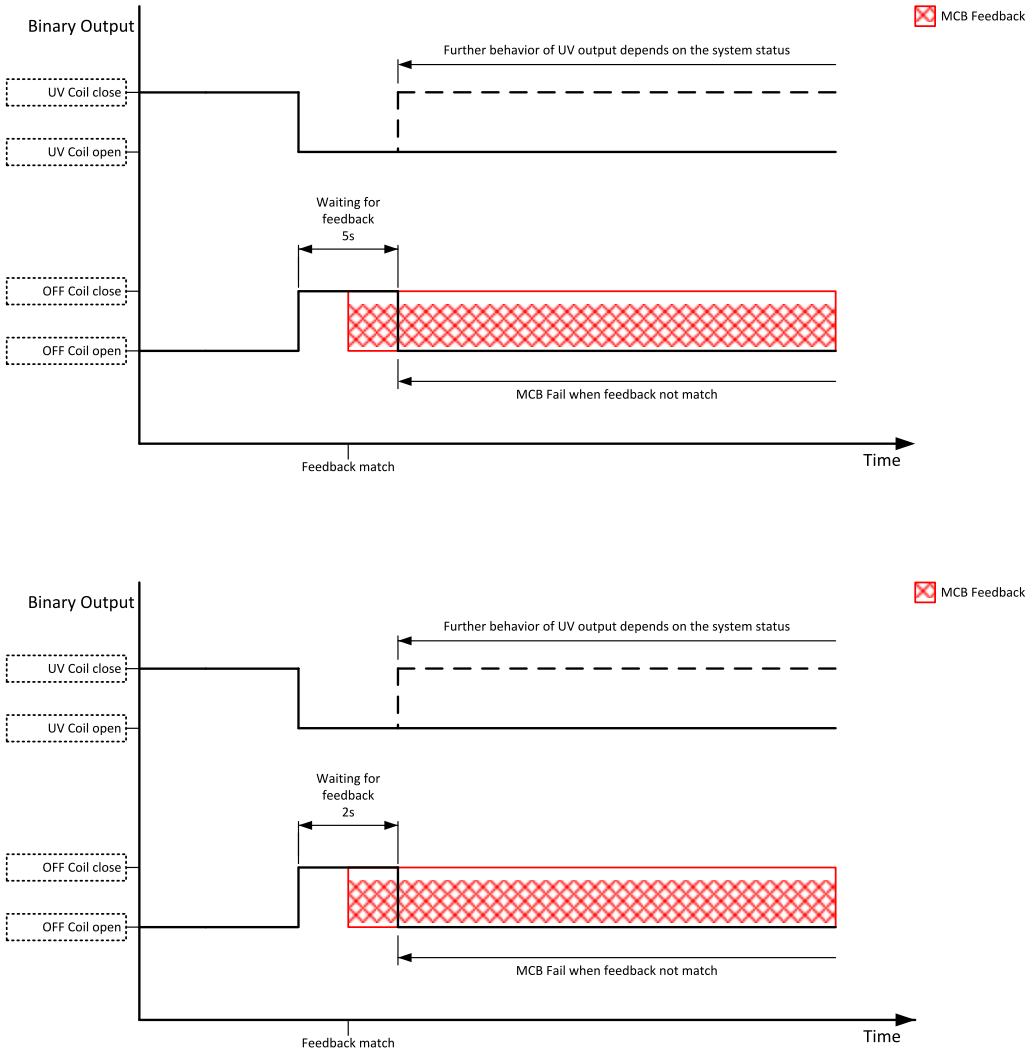


Image 8.88 MCB OFF Coil command

back to Logical binary outputs alphabetically

MCB ON Coil

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	46		

Description

The output is intended for control of close coil of mainsbus circuit breaker. The output gives at least 5 second pulse in the moment the breaker has to be closed.

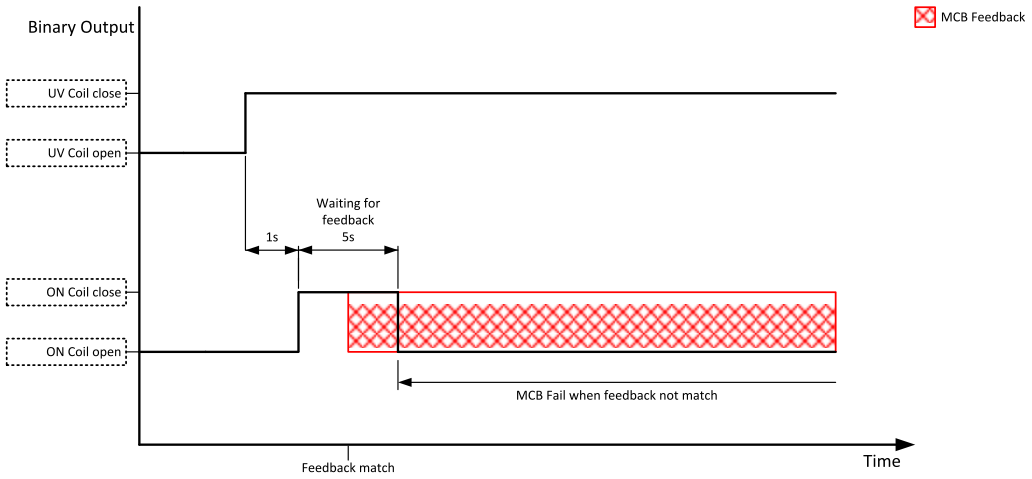


Image 8.89 MCB ON Coil close command

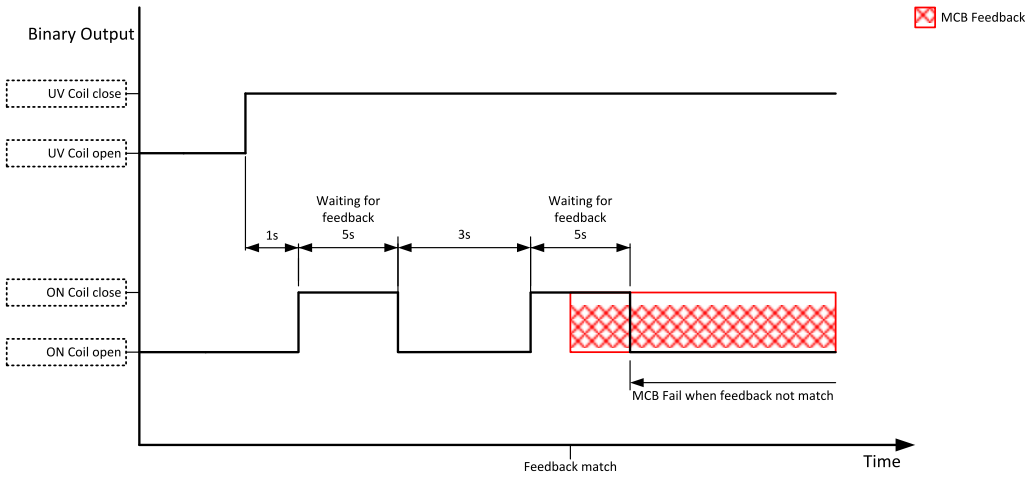


Image 8.90 Repeated MCB ON coil close command

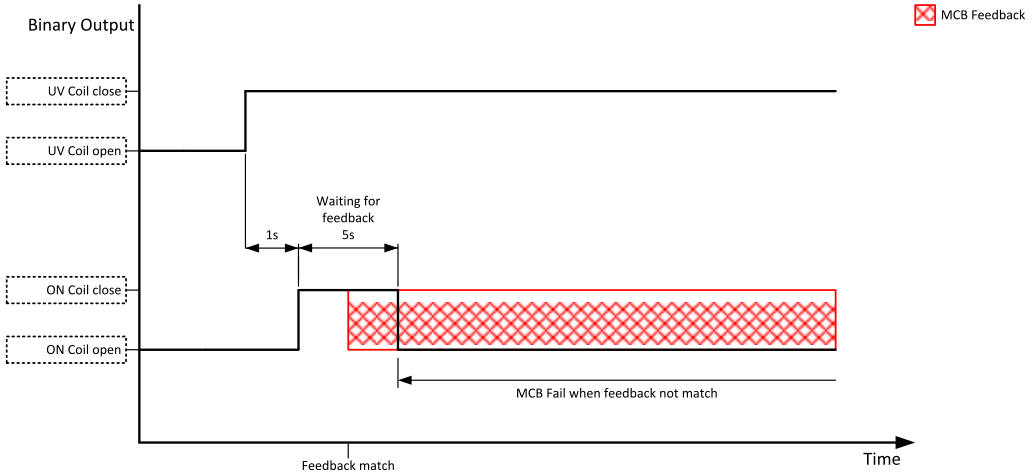


Image 8.91 MCB ON Coil close command

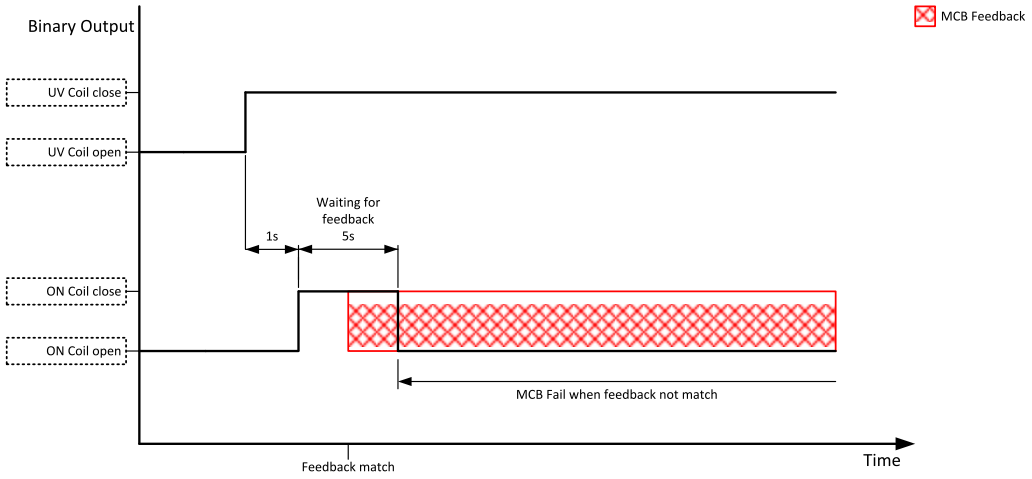


Image 8.92 MCB ON Coil close command

back to Logical binary outputs alphabetically

MCB Status

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	85		
Description			

This output indicates the MCB position as it is internally considered by the controller. The position is based on **MCB FEEDBACK (PAGE 741)** and **MCB FEEDBACK NEGATIVE* (PAGE 742)**.

- In case that only **MCB FEEDBACK (PAGE 741)** is used, this output mirrors the input.
- In case that both **MCB FEEDBACK (PAGE 741)** and **MCB FEEDBACK NEGATIVE* (PAGE 742)** are used and
  - Feedback match – output indicates MCBposition according to feedbacks.
  - Feedback do not match – output indicates last position when feedbacks matched.

back to Logical binary outputs alphabetically

MCB UV Coil

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	48		

Description

The output is intended for control of undervoltage coil of mainsbus 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.

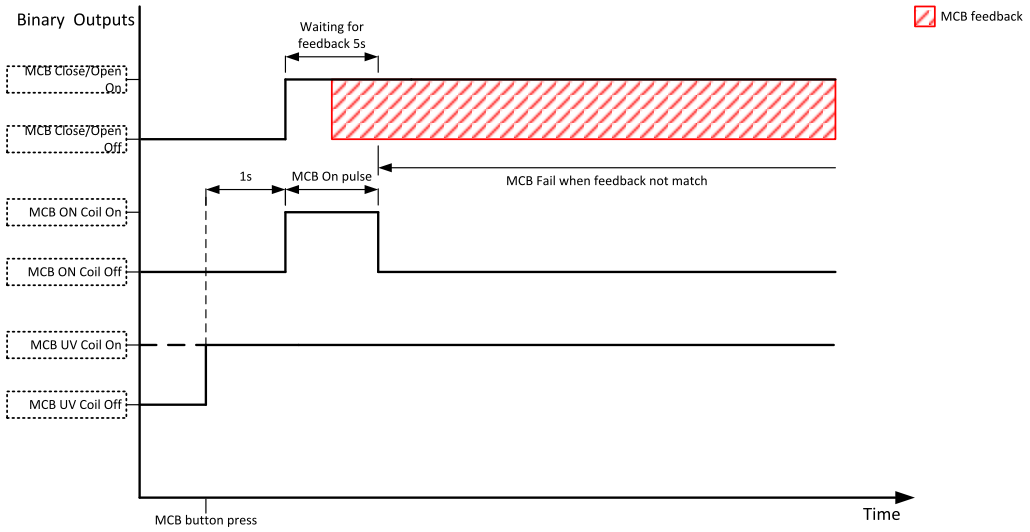


Image 8.93 MCB UV Coil close command

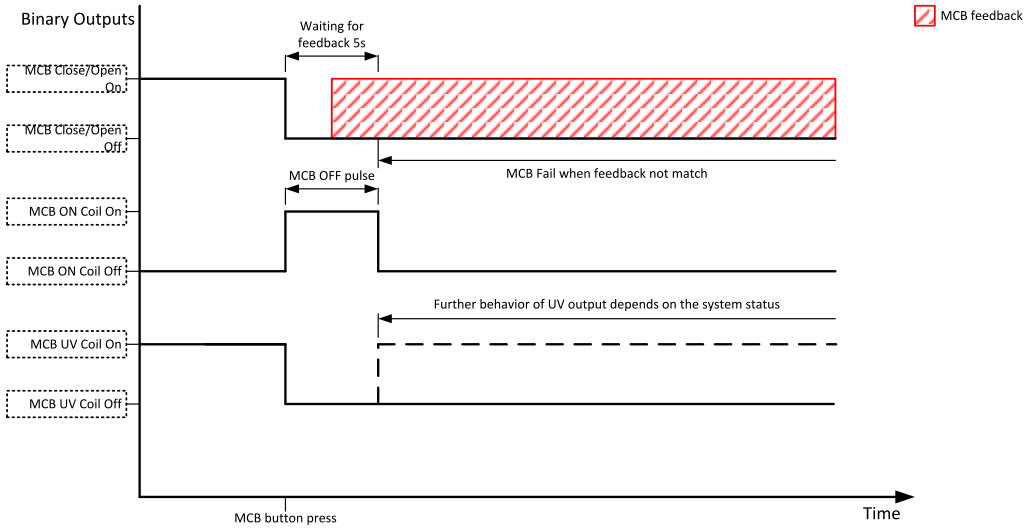


Image 8.94 MCB UV Coil open command

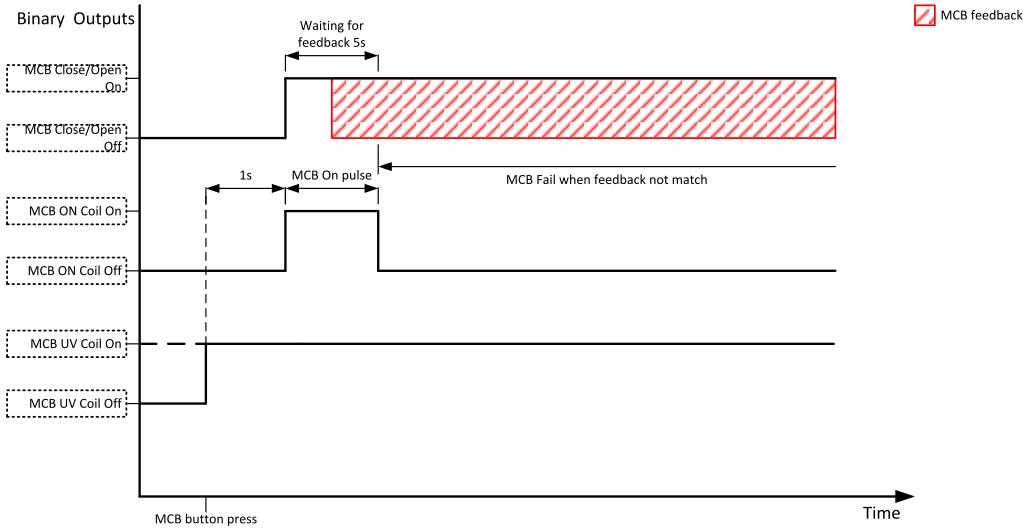


Image 8.95 MCB UV Coil close command

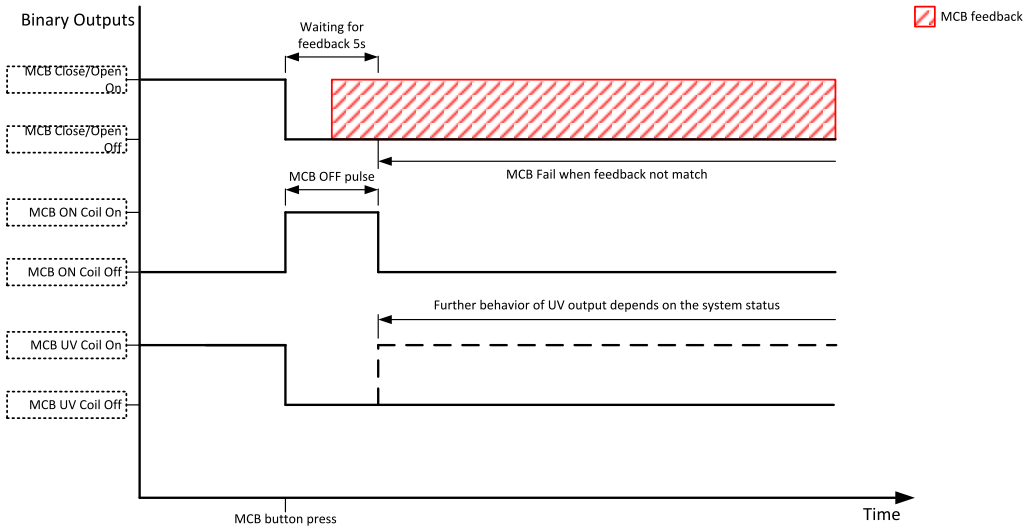


Image 8.96 MCB UV Coil close command

back to Logical binary outputs alphabetically

Minimal Power PTM Limitation

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2638		
Description			
This output is closed always when the controller detects that the Gen-set go below **Minimal Power PTM (page 372)**.			

back to Logical binary outputs alphabetically

Mode AUTO

Related FW	2.1.0	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	2.1.0	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	2.1.0	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	2.1.0	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	2.1.0	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

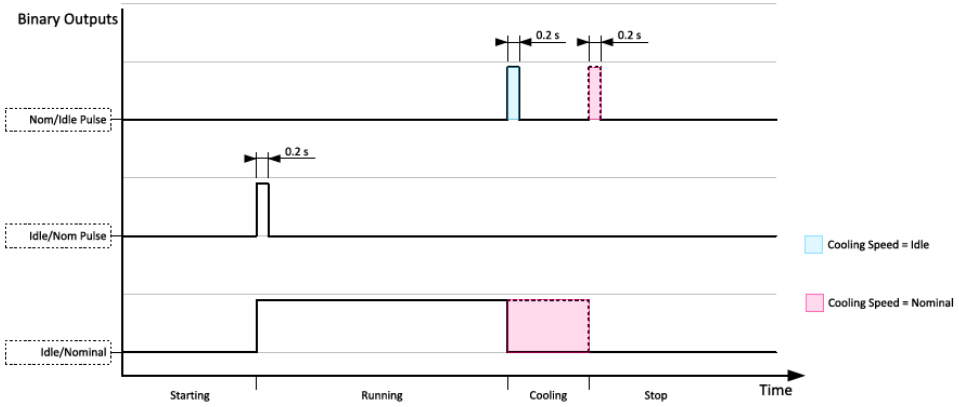
Nominal/Idle Pulse

Related FW	2.1.0	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 344)** = Idle
  - 200 ms pulse is generated when transition from the Running to the Cooling state is done.
- **Cooling Speed (page 344)**= 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 798)** is deactivated.



back to Logical binary outputs alphabetically

Not In AUTO

Related FW	2.1.0	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 Ready

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	63		
Description			

This output is closed when the Gen-set is not operable and is not ready to be started.

Closed if:

- **Controller Mode (page 675)** = OFF
- LBI **START BLOCKING (PAGE 754)** is closed

back to Logical binary outputs alphabetically

Not Used

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	286		
Description			
Output has no function.			

back to Logical binary outputs alphabetically

LBO: O

Operational

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	61		
Description			
This output is closed when the Gen-set is ready for operation or is currently in operation.			

back to Logical binary outputs alphabetically

LBO: P

Peak Shaving Active

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2118		
Description			
Active anytime, when the peak shaving start condition is fulfilled.			

back to Logical binary outputs alphabetically

Peripheral Module Comm Fail

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	115		
Description			
The LBO is active anytime when at least one CAN module is in comm fail – regardless the protection is set upon the lost of any specific CAN module.			

back to Logical binary outputs alphabetically

Power Switch

Related FW	2.1.0	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** and **Power Switch Off**. 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. ***Note:*** *Setpoints Power Switch On and Power Switch Off are invisible until configuration of this LBO.*			

back to Logical binary outputs alphabetically

Prelubrication Pump

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	49		
Description			
This output can be used for periodic lubrication of the engine while engine is not running.			

back to Logical binary outputs alphabetically

Prestart

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	36		
Description			

This output can be used for control of any device, which has to be activated just before start. the output is active for time period of **Prestart Time (page 334)**. The output is deactivated 100 ms before the **STARTER 1 (PAGE 818)** output is activated.

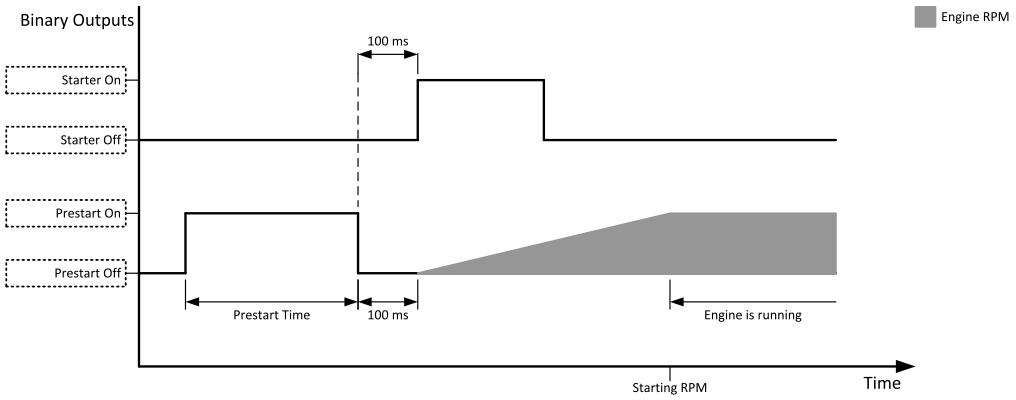


Image 8.97 Engine start

When the **Prestart Time (page 334)** is longer than **Cranking Fail Pause (page 333)** then the **Prestart Time (page 334)** in **Cranking Fail Pause (page 333)** is long as **Cranking Fail Pause (page 333)** minus 100 ms.

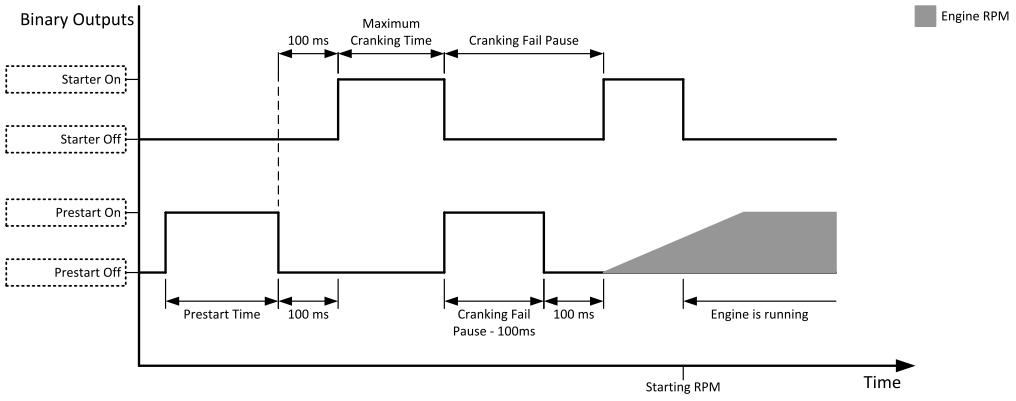


Image 8.98 Prestart in Cranking Fail Pause 1

When the **Prestart Time (page 334)** is shorter than **Cranking Fail Pause (page 333)** then the **Prestart Time (page 334)** in **Cranking Fail Pause (page 333)** is long as normal **Prestart Time (page 334)**.

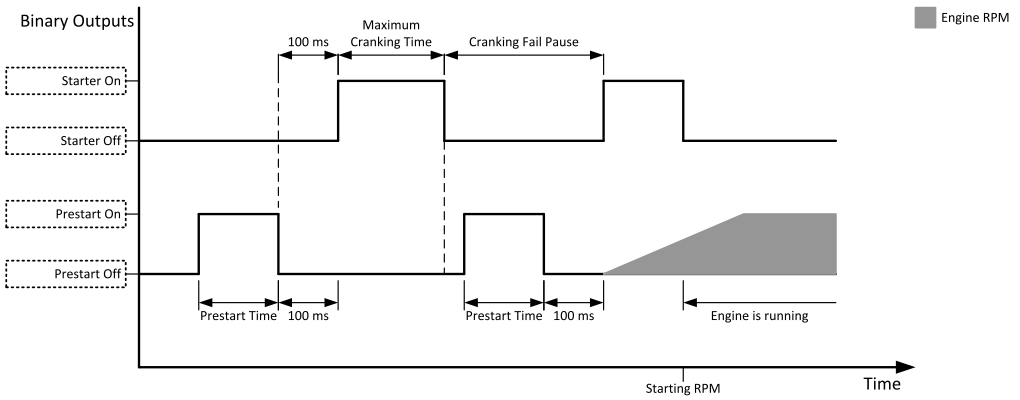


Image 8.99 Prestart in Cranking Fail Pause 2

back to Logical binary outputs alphabetically

Process Power Limitation

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2241		
Description			
This output is closed while **Generator P (page 645)** is being reduced due to: **Import/Export Limitation (page 300)** = Enabled.			

back to Logical binary outputs alphabetically

LBO: R

Ready

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	62		
Description			
The binary output is active when the engine is stopped and it is possible to start it i.e. no red alarm is activated or **SD OVERRIDE (PAGE 754)** is active. The binary output is switch on when the Ready state occurs. The binary output is switch off when the Prestart or the Not Ready or the Stop state occurs i.e. always except Ready state.			

back to Logical binary outputs alphabetically

Ready To AMF

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	324		
Description			
the output is active if the Gen-set is ready to start automatically and take the load if the mains fails, i.e.: › the controller is in SPtM operating mode › the controller is in AUTO controller mode and › no red alarm is present in the alarmlist › when the red alarm is confirmed during Stop Valve and other requirements are fulfilled then the LBO is still inactive until the state ready			

back to Logical binary outputs alphabetically

Ready To Excite

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	221		
Description			
This LBO is activated after the engine reaches RPM window given by setpoint **SUS RPM Window (page 363)**.			

back to Logical binary outputs alphabetically

Ready To Load

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	58		
Description			
the output is active whenever the GCB is closed or can be closed i.e. the stabilization phase is finished, the Gen-set is running and the **Minimal Stabilization Time (page 339)** timer has elapsed and the Gen-set voltage and frequency are within limits. If GCB is open then Gen-set voltage and frequency must be in limits. If GCB is close then Gen-set voltage and frequency can be out of limits, but protection delay can't be count down. If Gen-set voltage and frequency will return into limits until delay is count down then output is still active.			

back to Logical binary outputs alphabetically

Ready/AUTO

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2350		
Description			
This LBO is available in a configuration as standard LBO. It is active when controller in Ready state and in AUTO mode simultaneously.			

back to Logical binary outputs alphabetically

RegenerationNeeded

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1372		
Description			
This output is active when DPF lamp from ECU is active.			

back to Logical binary outputs alphabetically

Reverse Synchronization

Related FW	2.1.0	**Related applications**	MINT, SPtM, SPI
Comm object	69		
Description			
The output is active during reverse synchronization and is deactivated when MCB is closed or reverse synchronization is interrupted. ***Note:*** *The output can be used for external synchronizing module control.*			

back to Logical binary outputs alphabetically

ROCOF Active

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1073		
Description			
This output is activated for 3 seconds when ROCOF protection is active.			

back to Logical binary outputs alphabetically

Running

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	67		
Description			

The output is designed to be used as an indication that the Gen-set is running. The output is activated if **Fuel Solenoid (page 786)** is active and **Starter 1 (page 818)** and **Prestart (page 812)** are deactivated. The out remains active until engine stop and cooling period elapses.

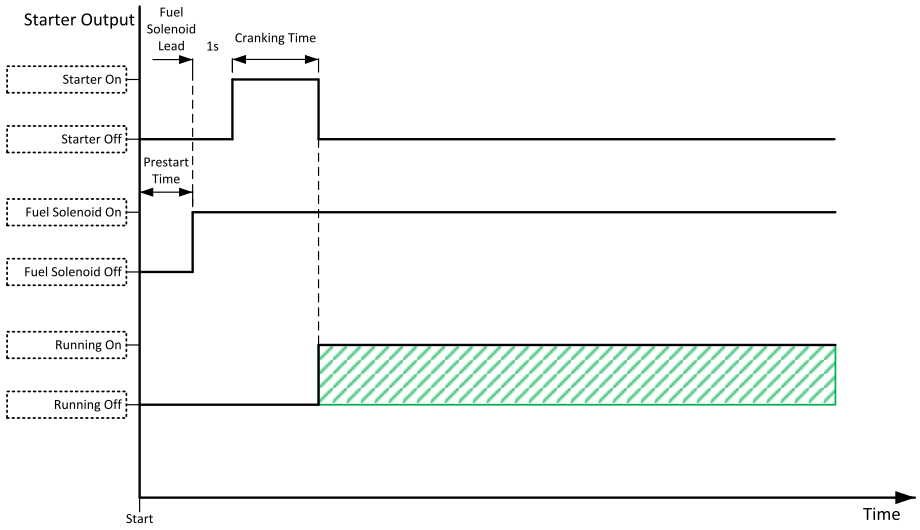


Image 8.100 Running

back to Logical binary outputs alphabetically

LBO: S

Sd Override

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	962		
Description			

The output is active if **Sd Override (page 754)** input is active and open if **Sd Override (page 754)** input is inactive. This output is usually used to send information about **Sd Override (page 754)** input into ECU.

back to Logical binary outputs alphabetically

Soft Load

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	71		
Description			

This output is closed when GCB closes and Gen-set is being soft loaded via **Load Ramp (page 447)**..

Note: *Output is not closed during **Warming Procedure (page 343)***

back to Logical binary outputs alphabetically

Soft Unload

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	73		
Description			
The output is active when generator is unloaded – controller is in the Soft unload state.			

back to Logical binary outputs alphabetically

Speed Down

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	57		
Description			
This output together with the complementary output **SPEED UP (PAGE 817)** 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	2.1.0	Related applications	MINT, SPtM
Comm object	56		
Description			
This output together with the complementary output **SPEED DOWN (PAGE 817)** 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	2.1.0	Related applications	MINT, SPtM
Comm object	33		
Description			

This output provides 1s pulse when:

- Start button is pressed on the controller front facia or
- Start button is pressed on any of external local/remote terminals or
- Start command is received via communication line or
- the input START BUTTON is activated.

back to Logical binary outputs alphabetically

Starter 1

Related FW	2.1.0	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 332)** in Engine Settings group. Cranking fail pause is adjusted by setpoint **Cranking Fail Pause (page 333)**.

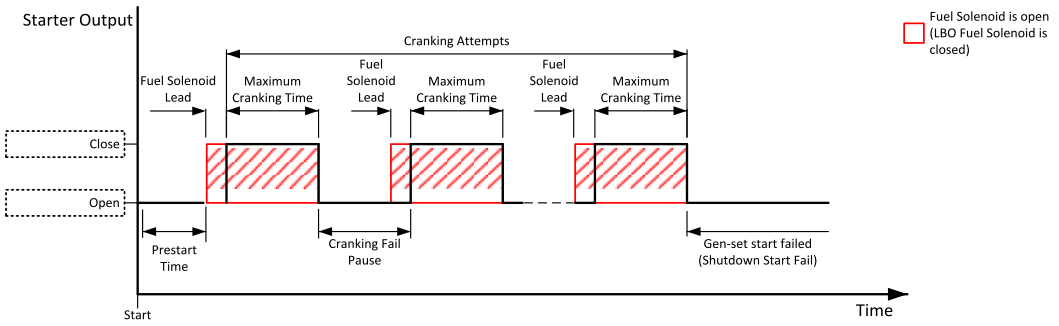


Image 8.101 Starter

The starter output opens when:

- Starting RPM are reached
- the "firing" speed is reached (gas engines only)
- maximum time of cranking is exceeded
- request to stop comes up
- D+ value is higher than **D+ Threshold (page 348)**
- Oil pressure value is higher than **Starting Oil Pressure (page 335)**
- Generator voltage >25 % of **Generator Nominal Voltage Ph-N (page 316)** or **Generator Nominal Voltage Ph-Ph (page 316)** (any phase)

back to Logical binary outputs alphabetically

Starter 2

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2415		
Description			

This output is dedicated for starter motor control. The number of cranking attempts is adjusted by setpoint **Cranking Attempts (page 332)** in Engine Settings group. Cranking fail pause is adjusted by setpoint **Cranking Fail Pause (page 333)**.

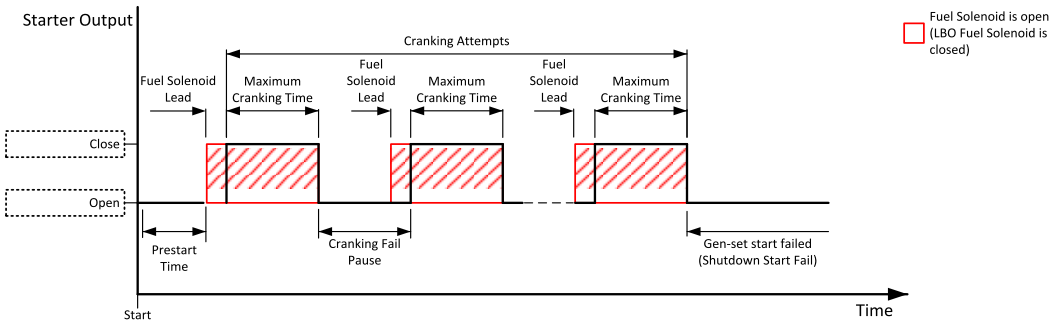


Image 8.102 Starter

The starter output opens when:

- Starting RPM are reached
- the "firing" speed is reached (gas engines only)
- maximum time of cranking is exceeded
- request to stop comes up
- D+ value is higher than **D+ Threshold (page 348)**
- Oil pressure value is higher than **Starting Oil Pressure (page 335)**
- Generator voltage >25 % of **Generator Nominal Voltage Ph-N (page 316)** or **Generator Nominal Voltage Ph-Ph (page 316)** (any phase)

back to Logical binary outputs alphabetically

Starting

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	65		
Description			

This output is closed at the beginning of the **Prestart Time (page 334)** period and opens after **Idle Time (page 337)** period ends or when **Sd Start Fail (page 941)** alarm is activated.

back to Logical binary outputs alphabetically

Still Log 0

Related FW	2.1.0	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	2.1.0	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	2.1.0	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	2.1.0	Related applications	MINT, SPtM
Comm object	25		
Description			
Output is active for 1 second after **STOP SOLENOID (PAGE 821)** output activation. This signal is sent to ECU in case of engine stop request.			

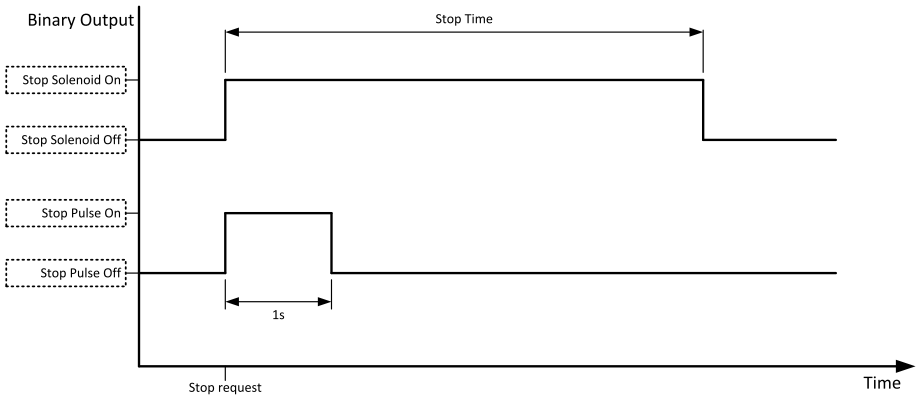


Image 8.103 Stop Pulse

back to Logical binary outputs alphabetically

Stop Solenoid

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	23		
Description			
This output is dedicated to control the stop solenoid (valve). The output is activated when an engine stop command is received and is deactivated 12 s after last running engine indication went off, i.e. engine is stopped.			

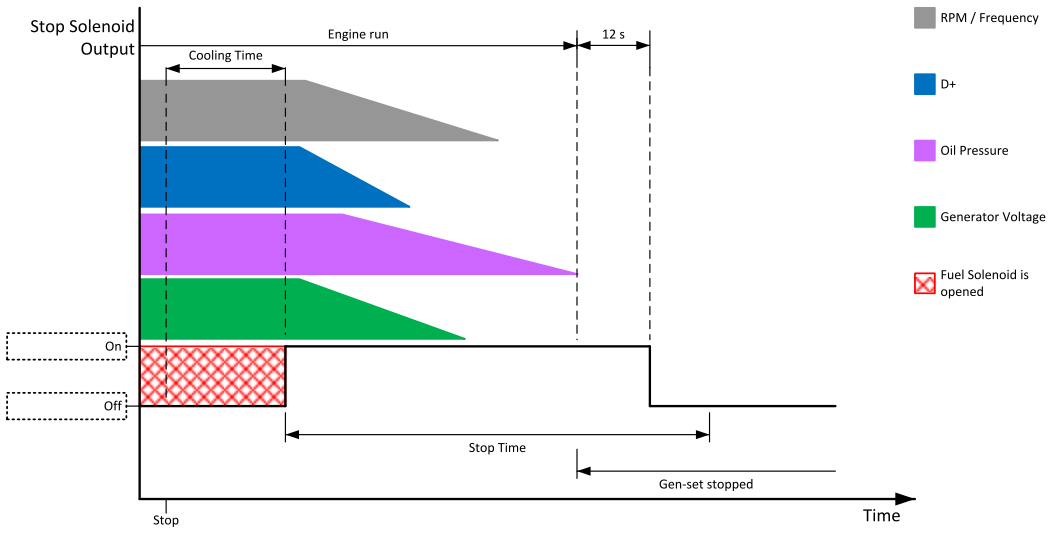


Image 8.104 Stop Solenoid 1

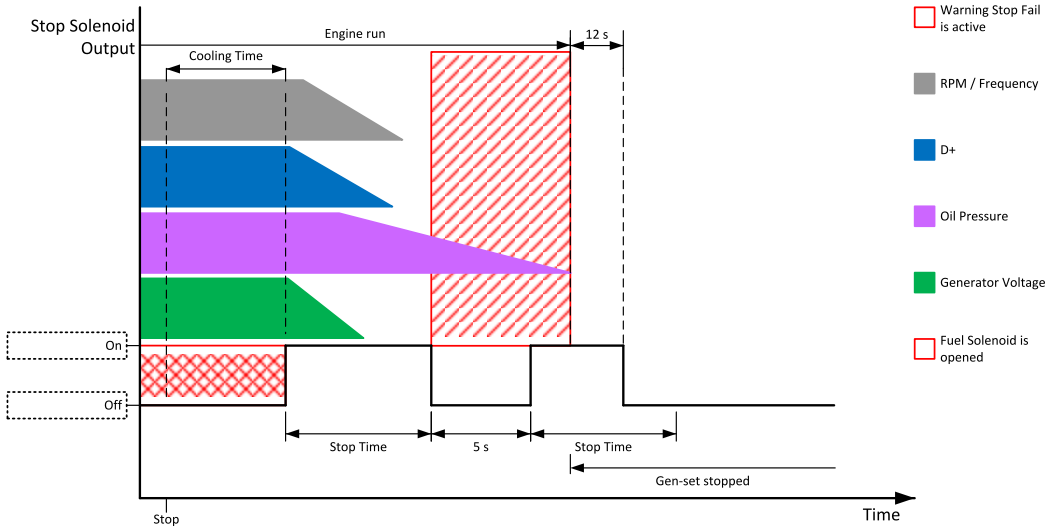


Image 8.105 Stop Solenoid 2

Note: *If **Additional running engine indications (page 116)** went off during 5 s pause than Stop Solenoid is not activated again otherwise stop solenoid is activated again.*

back to Logical binary outputs alphabetically

Supplying Load

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1249		
Description			

The binary output depends on measured generator active power. Power is compared with generator nominal active power with use of hysteresis and with delay of switch 1 s.

When the measured active power is equal to or bigger than 5 % of **Nominal Power (page 311)** for 1 s then the binary output is active.

When the measured active power is equal to or lower than 3 % of **Nominal Power (page 311)** for 1 s then the binary output is inactive.

back to Logical binary outputs alphabetically

SUS Excitation

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	223		
Description			

Behavior of this LBO depends on setpoint **Excitation Control (page 362)**.

- **Excitation Control (page 362)** = Internal
  - This LBO gets active as soon as LBO **Ready To Excite (page 814)** is activated.
- **Excitation Control (page 362)** = External
  - This LBO gets active as soon as LBI **SUS Excitation Block (page 755)** is deactivated and LBO **Ready To Excite (page 814)** is activated

back to Logical binary outputs alphabetically

Synchronizing

Related FW	2.1.0	**Related applications**	MINT, SPtM, SPI
Comm object	325		
Description			

The output is active during synchronization. output is active when GCB is closed or synchronization is interrupted.

back to Logical binary outputs alphabetically

Sys Start/Stop

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	190		
Description			

The output is main signal which indicates the active role of controller in following situations:

- Binary inputs **Remote Start/Stop (page 751)**, **Force Parallel (page 728)**, **Force Island (page 728)** are active
- TEST mode is active
- AMF condition is sensed (mains fail, mains protection...)
- Peakshaving function is activated and condition for start are fulfilled
- Start Button is pressed (only in MAN mode)

back to Logical binary outputs alphabetically

System Ready

Related FW	2.1.0	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 659)**. The output is inactive, if the group of Gen-sets does not have enough capacity to cover the **Start Reserve (page 659)** The output is active, if the **Actual Reserve (page 658)** is higher than the **Start Reserve (page 659)** or system is able to increase the **Actual Reserve (page 658)** 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 658)** lower than the **Start Reserve (page 659)**.			

back to Logical binary outputs alphabetically

System Reserve OK

Related FW	2.1.0	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	2.1.0	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** and **Temperature Switch Off**. ***Note:*** *Setpoints* ***Temperature Switch On*** *and* ***Temperature Switch Off*** *are invisible until configuration of this LBO.*			

back to Logical binary outputs alphabetically

LBO: U

User Key 1 State

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2777		
Description			
Command reflects actual state of a User key on ICD. When button is pressed, appropriate LBO is activated.			

back to Logical binary outputs alphabetically

User Key 2 State

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2778		
Description			
Command reflects actual state of a User key on ICD. When button is pressed, appropriate LBO is activated.			

back to Logical binary outputs alphabetically

User Key 3 State

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2779		
Description			
Command reflects actual state of a User key on ICD. When button is pressed, appropriate LBO is activated.			

back to Logical binary outputs alphabetically

User Key 4 State

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2780		
Description			
Command reflects actual state of a User key on ICD. When button is pressed, appropriate LBO is activated.			

back to Logical binary outputs alphabetically

User Key 5 State

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2781		
Description			
Command reflects actual state of a User key on ICD. When button is pressed, appropriate LBO is activated.			

back to Logical binary outputs alphabetically

LBO: V

Vector Shift Active

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	93		
Description			
This output is closed for 3 seconds when **Vector Shift Protection (page 406)** is activated.			

back to Logical binary outputs alphabetically

Ventilation

Related FW	2.1.0	**Related applications**	MINT, SPtM

Comm object	38
Description	
This logical binary output is activated at the beginning of start procedure together with **PRESTART (PAGE 812)** LBO. Ventilation output is deactivated when engine stops revolving. Ventilation LBO is also deactivated immediately when **EMERGENCY STOP (PAGE 725)** (or E-Stop) is activated or when controller is switched to OFF mode. ***Note:*** *The output is intended for control of an engine room ventilation fan, engine container ventilation fan, container louvres or similar running gen-set technology.*	

back to Logical binary outputs alphabetically

Ventilation Off Pulse

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2090		
Description			
This logical binary output is activated on falling edge of **VENTILATION (PAGE 825)** LBO (when engine stops). The pulse duration is adjusted by **Ventilation Pulse Time (page 358)** setpoint. ***Note:*** *The output is intended for control of an engine room ventilation fan, engine container ventilation fan, container louvres or similar running gen-set technology.*			

back to Logical binary outputs alphabetically

Ventilation On Pulse

Related FW	2.1.0	Related applications	MINT, SPtM
Comm object	2089		
Description			
This logical binary output is activated on rising edge of **VENTILATION (PAGE 825)** LBO (at the begining of prestart period). The pulse duration is adjusted by **Ventilation Pulse Time (page 358)** setpoint. ***Note:*** *The output is intended for control of an engine room ventilation fan, engine container ventilation fan, container louvres or similar running gen-set technology.*			

back to Logical binary outputs alphabetically

8.1.6 Logical analog inputs

What Logical analog inputs are:

Logical analog inputs are inputs for analog values.

Alphabetical groups of Logical analog inputs

LAI: A 829
LAI: C 832
LAI: E 832
LAI: F 832
LAI: L 833
LAI: M 833
LAI: O 834

For a full list of Logical analog inputs go to the chapter **Logical analog inputs alphabetically (page 828)**.

Logical analog inputs alphabetically

AIN Switch 01 829
AIN Switch 02 829
AIN Switch 03 829
AIN Switch 04 830
AIN Switch 05 830
AIN Switch 06 830
AIN Switch 07 831
AIN Switch 08 831
AIN Switch 09 831
AIN Switch 10 832
Coolant Temp 832
Engine Speed 832
Fuel Level 832
Load Control: ANEXT Baseload* 833
Load Control: ANEXT Imp/Exp Load* 833
Mains Import Measurement P 833
Mains Measurement Q 834
Oil Pressure 834
Oil Temp 834

back to Controller objects

LAI: A

AIN Switch 01

Related FW	2.1.0	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 58**. This analog input controls logical binary output **AIN Switch01 (page 763)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch01 On (page 478)** and **AIN Switch01 Off (page 479)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 02

Related FW	2.1.0	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 58**. This analog input controls logical binary output **AIN Switch02 (page 763)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch02 On (page 480)** and **AIN Switch02 Off (page 481)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 03

Related FW	2.1.0	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 58**. This analog input controls logical binary output **AIN Switch03 (page 764)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch03 On (page 482)** and **AIN Switch03 Off (page 483)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.

back to Logical analog inputs alphabetically

AIN Switch 04

Related FW	2.1.0	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 58**. This analog input controls logical binary output **AIN SWITCH04 (PAGE 764)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch04 On (page 484)** and **AIN Switch04 Off (page 485)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 05

Related FW	2.1.0	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 58**. This analog input controls logical binary output **AIN SWITCH05 (PAGE 765)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch05 On (page 486)** and **AIN Switch05 Off (page 487)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 06

Related FW	2.1.0	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 58**. This analog input controls logical binary output **AIN SWITCH06 (PAGE 765)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch06 On (page 488)** and **AIN Switch06 Off (page 489)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 07

Related FW	2.1.0	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 58**. This analog input controls logical binary output **AIN SWITCH07 (PAGE 766)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch07 On (page 490)** and **AIN Switch07 Off (page 491)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 08

Related FW	2.1.0	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 58**. This analog input controls logical binary output **AIN SWITCH08 (PAGE 766)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch08 On (page 492)** and **AIN Switch08 Off (page 493)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 09

Related FW	2.1.0	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 58**. This analog input controls logical binary output **AIN SWITCH09 (PAGE 767)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch09 On (page 494)** and **AIN Switch09 Off (page 495)**.

Note: *This function is not suitable for tristate or binary analog sensors.*

> **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**

back to Logical analog inputs alphabetically

AIN Switch 10

Related FW	2.1.0	**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 58**. This analog input controls logical binary output **AIN SWITCH10 (PAGE 767)**. The behavior of the switch depends on the adjustment of the setpoints **AIN Switch10 On (page 496)** and **AIN Switch10 Off (page 497)**. ***Note:*** *This function is not suitable for tristate or binary analog sensors.* **IMPORTANT: This analog input has no protection. Input is designed only to control appropriate logical binary output.**			

back to Logical analog inputs alphabetically

LAI: C

Coolant Temp

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	197		
Description			
Logical analog input designed for coolant temperature value received from analog sensor.			

back to Logical analog inputs alphabetically

LAI: E

Engine Speed

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	8		
Description			
This LAI is used for measurement of the engine's RPM. Value of this LAI has higher priority than measured value from dedicated RPM input or converted speed from frequency. ***Note:*** *This LAI expects to receive actual value of RPM, i.e. no conversion is applied.* **IMPORTANT: This LAI is always configured to ECU value Engine Speed with every single configured ECU module.**			

back to Logical analog inputs alphabetically

LAI: F

Fuel Level

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	78		
Description			
Logical analog input designed for fuel level value received from analog sensor.			

> **IMPORTANT: For right behavior of this function, curve for analog input has to be in percentage and setpoint Fuel Tank Volume (page 351) has to be adjusted correctly.**

back to Logical analog inputs alphabetically

LAI: L

Load Control: ANEXT Baseload*

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	1		
Description			
Source value for control of load in case of used mode **Load Control PTM Mode (page 294)** = Baseload and **Load Request Source* (page 295)** switched to Analog External Value. ***Note:*** *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*			

back to Logical analog inputs alphabetically

Load Control: ANEXT Imp/Exp Load*

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	2		
Description			
Source value for control of load in case of used mode **Load Control PTM Mode (page 294)** = Import/Export and **Load Request Source* (page 295)** switched to Analog External Value. ***Note:*** *This feature is available only in AGC archive. For more information see **Extended features (page 157)**.*			

back to Logical analog inputs alphabetically

LAI: M

Mains Import Measurement P

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	67		
Description			
Logical analog input designed for **Mains import measurement (page 169)**. Load transfer is considered to be finished when this value is lower then **Mains Unload MCB Open Window (page 446)**.			

back to Logical analog inputs alphabetically

Mains Measurement Q

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	6		
Description			
This LAI is designed for Mains import measurement, when **Mains Measurement Q (page 305)** = Analog Input. Value from this input is used in load transfer from mains to generator. Load transfer is considered to be finished when this value is lower than **Mains Unload MCB Open Window (page 446)**.			

back to Logical analog inputs alphabetically

LAI: O

Oil Pressure

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	9		
Description			
Logical analog input designed for oil pressure value received from analog sensor. ***Note:*** *This analog function can by also configured on binary input as binary function. In this case choose* ***Oil Pressure (page 744)*** *binary input in the list of binary inputs. Delay of this binary input is adjusted via the same setpoint like for analog function.*			

back to Logical analog inputs alphabetically

Oil Temp

Related FW	2.1.0	**Related applications**	MINT, SPtM
Comm object	77		
Description			
Logical analog input designed for oil temperature value received from analog sensor.			

back to Logical analog inputs alphabetically

8.1.7 PLC

List of PLC blocks

Group: Basic logical functions

OR/AND 836
Ext. XOR/RS 838

Group: Comparison of analog inputs

Comparator With Hysteresis 839
Comparator With Delay 840
Comp Win 841

Group: Math operations

Math Fc. 843
Interpolation* 844
Math AxB/C ±D* 845

Group: Time functions

Delay 846
Timer 848

Group: Ramp functions

Ramp 849
Up/Down* 851
Inc/Dec* 852
LowPassFlt* 853

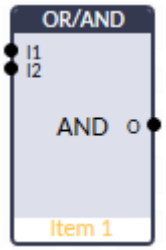
Group: Other functions

Counter 854
Decomp. 4 855
Hold* 856
Convert 857
Analog Switch 858
Analog Switch 8 859

Group: Basic Logical functions

OR/AND

PLC group	Basic logical functions
Related FW	2.1.0
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.

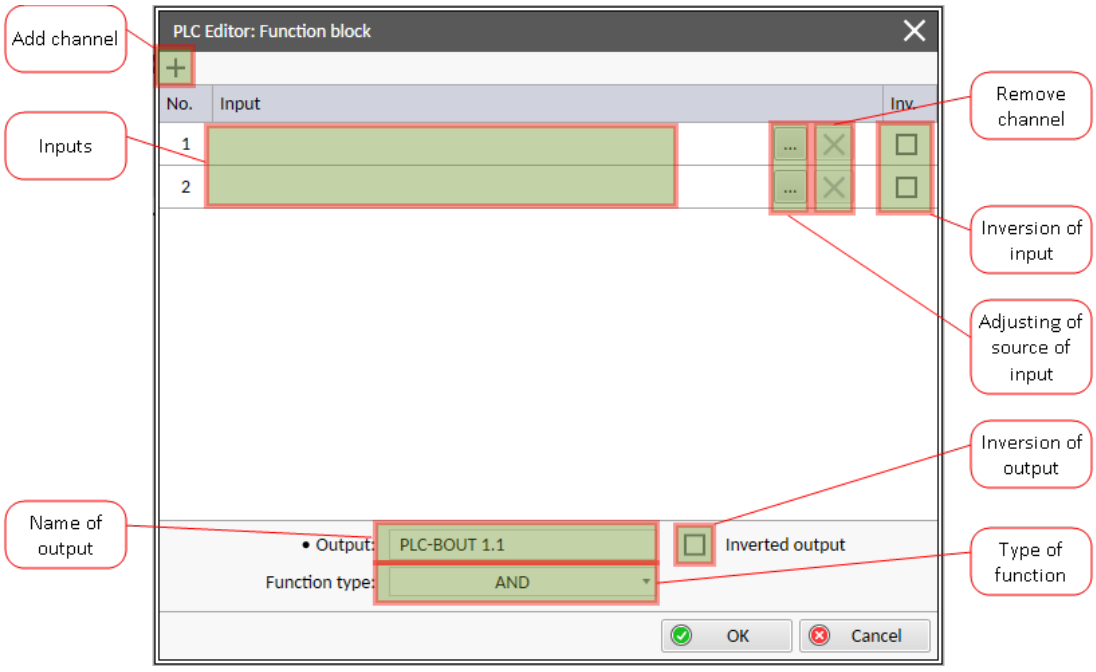
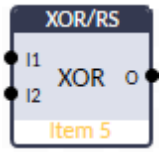


Image 8.106 Configuration of OR/AND block

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Ext. XOR/RS

PLC group	Basic logical functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	39



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

The block contains a setting for RS dominance. This setting is available in the block dialog window (i.e. this setting is constantly set by configuration and cannot be changed dynamically in operation).

Function RS

Input 1 (S)	Input 2 (R)	R-latch	S-latch	E-latch	JK-latch
		Q			
0	0	Q^{-1}	Q^{-1}	Q^{-1}	Q^{-1}
0	1	0	0	0	0
1	0	1	1	1	1
1	1	0	1	Q^{-1}	NOT(Q^{-1})

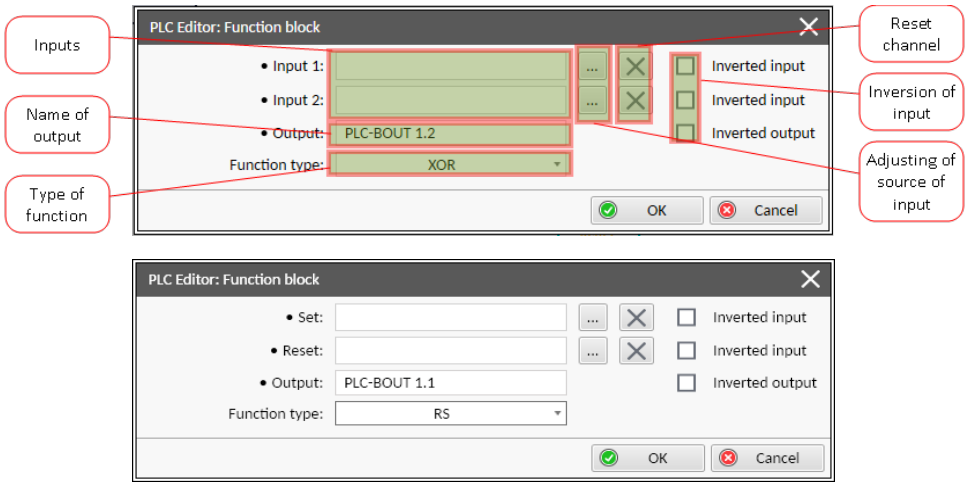


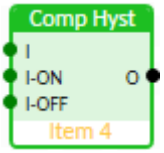
Image 8.107 Configuration of XOR/RS block

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Group: Comparison of analog inputs

Comparator With Hysteresis

PLC group	Comparison of analog inputs
Related FW	2.1.0
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.

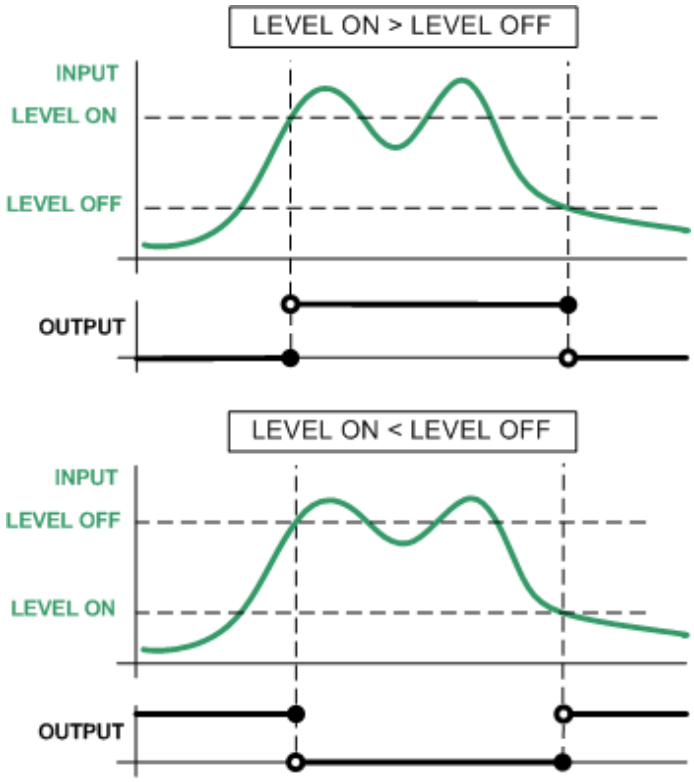


Image 8.108 Different On and Off levels

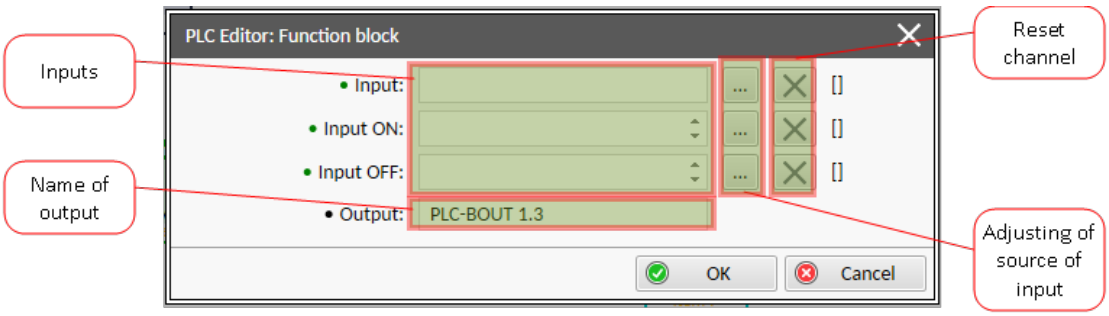


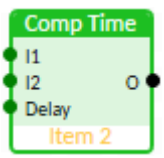
Image 8.109 Configuration of Comp Hyst block

Note: *Level On and Level Off can be constants or values from controller.*

> **IMPORTANT: In case that the values on inputs have different decimal numbers, then the values are converted and the name of block is red. It is strongly recommended to use values with the same decimal numbers.**

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Comparator With Delay

PLC group	Comparison of analog inputs	
Related FW	2.1.0	
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.

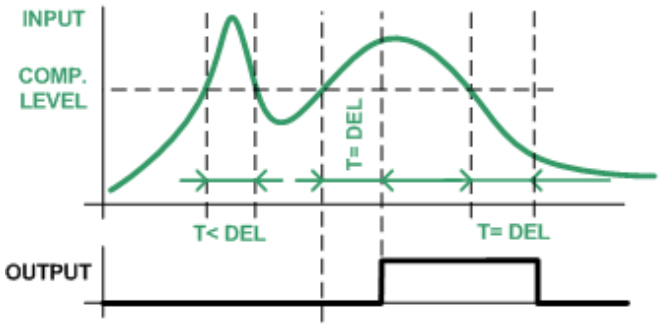


Image 8.110 Principle of delay

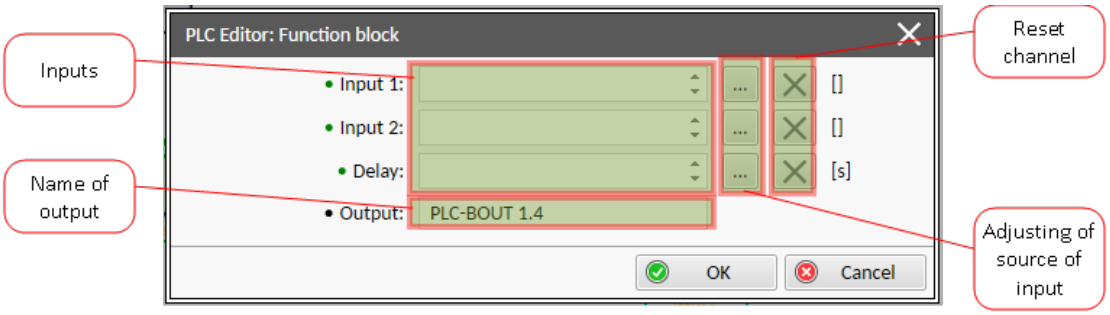


Image 8.111 Configuration of Comp Time block

Note: *Input 2 and Delay can be constants or values from controller.*

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Comp Win

PLC group	Comparison of analog inputs
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	18



Inputs

Input	Type	Negation	Range	Function
Input	Analog	No	-2 147 483 647 .. 2 147 483 647	Compared value
Input HIGH	Analog	No	Same as Input	Upper window limit
Input LOW	Analog	No	Same as Input	Lower window limit

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Comparator output

Description

The block output is switched on whenever the input value is in the range defined by Lo and Hi levels.

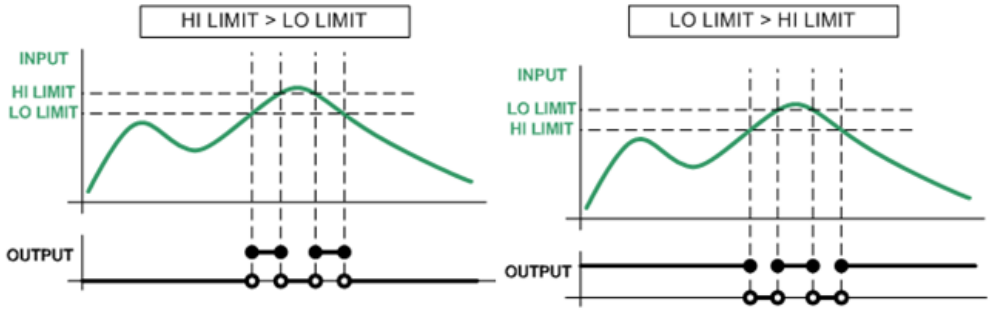


Image 8.112 Principle of delay

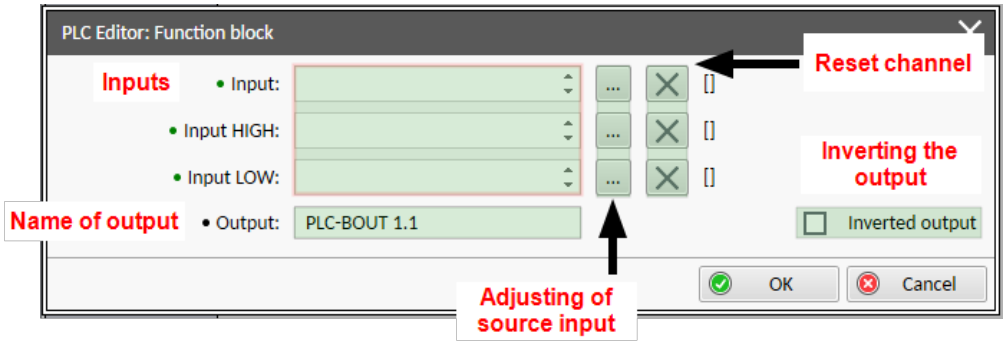


Image 8.113 Configuration of Comp Time block

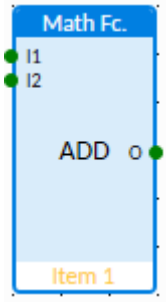
Note: *All inputs and can be constants or values from controller.*

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Group: Math operations

Math Fc.

PLC group	Math operations
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	17



Inputs

Input	Type	Negation	Range	Function
Input 1	Analog	No	-2147483647 .. 2147483647	Input 1
Input 2	Analog	No	Same as Input 1	Input 2
Input 3	Analog	No	Same as Input 1	Input 3
Input 4	Analog	No	Same as Input 1	Input 4
Input 5	Analog	No	Same as Input 1	Input 5
Input 6	Analog	No	Same as Input 1	Input 6
Input 7	Analog	No	Same as Input 1	Input 7
Input 8	Analog	No	Same as Input 1	Input 8

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	-2147483647 .. 2147483647	Result of the mathematical operation

Description

This block performs basic mathematical operations of 2 to 8 operands based on selected function.

Function	Output
ADD – Addition	Input 1 + Input 2 + … + Input N
SUB – Substraction	Input 1 - Input 2 - … - Input N
|SUB| – Absolute value of substraction	ABS(Input 1 - Input 2 - … - Input N)
AVG – Average	Input 1 + Input 2 + … + Input N) / N
MIN –Minimal value	MIN(Input 1, Input 2, … ,Input N)
MAX – Maximal value	MAX(Input 1, Input 2, … ,Input N)

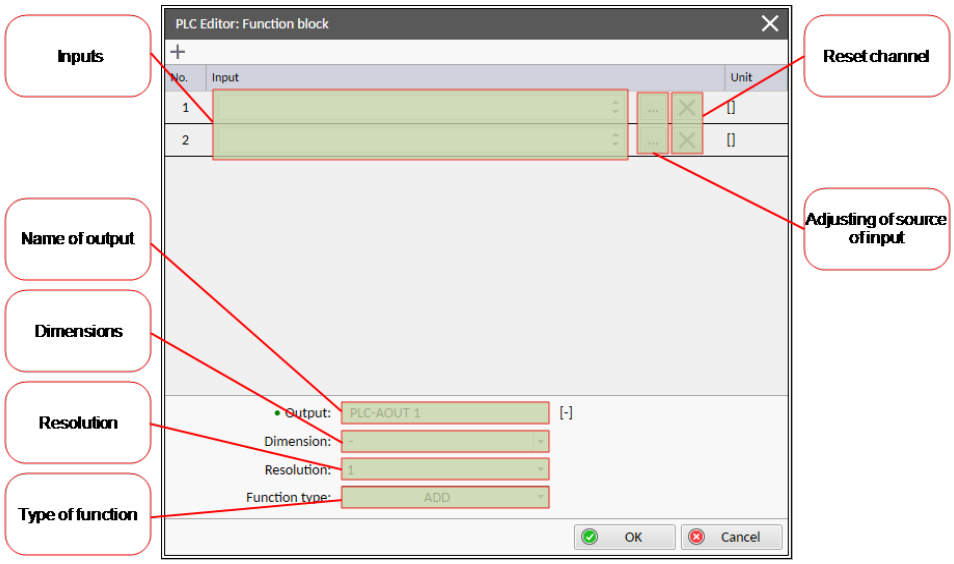


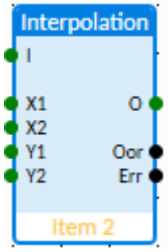
Image 8.114 Configuration of Math Fc. block

IMPORTANT: In case that values on inputs have different decimal numbers or dimensions than the values are converted and the name of block is red. It is strongly recommended to use values with the same decimal numbers.

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Interpolation*

PLC group	Math operations
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	34



Inputs

Input	Type	Range	Function
Input	Analog	-2^{32} .. 2^{32}	Input value
X1	Analog	-2^{32} .. 2^{32}	Low X limit of definition
X2	Analog	-2^{32} .. 2^{32}	High X limit of definition
Y1	Analog	-2^{32} .. 2^{32}	Low Y limit of definition
Y2	Analog	-2^{32} .. 2^{32}	High Y limit of definition

Outputs

Output	Type	Range	Function
Output	Analog	Y1 .. Y2	Transformed value
Out of Range	Binary	0/1	Closed when input is out of range <X1, X2>
Data Invalid	Binary	0/1	Closed when value on analog output is invalid

Description

This block performs a linear transformation of the input. The transformation function is defined by two pairs

of points **[X1, Y1]** and **[X2, Y2]**. If the **Input** lies inside of the interval **<X1, X2>** the **Output** is given by the conversion. If the **Input** is lying outside of this interval, **Output** is saturated either on high or low limit given by **Y1** or **Y2** and Out of Range is closed. If any of the inputs gets invalid, Data Invalid is closed and **Output** is set to invalid value. The **Output**, **Y1**, **Y2** has resolution and dimension based on settings of the block. The resolution and dimensions of the **X1** and **X2** is same as resolution of the **Input**.

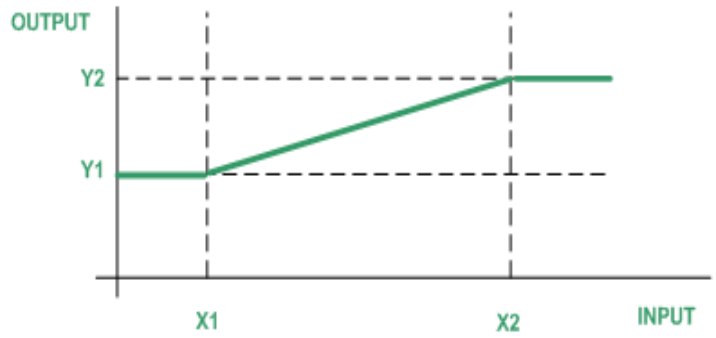


Image 8.115 Principle of Interpolation

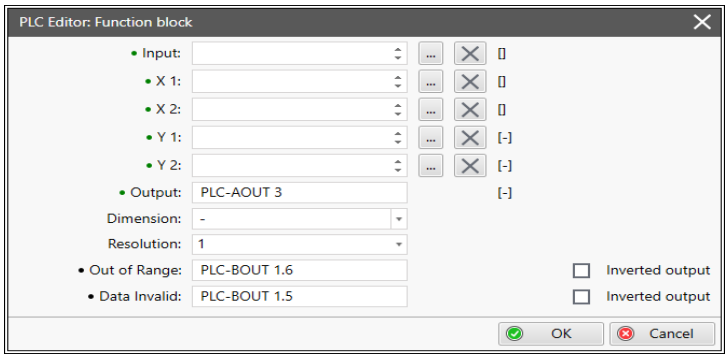


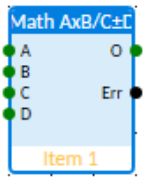
Image 8.116 Configuration of Interpolation block

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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Math AxB/C ±D*

PLC group	Math operations
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	51



Inputs

Input	Type	Negation	Range	Function
Input A	Analog	No	-2^{32} .. 2^{32}	First multiplicant
Input B	Analog	No	-2^{32} .. 2^{32}	Second multiplicant
Input C	Analog	No	-2^{32} .. 2^{32}	Divider
Input D	Analog	No	-2^{32} .. 2^{32}	Addend/Subtrahend

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	-2^{32} .. 2^{32}	Result of the mathematical operation
Data invalid	Binary	No	0/1	Closed when **Output** is out of range or when dividing by zero

Description

The block realizes the mathematical operation AxB/C ±D. In case of any invalid data on any of the inputs, the **Output** is set to invalid value and **Data Invalid** is closed. The **Output** has resolution and dimension based on setting of the block.

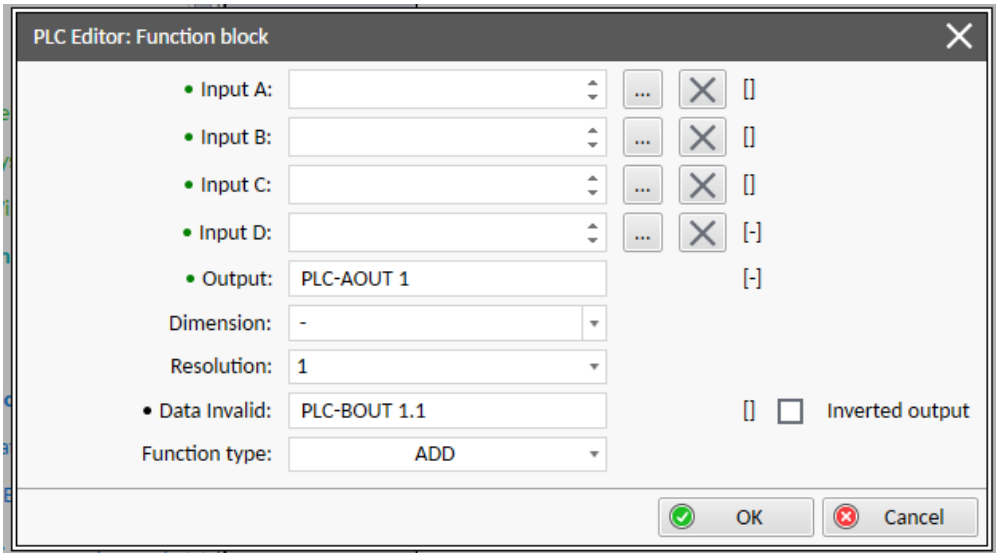


Image 8.117 Configuration of Math AxB/C ±D block

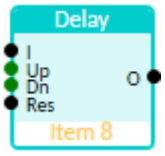
Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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Group: Time functions

Delay

PLC group	Time functions
Related FW	2.1.0
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	Analog	No	-3200.0 .. 3200.0	Delay of the falling edge resp. pulse

down			[s, m, h]	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.

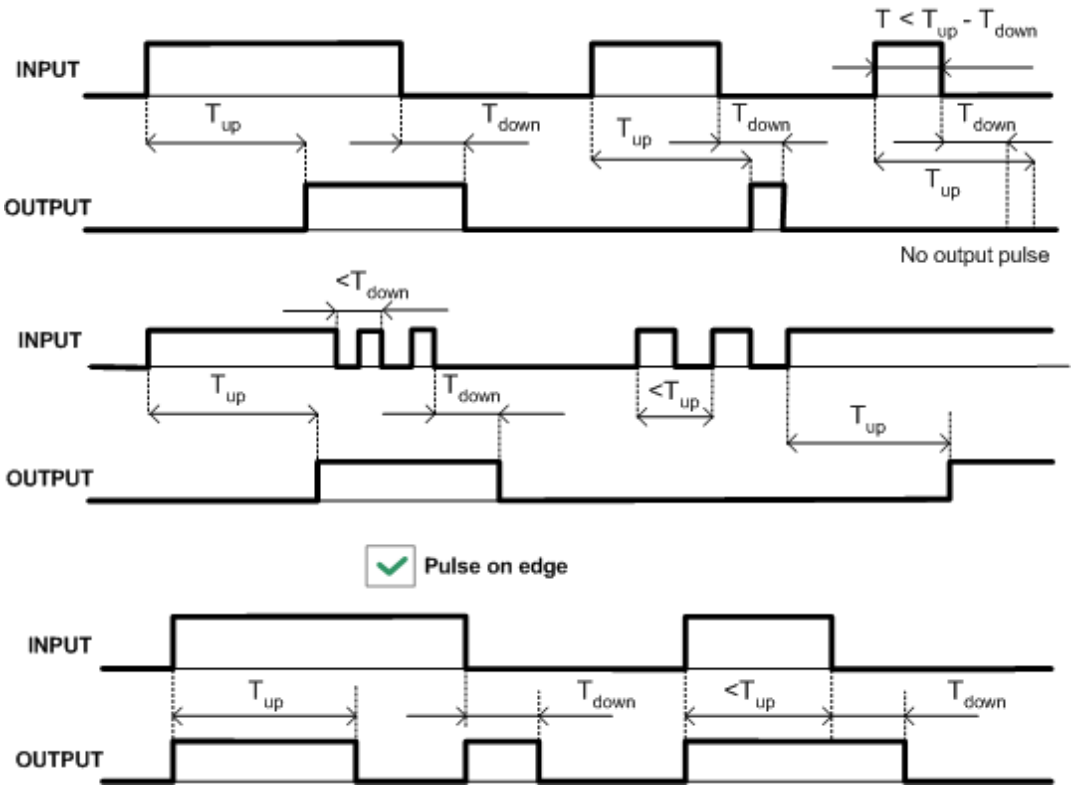


Image 8.118 Delay modes principles

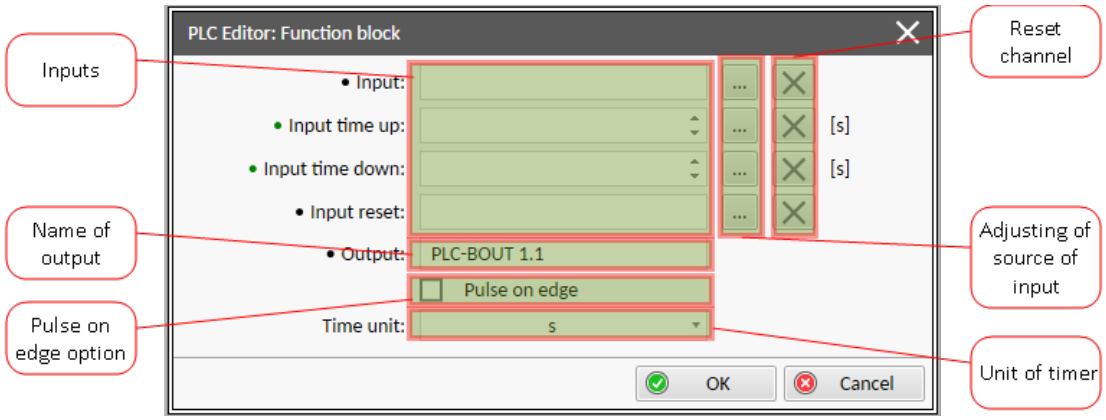


Image 8.119 Configuration of Delay block

Note: *If Input time up or Input time down value is <0, this input is internally set to zero.*

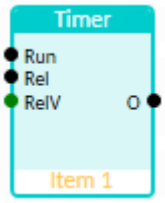
Note: *Input time up and Input time down values can be constants or values from controller.*

Note: *Use Pulse on edge option to choose between delay and pulse mode.*

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Timer

PLC group	Time functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	38



Inputs

Input	Type	Negation	Range	Function
Run	Binary	No	0/1	The timer runs only if this input is active or not connected
Reload	Binary	No	0/1	This input reloads the timer to the initial value
Reload value	Analog	No	0.0..3276.7 [s]	Initial value of the timer

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Timer output

Description

The block works as a countdown timer which is decreased by 1 every PLC cycle. The timer initial value is adjustable by the "Reload value" input. The timer is automatically reloaded with the initial value when it reaches zero or it can be reloaded at any other time using the "reload" input. The timer remains at reload value until the reload input is deactivated. The timer output is inverted always when the timer is reloaded.

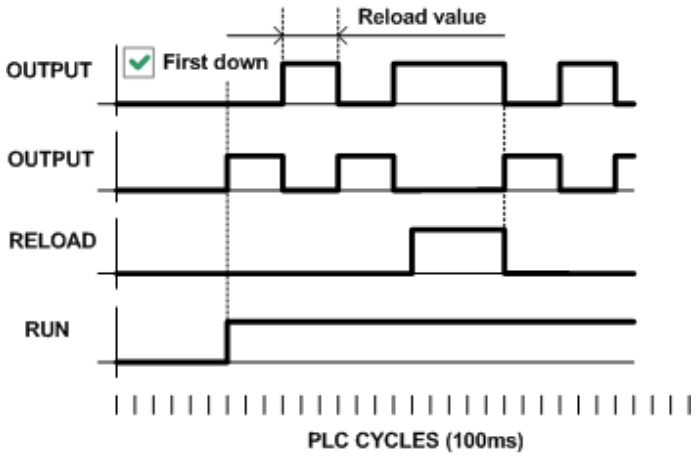


Image 8.120 Principle of timer

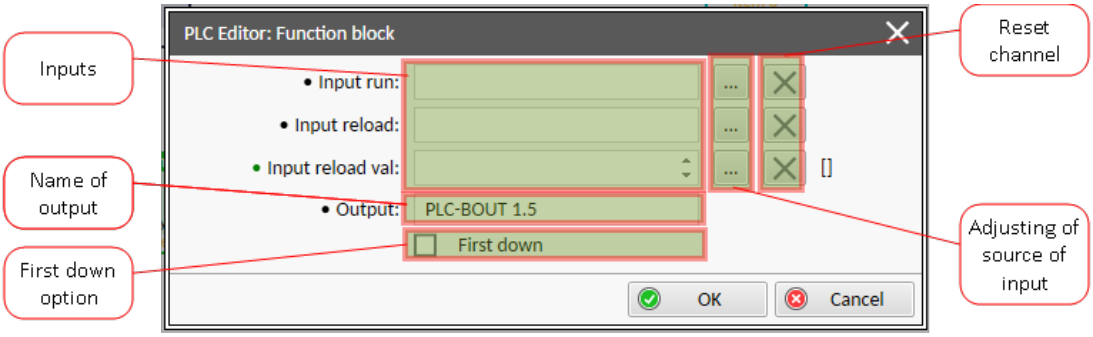


Image 8.121 Configuration of Timer block

Note: *Input reload value can be constant or value from controller.*

Note: *If you want the output to start at logical 0, tick First down option. Otherwise the output will start at logical 1.*

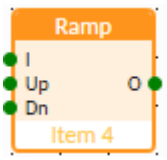
IMPORTANT: If the inputs are not connected and First down option is not ticked, then the output is active.

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Group: Ramp functions*

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

Ramp

PLC group	Ramp functions	
Related FW	2.1.0	
Related applications	MINT, SPtM	
Comm object	19	
Inputs		

Input	Type	Negation	Range	Function
Input	Analog	No	-2^{32} .. 2^{32}	Value to be ramped
Up	Analog	No	-2^{32} .. 2^{32}	Maximal rising rate of the **Output** per second
Down	Analog	No	-2^{32} .. 2^{32}	Maximal lowering rate of the **Output** per second

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	-2^{32} .. 2^{32}	Ramped value

Description

This block limits maximal rate of change of **Output**. The maximal rates **Up** and **Down** are adjustable separately and ramping is based on enabled ramps. The **Output** has resolution and dimension based on setting of the block.

Function	Description
Enabled Up	**Output** can be ramped only up.
Enabled Down	**Output** can be ramped only down.
Enabled Up/Down	**Output** can be ramped up and down.

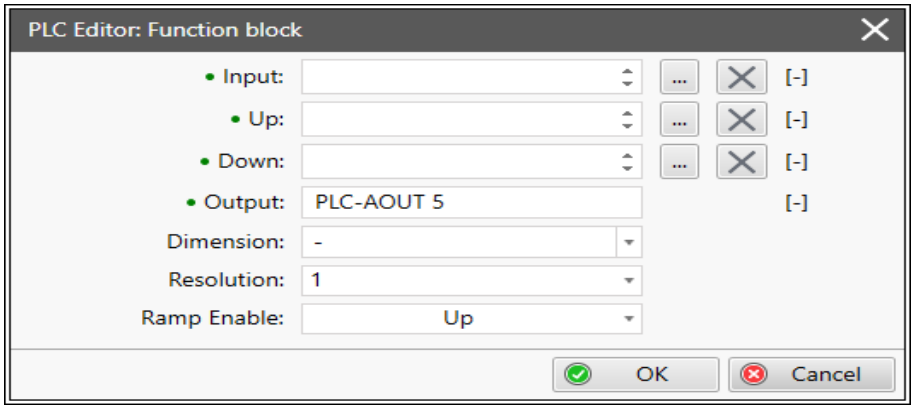


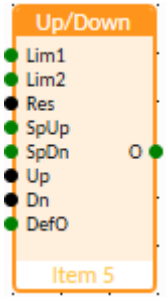
Image 8.122 Configuration of Ramp block

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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Up/Down*

PLC group	Ramp functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	20



Inputs

Input	Type	Negation	Range	Function
Limit 1	Analog	No	-2^{32} .. 2^{32}	First limit of **Output**
Limit 2	Analog	No	-2^{32} .. 2^{32}	Second limit of **Output**
Reset	Binary	No	0/1	Resets **Output** to **Default Output Value** when active
Speed Up	Analog	No	-2^{32} .. 2^{32}	Rising rate of **Output** per second
Speed Down	Analog	No	-2^{32} .. 2^{32}	Lowering rate of **Output** per second
Up	Binary	No	0/1	Activates rising of **Output**
Down	Binary	No	0/1	Activates lowering of **Output**
Default Output Value	Analog	No	-2^{32} .. 2^{32}	Initial value of **Output**

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	Limit 1 .. Limit 2	Output value

Description

This block works as an analog ramp controlled by binary inputs **Up** and **Down** with a defined rite of increase/decrease.

The ramp speed is adjusted by **Speed Up** and **Speed Down**.

The **Output** limitation is set by **Limit 1** and **Limit 2**. The default value of **Output** is set by **Default Output Value**.

Activate **Reset** to reset **Output** to **Default Output Value**. The **Output** has resolution and dimension based on setting of the block.

> **IMPORTANT: If both the inputs Up and Down are active, the Output is set to Default Output Value.**

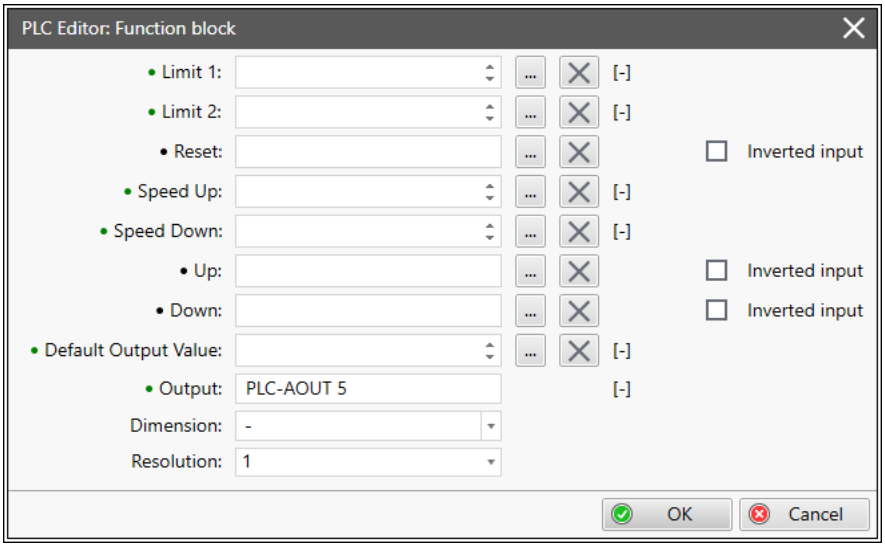


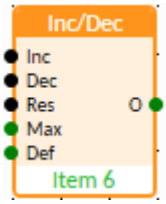
Image 8.123 Configuration of Up/Down block

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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Inc/Dec*

PLC group	Ramp functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	22



Inputs

Input	Type	Negation	Range	Function
Increment	Binary	No	0/1	Rising edge increase value of **Output** by 1
Decrement	Binary	No	0/1	Risinge edge decrease value of **Output** by 1
Reset	Binary	No	0/1	Rising edge resets **Output** to **Default**
Maximum	Analog	No	-2^{32} .. 2^{32}	Maximum value of **Output**
Default	Analog	No	-2^{32} .. 2^{32}	Initial value of **Output**

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	-2^{32} .. Maximum	Output value

Description

The block increments/decrements **Output** based on rising edge on **Increment/Decrement**.

If the Increment and Decrement edges arrive simultaneously, the Output value does not change.

- If the counter value is at Maximum and incrementation is coming, the counter will be 0 again.
- If the counter value is at 0 and decrementing is coming, the counter will have be at Maximum.

The Output can be reset by rising edge on Reset.

The Output has a Resolution and Dimension according to the block settings.

Note: *If both the inputs Increment and Decrement are active, the Output value is not changed.*

IMPORTANT: When the controller is powered off the Output value is not preserved.

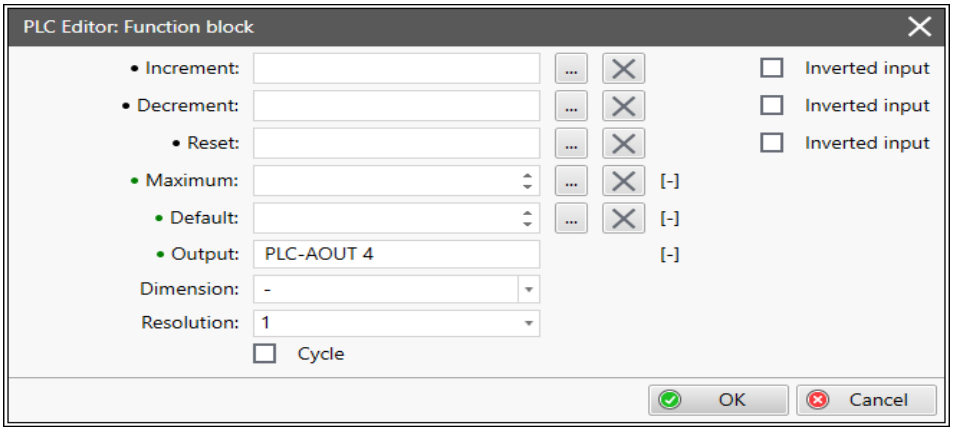


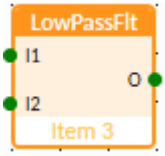
Image 8.124 Configuration of Inc/Dec block

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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LowPassFlt*

PLC group	Ramp functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	40



Inputs

Input	Type	Negation	Range	Function
Input	Analog	No	-2^{32} .. 2^{32}	Input Value
Tau	Analog	No	0,0 .. 60,0 [s]	Time Constant of the filter

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	-2^{32} .. 2^{32}	Filtered **Input**

Description

The block performs the function of the first-order low pass filter. Typical usage of this function is filtering of a value whose instantaneous value fluctuates rapidly around its mean, which is changing slower. The **Output** has resolution and dimension based on setting of the block.

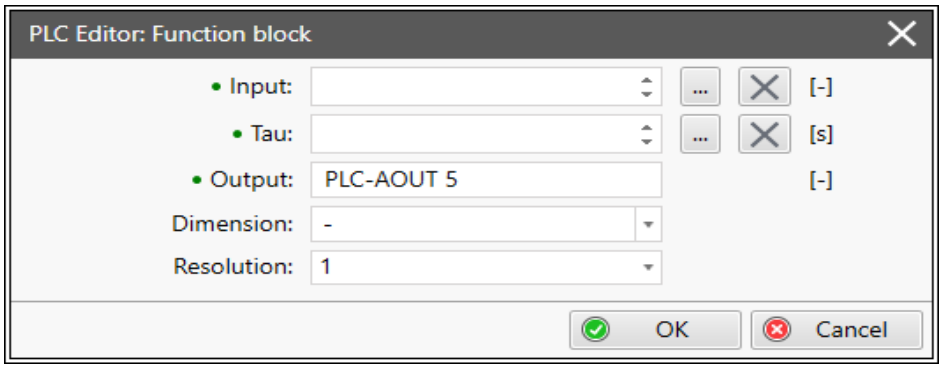


Image 8.125 Configuration of LowPassFlt block

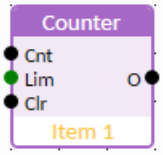
Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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Group: Other functions

Counter

PLC group	Other functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	13



Inputs

Input	Type	Negation	Range	Function
Input Count Up	Binary	No	0/1	Input at which the edges are counted
Input Preset Limit	Analog	No	0 .. 32767 [-]	Counter value limit for activation of the output
Input Clear	Binary	No	0/1	Reset input

Outputs

Output	Type	Negation	Range	Function
Output	Binary	No	0/1	Output is activated when the counter value exceeds the limit

Description

The block works as a counter of edges (selectable rising, falling or both) with reset input and adjustable counting limit. The maximal counter value is 32767. The counter value is lost when the controller is switched off. The output is activated when the counter value is equal or higher than Input Preset Limit and stays active until the block reset is done using Input Clear. Activating of the Input Clear resets the counter value to 0 and deactivates the output. Holding the Input Clear active blocks the counting.

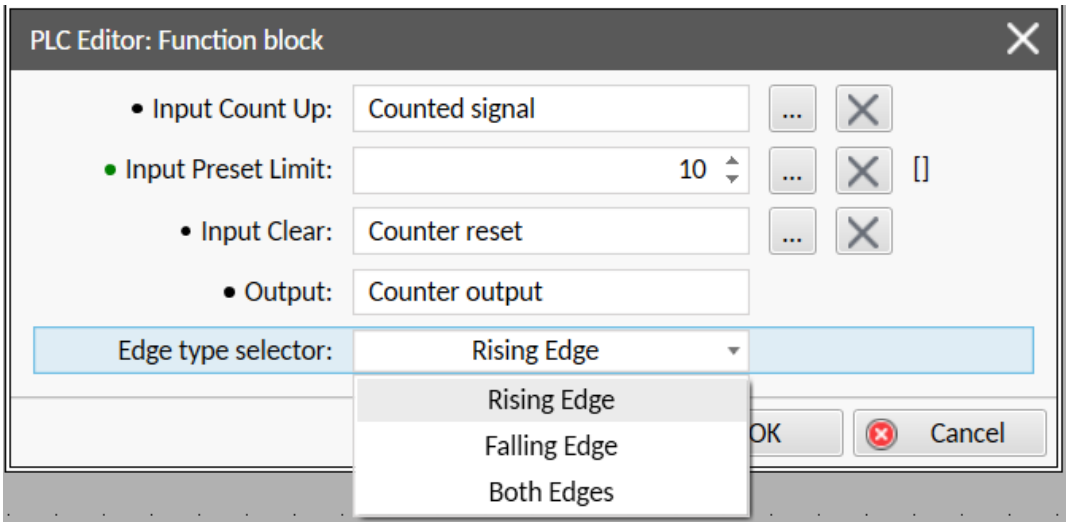
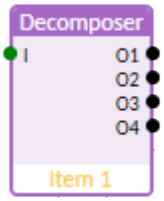


Image 8.126 Configuration of the Counter block

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Decomp. 4

PLC group	Other functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	24



Inputs

Input	Type	Negation	Range	Function
Input	Analog	No	-2 147 483 647 .. 2 147 483 647	Value to be "decomposed" to bits

Outputs

Output	Type	Negation	Range	Function
Output 1	Binary	Yes	0/1	Bit 0,4,8,12,16,20,24,28 - according to selected group of bits.
Output 2	Binary	Yes	0/1	Bit 1,5,9,13,17,21,25,29 - according to selected group of bits.
Output 3	Binary	Yes	0/1	Bit 2,6,10,14,18,22,26,30 - according to selected group of bits.
Output 4	Binary	Yes	0/1	Bit 3,7,11,15,19,23,27,31 - according to selected group of bits.

Description

The block converts the input analog value to binary form and provides selected bits as binary outputs.

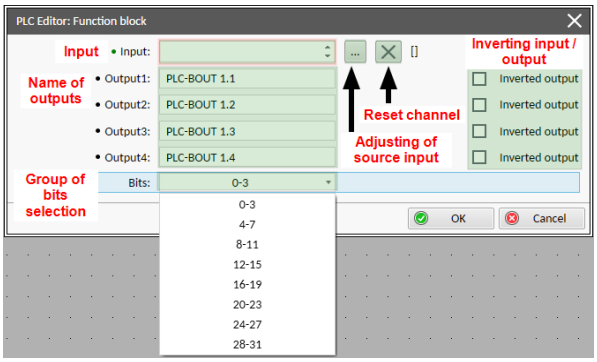
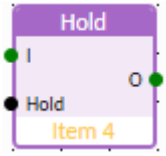


Image 8.127 Configuration of Decomp. 4 block

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Hold*

PLC group	Other functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	37



Inputs

Input	Type	Negation	Range	Function
Input	Analog	No	-2 147 483 647 .. 2 147 483 647	Input value
Hold	Binary	No	0/1	Input triggering the function

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	-2 147 483 647 .. 2 147 483 647	Hold output

Description

The block is holding **Input** value based on value of **Hold** and selected mode. The Output has resolution and dimension based on setting of the block.S

Mode	Description
Edge	The block behaves like analog memory. Input **Hold** behaves like the reload trigger and reacts on rising edge. The initial value of the **Output** after restart of the controller is 0.
Level	The block is like a mirror of the **Input** while the **Hold** is inactive. The value of **Output** is latched at the last value while **Hold** is active.

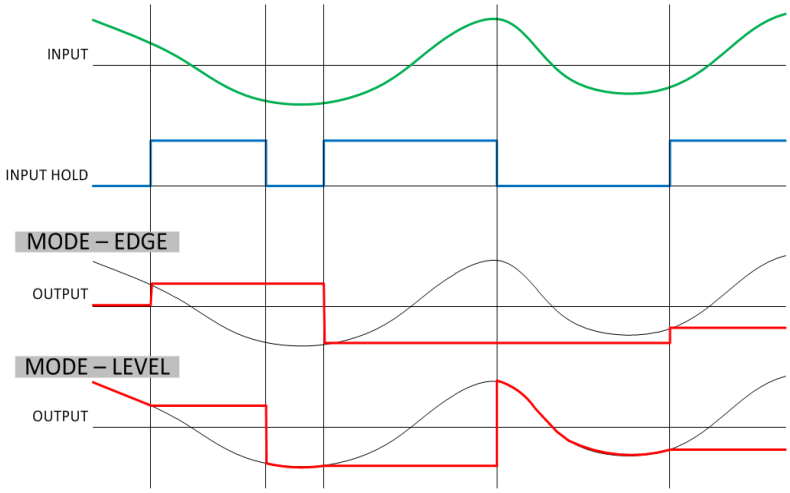


Image 8.128 Principle of the Hold modes

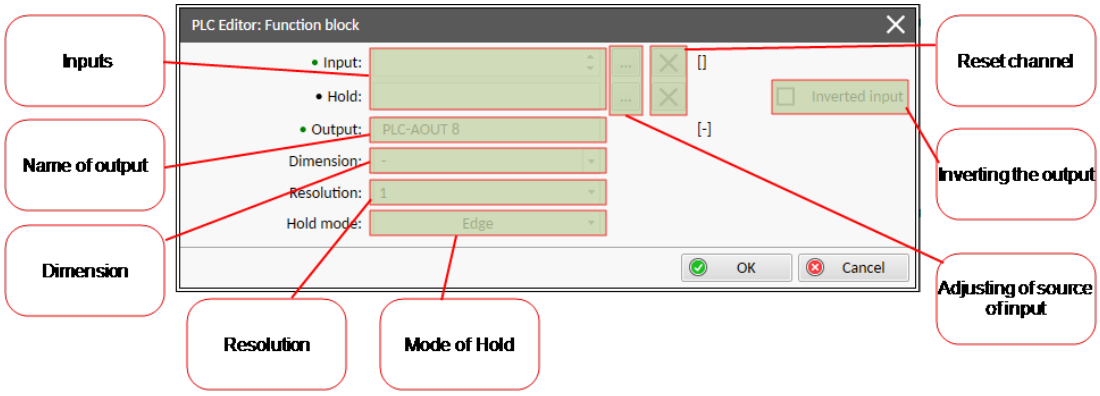


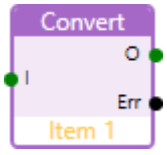
Image 8.129 Configuration of the Hold block

Note: *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

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Convert

PLC group	Other functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	52



Inputs

Input	Type	Negation	Range	Function
Input	Analog	No	-2 147 483 647 .. 2 147 483 647	Input value

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	-2 147 483 647 .. 2 147 483 647	Converted Input value
Output Err	Binary	No	-	The attribute of invalid data on output

Description

The block converts the input value of any data type, dimension, and resolution of the input value.

- The data type is converted to INTEGER32
- Dimension is converted based on user configuration (there is no recalculation, we just simply change dimension, ie. if the input is 100 W and the user selects kW, the output is 100 kW)
- Resolution is converted based on user configuration (there is recalculation performed)

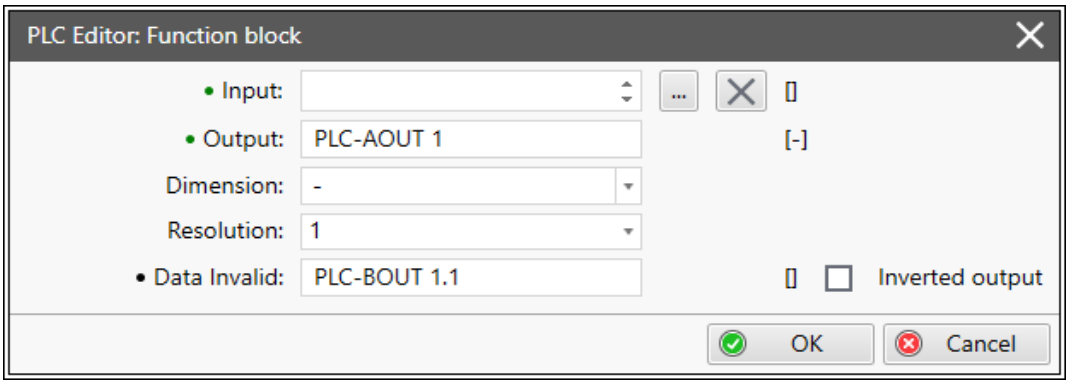


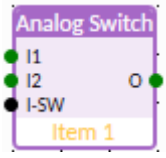
Image 8.130 Configuration of Convert block

Note: *Conversion is done to Integer32, if the input value is out of Integer32 range, output value is set to invalid status.*

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Analog Switch

PLC group	Other functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	5



Inputs

Input	Type	Negation	Range	Function
Input 1	Analog	No	-2 147 483 647 .. 2 147 483 647	Input value 1
Input 2	Analog	No	Same as Input 1	Input value 2
Input SW	Binary	No	0/1	Switching between Input value 1 and 2

Outputs

Output	Type	Negation	Range	Function

Output	Analog	No	-2 147 483 647 .. 2 147 483 647	Switch output

Description

The block is switching **Input 1** and **Input 2** based on value of **Input SW**. The **Output** has resolution and dimension based on setting of the block.

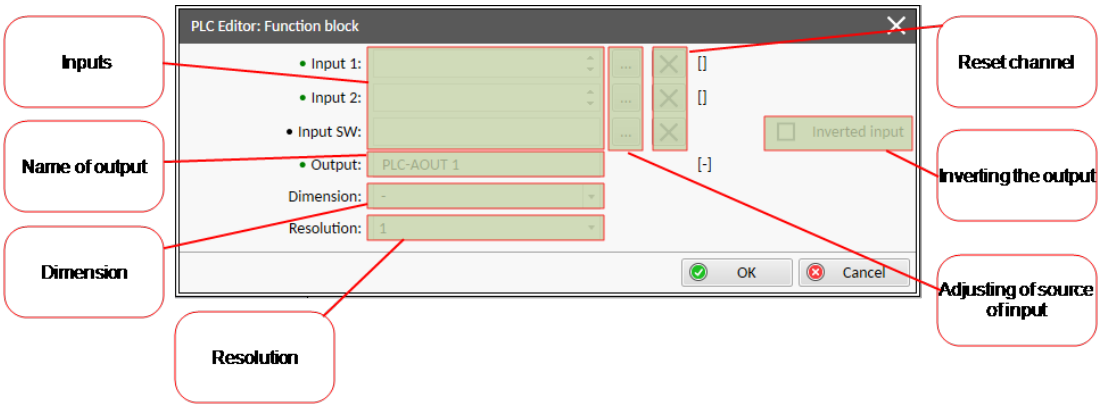


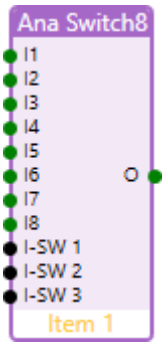
Image 8.131 Configuration of Analog Switch block

> **IMPORTANT: In case that values on inputs have different decimal numbers or dimensions than the values are converted and the name of block is red. It is strongly recommended to use values with the same decimal numbers.**

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Analog Switch 8

PLC group	Other functions
Related FW	2.1.0
Related applications	MINT, SPtM
Comm object	45



Inputs

Input	Type	Negation	Range	Function
Input 1	Analog	No	-2^{32} .. 2^{32}	Input value 1
Input 2	Analog	No	-2^{32} .. 2^{32}	Input value 2
Input 3	Analog	No	-2^{32} .. 2^{32}	Input value 3 (optional)
Input 4	Analog	No	-2^{32} .. 2^{32}	Input value 4 (optional)
Input 5	Analog	No	-2^{32} .. 2^{32}	Input value 5 (optional)
Input 6	Analog	No	-2^{32} .. 2^{32}	Input value 6 (optional)

Input 7	Analog	No	-2^{32} .. 2^{32}	Input value 7 (optional)
Input 8	Analog	No	-2^{32} .. 2^{32}	Input value 8 (optional)
Input SW 1	Binary	No	0/1	Switch input 1
Input SW 2	Binary	No	0/1	Switch input 2
Input SW 3	Binary	No	0/1	Switch input 3

Outputs

Output	Type	Negation	Range	Function
Output	Analog	No	-2^{32} .. 2^{32}	Switch output according to the SW 1, SW 2 and SW 3

Description

The block works as an analog multiplexer. The output value could be selected from up to 8 inputs according to the 'Input SW 3', 'Input SW 2' and 'Input SW 1' state is appropriate input value copied to the output, see the table below.

Input SW 3	Input SW 2	Input SW 1	Output
0	0	0	Input 1
0	0	1	Input 2
0	1	0	Input 3
0	1	1	Input 4
1	0	0	Input 5
1	0	1	Input 6
1	1	0	Input 7
1	1	1	Input 8

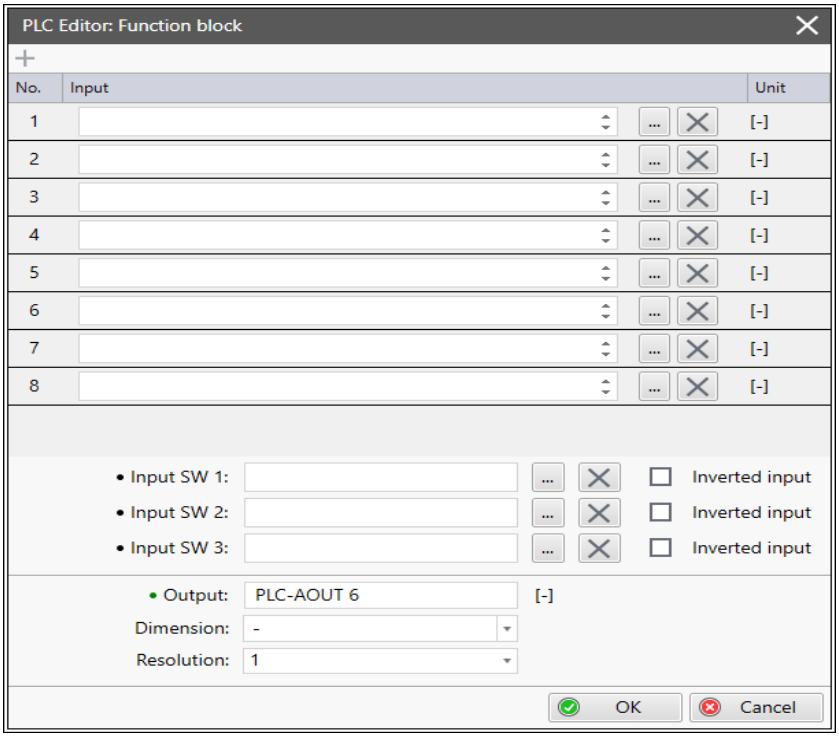


Image 8.132 Configuration of Analog Switch 8 block

back to List of PLC blocks

8.2 Alarms

What alarms are:

The controller evaluates two levels of alarms. For more information **see Alarm management on page 198**.

8.2.1 Alarm levels in the controller

8.2.2 Alarms level 1 861
8.2.3 Alarms level 2 908

8.2.2 Alarms level 1

What alarms level 1 are:

The level 1 alarm indicates that a value or parameter is out of normal limits, but has still not reached critical level.

List of alarms level 1

AL Fuel Transfer Failed ..865
AL Transferring Fuel 865
Wrn Alarm Email 1 Fail ...865
Wrn Alarm Email 2 Fail ...865
Wrn Alarm Email 3 Fail ...865
Wrn Alarm Email 4 Fail ...866
Wrn Alarm SMS 1 Fail 866
Wrn Alarm SMS 2 Fail 866
Wrn Alarm SMS 3 Fail 866
Wrn Alarm SMS 4 Fail 867
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Wrn ATT DEF Level Lamp 867
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Wrn Battery Undervoltage869
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ALI Bus Ph L2 Inverted ...870
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Wrn EM(A) - configuration mistake 875
Wrn EM(A) - insufficient ..875
Wrn EM(A) - missing or damaged 875
Wrn EM(B) - a message lost 876
Wrn EM(B) - configuration mistake 876
Wrn EM(B) - insufficient ..876
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Wrn Event SMS 2 Fail 878
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Wrn Fence 2 Alarm 879
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ALI Gen Ph L1 Inverted .. 879
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Wrn Generator L1 Undervoltage 880
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Wrn Generator L1L2 Undervoltage 881
Wrn Generator L2 Overvoltage 881
Wrn Generator L2 Undervoltage 882
Wrn Generator L2L3 Overvoltage 882
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Wrn Generator L3L1 Overvoltage 883
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ALI Mains Ph L2 Inverted 885
ALI Mains Ph L3 Inverted 885
ALI Mains Ph Rotation Opposite 885
Mains Voltage Unbalance ph-n 885
Mains Voltage Unbalance ph-ph 886

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Wrn Maintenance Timer 1 RunHours 886
Wrn Maintenance Timer 2 Interval 886
Wrn Maintenance Timer 2 RunHours 887
Wrn Maintenance Timer 3 Interval 887
Wrn Maintenance Timer 3 RunHours 887
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Wrn Module(slotA) - unattended 891
Wrn Module(slotB) - unattended 891
Wrn Module(slotA) - comm. outage 891
Wrn Module(slotB) - comm. outage 891
Wrn Module(slotA) - unexpected 892
Wrn Module(slotB) - unexpected 892
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Wrn Module: Slot 2 893
Wrn Module: Slot 3 893
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ALI Not Lubricated 894
Wrn Overload 894
Wrn Override All Sd 894
Wrn PasswEnterBlock 895
Wrn Password reset e-mail addr is not set 895
Wrn Production Mode 895
Wrn Rental Timer 1 895
AHI Rental Timer 1 Elapsed 895
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AHI Rental Timer 2 Elapsed 896
Wrn Reverse Synchro FailWrn Synchronisation Fail 896
HST ROCOF 896
Wrn RTC Battery Flat 896
Wrn SHAIN 1* 897
Wrn SHAIN 2* 897
Wrn SHAIN 3* 897
Wrn SHAIN 4* 897
Wrn SHAIN Collision* 898
Wrn SHBIN 1* 898
Wrn SHBIN 2* 898
Wrn SHBIN 3* 899
Wrn SHBIN 4* 899
Wrn SHBIN 5* 899
Wrn SHBIN 6* 899
Wrn SHBIN Collision* 900
Wrn SNMP TRAP 1 Fail .. 900
Wrn SNMP TRAP 2 Fail .. 900
Wrn Soft Transfer Fail 900
Wrn Speed Regulation Limit 900
ALI Start Blocking 901
Wrn Stop Fail 901
Wrn SUS Min Power 901
ALI SUS Sequence Blocked 902
Wrn Unsupported PMS Mode 902
HST VectorShift 902
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AL Wrong PLC Configuration 903
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Wrn AI/Hist.msg. 5 905
Wrn AI/Hist.msg. 6 905
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Wrn AI/Hist.msg. 11 906
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MP Mains/Bus Volt Unbal Ph-N 929
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Stp GCB Fail To Close ... 941
Stp GCB Fail To Open 941
Stp GCB Fail 941
Stp Request under MinPowerPTM 942
Stp Synchronisation Fail . 942

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AL Fuel Transfer Failed

Alarm Type	ALI
Alarmlist message	Fuel Transfer Failed
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when Fuel Level, received from ECU or LAI, does not increase during time **Transfer Wrn Delay (page 355)**.

back to List of alarms level 1

AL Transferring Fuel

Alarm Type	ALI
Alarmlist message	Transferring Fuel
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if **FUEL PUMP (PAGE 786)** is active.

back to List of alarms level 1

Wrn Alarm Email 1 Fail

Alarm Type	WRN
Alarmlist message	Alarm Email 1 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 1 (page 619)** and email wasn't send.

back to List of alarms level 1

Wrn Alarm Email 2 Fail

Alarm Type	WRN
Alarmlist message	Alarm Email 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 2 (page 620)** and email wasn't send.

back to List of alarms level 1

Wrn Alarm Email 3 Fail

Alarm Type	WRN
Alarmlist message	Alarm Email 3 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm email to email

	address which is adjusted in setpoint **Email Address 3 (page 620)** and email wasn't send.

back to List of alarms level 1

Wrn Alarm Email 4 Fail

Alarm Type	WRN
Alarmlist message	Alarm Email 4 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm email to email address which is adjusted in setpoint **Email Address 4 (page 621)** and email wasn't send.

back to List of alarms level 1

Wrn Alarm SMS 1 Fail

Alarm Type	WRN
Alarmlist message	Alarm SMS 1 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 1 (page 579)** and SMS wasn't sent.

back to List of alarms level 1

Wrn Alarm SMS 2 Fail

Alarm Type	WRN
Alarmlist message	Alarm SMS 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 2 (page 580)** and SMS wasn't sent.

back to List of alarms level 1

Wrn Alarm SMS 3 Fail

Alarm Type	WRN
Alarmlist message	Alarm SMS 3 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 3 (page 580)** and SMS wasn't sent.

back to List of alarms level 1

Wrn Alarm SMS 4 Fail

Alarm Type	WRN
Alarmlist message	Alarm SMS 4 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an alarm SMS to telephone number which is adjusted in setpoint **Telephone Number 4 (page 581)** and SMS wasn't sent.

back to List of alarms level 1

Wrn CAN 2 Units Missing

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn CAN 2 Units Missing
Related applications	MINT, SPtM
Description	This alarm is activated when actual number of unit on CAN2 is lower than value adjusted in setpoint **#Number Of Units On CAN2 (page 329)**, **#Number Of Units On CAN2 Check (page 328)** is Enabled and **#CAN2 Units Missing Protection (page 328)** is adjusted to Warning.

back to List of alarms level 1

Wrn ATT DEF Level Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT DEF Level Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when ECU send information that ECU ATT DEF Level Lamp is activated. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Wrn ATT DPF Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT DPF Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when ECU send information that ECU ATT DPF Lamp is activated. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Hst ATT Force Regen Active

Alarm Type	AHI

Alarmlist message	Hst ATT Force Regen Active
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This message is written in the history when LBI **ATT FORCE REGEN (PAGE 716)** is active. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Wrn ATT HEST Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT HEST Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when ECU send information that ECU ATT Hest Lamp is activated. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Hst ATT Inhib Regen Active

Alarm Type	AHI
Alarmlist message	Hst ATT Inhib Regen Active
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This message is written in the history when LBI **ATT INHIBIT REGEN (PAGE 717)** is active. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Wrn ATT Inhibited Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT Inhibited Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate Inhibited Lamp. This alarm is activated when ECU send information that ECU ATT Inhibited Lamp is activated. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Wrn ATT Interlock Active

Alarm Type	AHI
Alarmlist message	ATT interlock Active
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	This message is written in the history when LBI **ATT INTERLOCK (PAGE 718)** is active. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Wrn ATT SCR Error Lamp

Alarm Type	AHI
Alarmlist message	Wrn ATT SCR Error Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when ECU send information that ECU ATT SCR Error Lamp is activated. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Wrn Battery Charger Fail

Alarm Type	WRN
Alarmlist message	Battery Charge Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when logical binary input **BATTERY CHARGER (PAGE 719)** is active.

back to List of alarms level 1

Wrn Battery Overvoltage

Alarm Type	WRN
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: › **Battery Overvoltage (page 356)** › **Battery <> Voltage Delay (page 356)**

back to List of alarms level 1

Wrn Battery Undervoltage

Alarm Type	WRN
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:

	› **Battery Undervoltage (page 355)** › **Battery <> Voltage Delay (page 356)**

back to List of alarms level 1

Wrn Brute Force Protection Active

Alarm Type	WRN
Alarmlist message	Wrn Brute Force Protection Active
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when account break protection detects possible attack and at least one account is blocked according to **Account break protection (page 254)** rules.

back to List of alarms level 1

ALI Bus Ph L1 Inverted

Alarm Type	ALI
Alarmlist message	ALI Bus Ph L1 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if bus phase L1 is inverted.

back to List of alarms level 1

ALI Bus Ph L2 Inverted

Alarm Type	ALI
Alarmlist message	ALI Bus Ph L2 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if bus phase L2 is inverted.

back to List of alarms level 1

ALI Bus Ph L3 Inverted

Alarm Type	ALI
Alarmlist message	ALI Bus Ph L3 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if bus phase L3 is inverted.

back to List of alarms level 1

ALI Bus Ph Rotation Opposite

Alarm Type	ALI
Alarmlist message	ALI Bus Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	MINT, SPtM

Description	This alarm is issued if bus phases are wired in wrong order.

back to List of alarms level 1

ALI Dead Bus GCB blocked

Alarm Type	ALI
Alarmlist message	Dead Bus GCB blocked
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if GCB breaker can not be closed because controller does not have the master status. This can happen while droop mode is active. -> related setpoints **Dead Bus GCB Close Master (page 458)**, **Load/Var Sharing Regulation Type (page 457)**.

back to List of alarms level 1

Wrn Default Password

Alarm Type	WRN
Alarmlist message	Default Password
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is issued if the factory default password and/or access code are used and engine is running. Factory default password and access code are "0".

back to List of alarms level 1

Wrn Display Fail

Alarm Type	WRN
Alarmlist message	Wrn Display Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if communication with display is interrupted or lost.

back to List of alarms level 1

Wrn ECU 1 Comm Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU 1 Comm Fail
Alarm evaluated	ECU 1 is configured
Related applications	MINT, SPtM
Description	This alarm is activated when there is no communication received from ECU configured in ECU slot 1.

back to List of alarms level 1

Wrn ECU 2 Comm Fail

Alarm Type	WRN

Alarmlist message	Wrn ECU 2 Comm Fail
Alarm evaluated	ECU 2 is configured
Related applications	MINT, SPtM
Description	This alarm is activated when there is no communication received from ECU configured in ECU slot 2.

back to List of alarms level 1

Wrn ECU 3 Comm Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU 3 Comm Fail
Alarm evaluated	ECU 3 is configured
Related applications	MINT, SPtM
Description	This alarm is activated when there is no communication received from ECU configured in ECU slot 3.

back to List of alarms level 1

Wrn ECU 4 Comm Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU 4 Comm Fail
Alarm evaluated	ECU 4 is configured
Related applications	MINT, SPtM
Description	This alarm is activated when there is no communication received from ECU configured in ECU slot 4.

back to List of alarms level 1

Wrn ECU 5 Comm Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU 5 Comm Fail
Alarm evaluated	ECU 5 is configured
Related applications	MINT, SPtM
Description	This alarm is activated when there is no communication received from ECU configured in ECU slot 5. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn ECU 6 Comm Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU 6 Comm Fail
Alarm evaluated	ECU 6 is configured

Related applications	MINT, SPtM
Description	This alarm is activated when there is no communication received from ECU configured in ECU slot 6. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn ECU 7 Comm Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU 7 Comm Fail
Alarm evaluated	ECU 7 is configured
Related applications	MINT, SPtM
Description	This alarm is activated when there is no communication received from ECU configured in ECU slot 7. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn ECU 8 Comm Fail

Alarm Type	WRN
Alarmlist message	Wrn ECU 8 Comm Fail
Alarm evaluated	ECU 8 is configured
Related applications	MINT, SPtM
Description	This alarm is activated when there is no communication received from ECU configured in ECU slot 8. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn ECU Red Lamp

Alarm Type	AHI
Alarmlist message	Wrn ECU Red Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when ECU send information that ECU Red lamp is activated. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears. ***Note:*** *This lamp can be ignored during prestart phase. Use InteliConfig to enable this function.*

back to List of alarms level 1

Wrn ECU Wait To Start

Alarm Type	AHI
Alarmlist message	Wrn 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 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Wrn ECU Yellow Lamp

Alarm Type	AHI
Alarmlist message	Wrn ECU Yellow Lamp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when ECU send information that ECU Yellow lamp is activated. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Wrn ECU Communication Fail

Alarm Type	WRN
Alarmlist message	ECU Communication Fail
Alarm evaluated	With configured LBO **ECU POWER RELAY (PAGE 782)** – only when this LBO is active Without configured LBO **ECU POWER RELAY (PAGE 782)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU is configured, but the communication with the ECU is not established or has dropped out. LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Wrn ECUDiagBlocked

Alarm Type	ALI
Alarmlist message	ECUDiagBlocked
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	LBO **ALARM (PAGE 772)** is not activated, after deactivation of lamp, alarm automatically disappears.

back to List of alarms level 1

Wrn EM(A) - a message lost

Alarm Type	WRN
Alarmlist message	EM(A) - a message lost
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 1

Wrn EM(A) - configuration mistake

Alarm Type	WRN
Alarmlist message	EM(A) - configuration mistake
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with configuration of binary input or output of module in slot.

back to List of alarms level 1

Wrn EM(A) - insufficient

Alarm Type	WRN
Alarmlist message	EM(A) - insufficient
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that module does not support all required features.

back to List of alarms level 1

Wrn EM(A) - missing or damaged

Alarm Type	WRN
Alarmlist message	EM(A) - missing or damaged
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication with module in slot (in first 5 second there was no communication and module is configured in slot).

back to List of alarms level 1

Wrn EM(B) - a message lost

Alarm Type	WRN
Alarmlist message	EM(B) - a message lost
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 1

Wrn EM(B) - configuration mistake

Alarm Type	WRN
Alarmlist message	EM(B) - configuration mistake
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with configuration of binary input or output of module in slot.

back to List of alarms level 1

Wrn EM(B) - insufficient

Alarm Type	WRN
Alarmlist message	EM(B) - insufficient
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that module does not support all required features.

back to List of alarms level 1

Wrn EM(B) - missing or damaged

Alarm Type	WRN
Alarmlist message	EM(B) - missing or damaged
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication with module in slot (if first 5 second there was no communication and module is configured in slot).

back to List of alarms level 1

Wrn Emergency Droop Active

Alarm Type	WRN
Alarmlist message	Wrn Emergency Droop Active
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will switch from isochronous regulation to droop regulation when number of controller detected by the controller on

	CAN2 is lower than the number in the setpoint #Number Of Controller On CAN.

back to List of alarms level 1

Wrn Event Email 1 Fail

Alarm Type	WRN
Alarmlist message	Event Email 1 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 1 (page 619)** and email wasn't send.

back to List of alarms level 1

Wrn Event Email 2 Fail

Alarm Type	WRN
Alarmlist message	Event Email 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 2 (page 620)** and email wasn't send.

back to List of alarms level 1

Wrn Event Email 3 Fail

Alarm Type	WRN
Alarmlist message	Event Email 3 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 620)** and email wasn't send.

back to List of alarms level 1

Wrn Event Email 4 Fail

Alarm Type	WRN
Alarmlist message	Event Email 4 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event email to email address which is adjusted in setpoint **Email Address 4 (page 621)** and email wasn't send.

back to List of alarms level 1

Wrn Event SMS 1 Fail

Alarm Type	WRN
Alarmlist message	Event SMS 1 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 1 (page 579)** and SMS wasn't send.

back to List of alarms level 1

Wrn Event SMS 2 Fail

Alarm Type	WRN
Alarmlist message	Event SMS 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 2 (page 580)** and SMS wasn't send.

back to List of alarms level 1

Wrn Event SMS 3 Fail

Alarm Type	WRN
Alarmlist message	Event SMS 3 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 3 (page 580)** and SMS wasn't send.

back to List of alarms level 1

Wrn Event SMS 4 Fail

Alarm Type	WRN
Alarmlist message	Event SMS 4 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm indicates that there was a request to send an event SMS to telephone number which is adjusted in setpoint **Telephone Number 4 (page 581)** and SMS wasn't send.

back to List of alarms level 1

ALI External Mains Fail

Alarm Type	ALI
Alarmlist message	External Mains Fail

Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active when LBI **EXTERNAL MAINS FAIL RELAY (PAGE 725)** is active.

back to List of alarms level 1

Wrn Fence 1 Alarm

Alarm Type	WRN
Alarmlist message	Wrn Fence 1 Alarm
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 553)** › **Fence 1 Protection (page 555)** › **Fence 1 Radius (page 556)**

back to List of alarms level 1

Wrn Fence 2 Alarm

Alarm Type	WRN
Alarmlist message	Wrn Fence 2 Alarm
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 553)** › **Fence 2 Protection (page 557)** › **Fence 2 Radius (page 558)**

back to List of alarms level 1

Wrn Fuel Theft

Alarm Type	WRN
Alarmlist message	Wrn Fuel Theft
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when the fuel level value measured at relevant AI (Fuel Level) drops faster than is the limit adjusted by setpoint **Maximal Fuel Drop (page 352)**.

back to List of alarms level 1

ALI Gen Ph L1 Inverted

Alarm Type	ALI
Alarmlist message	ALI Gen Ph L1 Inverted

Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if generator phase L1 is inverted.

back to List of alarms level 1

ALI Gen Ph L2 Inverted

Alarm Type	ALI
Alarmlist message	ALI Gen Ph L2 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if generator phase L2 is inverted.

back to List of alarms level 1

ALI Gen Ph L3 Inverted

Alarm Type	ALI
Alarmlist message	ALI Gen Ph L3 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if generator phase L3 is inverted.

back to List of alarms level 1

ALI Gen Ph Rotation Opposite

Alarm Type	ALI
Alarmlist message	ALI Gen Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if generator phases are wired in wrong order.

back to List of alarms level 1

Wrn Generator L1 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 376)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L1 Undervoltage

Alarm Type	WRN

Alarmlist message	Generator L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 377)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L1L2 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L1L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 376)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L1L2 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L1L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 377)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L2 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 376)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L2 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 377)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L2L3 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L2L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 376)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L2L3 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L2L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 377)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L3 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 376)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L3 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 377)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L3L1 Overvoltage

Alarm Type	WRN
Alarmlist message	Generator L3L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: › **Generator Overvoltage Wrn (page 376)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator L3L1 Undervoltage

Alarm Type	WRN
Alarmlist message	Generator L3L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: › **Generator Undervoltage Wrn (page 377)** › **Generator <> Voltage Delay (page 378)**

back to List of alarms level 1

Wrn Generator Overfrequency

Alarm Type	WRN
Alarmlist message	Generator > Frequency
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator overfrequency in the phase L1. The following setpoints are related to it: › **Generator Overfrequency Wrn (page 379)**

	› **Generator <> Frequency Delay (page 380)**

back to List of alarms level 1

Wrn Generator Uderfrequency

Alarm Type	WRN
Alarmlist message	Generator < Frequency
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator underfrequency in the phase L1. The following setpoints are related to it: › **Generator Underfrequency Wrn (page 380)** › **Generator <> Frequency Delay (page 380)**

back to List of alarms level 1

Wrn Charging Alternator Fail

Alarm Type	SD
Alarmlist message	Sd Charging Alternator Fail
Alarm evaluated	Engine running only
Related applications	MINT, SPtM
Description	This alarm is issued if the engine is running and the voltage on the D+ terminal is lower than **D+ Threshold (page 348)** of the controller supply voltage. This alarm works similar to the red "battery" alarm indicator on a vehicle dashboard. The setpoint has to be in Charge Fail or Enabled position to enable this alarm.

back to List of alarms level 2

Wrn Load IMP/EXP Fail

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Load IMP/EXP Fail
Related applications	MINT, SPtM
Description	This alarm is active when **Load Control PTM Mode (page 294)** = Imp/Exp but Mains Measurement P is unavailable. When this alarm is active, load is controlled as if **Load Control PTM Mode (page 294)** = Baseload. Alarm is caused by: › **Mains Measurement P (page 304)** = None › **Mains Measurement P (page 304)** = Analog Input and » LAI **Mains Import Measurement P (page 833)** is not configured » Value from **Mains Import Measurement P (page 833)** has Invalid flag

back to List of alarms level 1

ALI Mains Ph L1 Inverted

Alarm Type	ALI

Alarmlist message	ALI Mains Ph L1 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if mains phase L1 is inverted.

back to List of alarms level 1

ALI Mains Ph L2 Inverted

Alarm Type	ALI
Alarmlist message	ALI Mains Ph L2 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if mains phase L2 is inverted.

back to List of alarms level 1

ALI Mains Ph L3 Inverted

Alarm Type	ALI
Alarmlist message	ALI Mains Ph L3 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if mains phase L3 is inverted.

back to List of alarms level 1

ALI Mains Ph Rotation Opposite

Alarm Type	ALI
Alarmlist message	ALI Mains Ph Rotation Opposite
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if mains phases are wired in wrong order.

back to List of alarms level 1

Mains Voltage Unbalance ph-n

Alarm Type	MP
Alarmlist message	Mains Voltage Unbalance ph-n
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued depending on evaluation of the unbalance of the phase voltages, i.e. the difference between highest and lowest phase voltage at any given time. The following setpoints are related to it: › **Mains Voltage Unbalance (page 399)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Mains Voltage Unbalance Delay (page 399)** adjusts the alarm delay.

back to List of alarms level 1

Mains Voltage Unbalance ph-ph

Alarm Type	MP
Alarmlist message	Mains Voltage Unbalance ph-ph
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued depending on evaluation of the unbalance of the phase to phase voltages, i.e. the difference between highest and lowest phase to phase voltage at any given time. The following setpoints are related to it: › **Mains Voltage Unbalance (page 399)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Mains Voltage Unbalance Delay (page 399)** adjusts the alarm delay.

back to List of alarms level 1

Wrn Maintenance Timer 1 Interval

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 1 Interval
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 1 Interval (page 669)** Interval reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 Interval (page 365)** (unit is in months-m) and it counts down in days based on actual date (No matter if engine is running or not). Setpoint **Maintenance Timer 1 Protection (page 366)** has to be set to: Warning

back to List of alarms level 1

Wrn Maintenance Timer 1 RunHours

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 1 RunHours
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 1 RunHours (page 669)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 RunHours (page 365)** (unit is hours-h) and it counts down in hours while engine is running. Setpoint **Maintenance Timer 1 Protection (page 366)** has to be set to: Warning

back to List of alarms level 1

Wrn Maintenance Timer 2 Interval

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 2 Interval
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 2 Interval (page 669)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 2 Interval (page 367)** (unit is in months-m) and it counts down in days based on actual date (No matter if engine is running or not). Setpoint **Maintenance Timer 2 Protection (page 367)** has to be set to: Warning

back to List of alarms level 1

Wrn Maintenance Timer 2 RunHours

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 2 RunHours
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 2 RunHours (page 669)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 2 RunHours (page 366)** (unit is hours-h) and it counts down in hours while engine is running. Setpoint **Maintenance Timer 2 Protection (page 367)** has to be set to: Warning

back to List of alarms level 1

Wrn Maintenance Timer 3 Interval

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 3 Interval
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 3 Interval (page 670)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 3 Interval (page 368)** (unit is in months-m) and it counts down in days based on actual date (No matter if engine is running or not). Setpoint **Maintenance Timer 3 Protection (page 369)** has to be set to: Warning

back to List of alarms level 1

Wrn Maintenance Timer 3 RunHours

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 3 RunHours
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 3 RunHours (page 670)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 3 RunHours (page 368)** (unit is hours-h) and it counts down in hours while engine is running. Setpoint **Maintenance Timer 3 Protection (page 369)** has to be set to: Warning

back to List of alarms level 1

Wrn Maintenance Timer 4 Interval

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 4 Interval
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value Maintenance Timer 4 Interval reaches 0. The value is adjustable by setpoint **Maintenance Timer 4 Interval (page 370)** (unit is in months-m) and it counts down in days based on actual date (No matter if engine is running or not). Setpoint **Maintenance Timer 4 Protection (page 370)** has to be set to: Warning

back to List of alarms level 1

Wrn Maintenance Timer 4 RunHours

Alarm Type	WRN
Alarmlist message	Wrn Maintenance Timer 4 RunHours
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value Maintenance Timer RunHours 4 reaches 0. The value is adjustable by setpoint **Maintenance Timer 4 RunHours (page 369)** (unit is hours-h) and it counts down in hours while engine is running. Setpoint **Maintenance Timer 4 Protection (page 370)** has to be set to: Warning

back to List of alarms level 1

ALI Manual Restore

Alarm Type	ALI
Alarmlist message	Manual Restore
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Alarm is activated when controller is in AUTO mode, **Return From Island (page 403)** setpoint is set to manual, load is on Gen-set and mains has returned.

back to List of alarms level 1

Wrn MCB Fail

Alarm Type	WRN
Alarmlist message	Wrn MCB Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm will occur when the **MCB Feedback (page 741)** input does not match the expected position given by the **MCB Close/Open (page 803)** output. It stays active until the mismatch between the output and feedback disappears. › If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued

	immediately. › Self-opening of the breaker is not considered a fault and if all mains values are within limits, the command to reclose the breaker is issued after delay given by the setpoint **Mains Return Delay (page 393)** has elapsed. › The alarm will be also issued, if the breaker does not respond to the close command within 5 seconds. After this period has elapsed the output MCB Close/Open is deactivated again and the next attempt to close the breaker will occur first after the alarm is reset. › The alarm will be also issued if the breaker does not respond to the open command within 5 seconds. The output MCB Close/Open will stay deactivated. Closing of GCB is blocked until this alarm becomes inactive.

back to List of alarms level 1

Wrn MCB Fail To Close

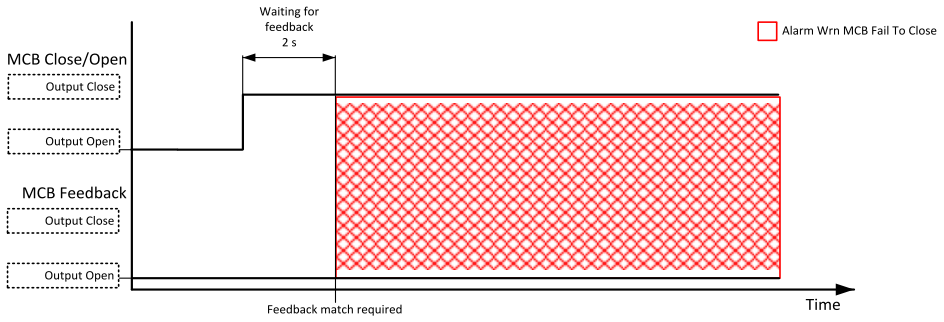
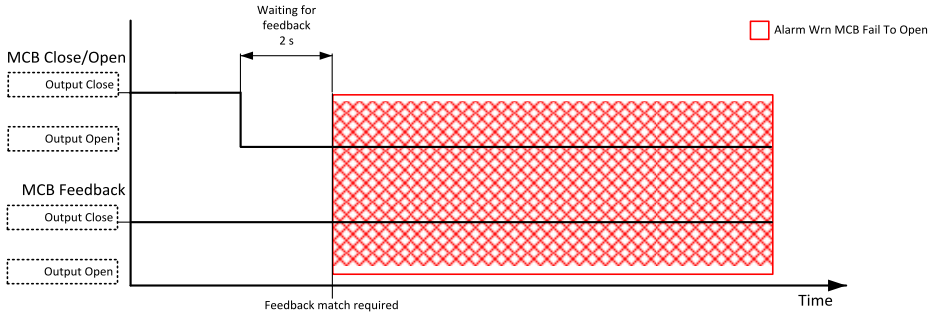
Alarm Type	WRN
Alarmlist message	Wrn MCB Fail To Close
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when there is a problem with circuit breaker position while closing. › LBO **MCB CLOSE/OPEN (PAGE 803)** closed but LBI **MCB FEEDBACK (PAGE 741)** did not closed in 2 seconds. › **Self-closing of breaker with mains parameters with limits** – not considered as fault, MCB close command is issued after **MCB Close Delay (page 394)**. 

Image 8.133 MCB Fail To Close

back to List of alarms level 1

Wrn MCB Fail To Open

Alarm Type	WRN
Alarmlist message	Wrn MCB Fail To Open
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	This alarm is activated when there is a problem with circuit breaker position while opening. › LBO **MCB CLOSE/OPEN (PAGE 803)** opened but LBI **MCB FEEDBACK (PAGE 741)** did not opened in 2 seconds. › **Self-opening of breaker with mains parameters without limits** – not considered as fault, MCB open command is issued according to the setpoint **MCB Opens On (page 405)**.  Image 8.134 MCB Fail To Open

back to List of alarms level 1

Wrn Module(slotA) - false module

Alarm Type	WRN
Alarmlist message	Module(slotA) - fake module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that false module is inserted in slot.

back to List of alarms level 1

Wrn Module(slotB) - false module

Alarm Type	WRN
Alarmlist message	Module(slotB) - fake module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that false module is inserted in slot.

back to List of alarms level 1

Wrn Module(slotA) - unknown module

Alarm Type	WRN
Alarmlist message	Module(slotA) - unknown module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that unknown module is inserted in slot.

back to List of alarms level 1

Wrn Module(slotB) - unknown module

Alarm Type	WRN
Alarmlist message	Module(slotB) - unknown module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that unknown module is inserted in slot.

back to List of alarms level 1

Wrn Module(slotA) - unattended

Alarm Type	WRN
Alarmlist message	Module(slotA) - unattended
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

back to List of alarms level 1

Wrn Module(slotB) - unattended

Alarm Type	WRN
Alarmlist message	Module(slotB) - unattended
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

back to List of alarms level 1

Wrn Module(slotA) - comm. outage

Alarm Type	WRN
Alarmlist message	Module(slotA) - comm. outage
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 1

Wrn Module(slotB) - comm. outage

Alarm Type	WRN
Alarmlist message	Module(slotB) - comm. outage
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 1

Wrn Module(slotA) - unexpected

Alarm Type	WRN
Alarmlist message	Module(slotA) - unexpected
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

back to List of alarms level 1

Wrn Module(slotB) - unexpected

Alarm Type	WRN
Alarmlist message	Module(slotB) - unexpected
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

back to List of alarms level 1

Wrn Module: Slot 1

Alarm Type	WRN
Alarmlist message	Module: Slot 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 1.

back to List of alarms level 1

Wrn Module: Slot 2

Alarm Type	WRN
Alarmlist message	Module: Slot 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 2.

back to List of alarms level 1

Wrn Module: Slot 3

Alarm Type	WRN
Alarmlist message	Module: Slot 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 3.

back to List of alarms level 1

Wrn Module: Slot 4

Alarm Type	WRN
Alarmlist message	Module: Slot 4
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 4.

back to List of alarms level 1

Wrn Module: Slot 5

Alarm Type	WRN
Alarmlist message	Module: Slot 5
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 5.

back to List of alarms level 1

ALI Not Lubricated

Alarm Type	ALI
Alarmlist message	Not Lubricated
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active during first cycle of Prelubrication cycles. While the alarm is active it is not possible to start the engine.

back to List of alarms level 1

Wrn Overload

Alarm Type	WRN
Alarmlist message	Overload
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is issued when the Gen-set power is over the limit for time period longer than the delay. The following setpoints are related to it: › **Overload Wrn (page 371)** adjusts the overload limit. › **Overload BOC (page 371)** Overload Del adjusts the delay.

back to List of alarms level 1

Wrn Override All Sd

Alarm Type	WRN
Alarmlist message	Override All Sd
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs when binary input **SD OVERRIDE (PAGE 754)** is activated.

back to List of alarms level 1

Wrn PasswEnterBlock

Alarm Type	WRN
Alarmlist message	PasswEnterBlock
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate that user will not be able to type in password for set amount of time. ***Note:*** *This is cause by too many invalid attempts.*

back to List of alarms level 1

Wrn Password reset e-mail addr is not set

Alarm Type	WRN
Alarmlist message	Wrn Password reset e-mail addr is not set
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active when there is no email address set in the controller and simultaneously controller administrator password is not the default password. ***Note:*** *When default password is changed the Wrn Password reset e-mail addr is not set will be active after the restart of the controller.*

back to List of alarms level 1

Wrn Production Mode

Alarm Type	WRN
Alarmlist message	Wrn Production Mode
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Alarm is active when the controller has turned on Productiom mode. In turned on Production mode the user has the highest level 3 access without performing log in.

back to List of alarms level 1

Wrn Rental Timer 1

Alarm Type	WRN
Alarmlist message	Wrn Rental Timer 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs xx hours before **Rental Timer 1 (page 548)** elapsed. Hours are adjusted by setpoint **Rental Timer 1 Wrn (page 550)**.

back to List of alarms level 1

AHI Rental Timer 1 Elapsed

Alarm Type	AHI

Alarmlist message	Rental Timer 1 Elapsed
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when **Rental Timer 1 (page 548)** elapses.

back to List of alarms level 1

Wrn Rental Timer 2

Alarm Type	WRN
Alarmlist message	Wrn Rental Timer 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs xx hours before **Rental Timer 2 (page 550)** elapsed. Hours are adjusted by setpoint **Rental Timer 2 Wrn (page 552)**.

back to List of alarms level 1

AHI Rental Timer 2 Elapsed

Alarm Type	AHI
Alarmlist message	Rental Timer 2 Elapsed
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when **Rental Timer 2 (page 550)** elapses.

back to List of alarms level 1

Wrn Reverse Synchro FailWrn Synchronisation Fail

Alarm Type	WRN
Alarmlist message	Wrn Reverse Synchro Fail
Alarm evaluated	During synchronization
Related applications	MINT, SPtM
Description	This alarm is issued when Gen-set is synchronizing to the mains/bus via MCB and **Synchronization Timeout (page 454)** gets elapsed.

back to List of alarms level 1

HST ROCOF

Alarm Type	HST
Alarmlist message	ROCOF
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if ROCOF protection is triggered.

back to List of alarms level 1

Wrn RTC Battery Flat

Alarm Type	WRN

Alarmlist message	RTC Battery Flat
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if RTC battery is weak or flat and has to be changed.

back to List of alarms level 1

Wrn SHAIN 1*

Alarm Type	WRN
Alarmlist message	Wrn SHAIN 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active during first cycle of Prelubrication cycles. While the alarm is active it is not possible to start the engine. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHAIN 2*

Alarm Type	WRN
Alarmlist message	Wrn SHAIN 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when shared analog inputs are not received from SHAIN module 2. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHAIN 3*

Alarm Type	WRN
Alarmlist message	Wrn SHAIN 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when shared analog inputs are not received from SHAIN module 3. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHAIN 4*

Alarm Type	WRN
Alarmlist message	Wrn SHAIN 4

Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when shared analog inputs are not received from SHAIN module 4. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHAIN Collision*

Alarm Type	WRN
Alarmlist message	Wrn SHAIN Collision
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when controller receives shared analog inputs of any SHAIN module from more than just one controller. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHBIN 1*

Alarm Type	WRN
Alarmlist message	Wrn SHBIN 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 1. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHBIN 2*

Alarm Type	WRN
Alarmlist message	Wrn SHBIN 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 2. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHBIN 3*

Alarm Type	WRN
Alarmlist message	Wrn SHBIN 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 3. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHBIN 4*

Alarm Type	WRN
Alarmlist message	Wrn SHBIN 4
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 4. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHBIN 5*

Alarm Type	WRN
Alarmlist message	Wrn SHBIN 5
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 5. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHBIN 6*

Alarm Type	WRN
Alarmlist message	Wrn SHBIN 6
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when shared binary inputs are not received from SHBIN module 6. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SHBIN Collision*

Alarm Type	WRN
Alarmlist message	Wrn SHBIN Collision
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when controller receives shared binary inputs of any SHBIN module from more than just one controller. ***Note:*** *This feature is available only in AGC archive. For more information see* ***Extended features (page 157)****.*

back to List of alarms level 1

Wrn SNMP TRAP 1 Fail

Alarm Type	WRN
Alarmlist message	SNMP TRAP 1 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if TRAP will not be able to reach server.

back to List of alarms level 1

Wrn SNMP TRAP 2 Fail

Alarm Type	WRN
Alarmlist message	SNMP TRAP 2 Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if TRAP will not be able to reach server, or in case there is no reply for the server

back to List of alarms level 1

Wrn Soft Transfer Fail

Alarm Type	WRN
Alarmlist message	Soft Transfer Fail
Alarm evaluated	During transition of load
Related applications	MINT, SPtM
Description	This alarm is issued when the unloading was not successful (**Load Ramp (page 447)** + 10 % gets elapsed).

back to List of alarms level 1

Wrn Speed Regulation Limit

Alarm Type	WRN
Alarmlist message	Wrn Speed Regulation Limit
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	This alarm is issued to indicate the speed governor output stays close to one of the limit values for more than 2 seconds.

back to List of alarms level 1

ALI Start Blocking

Alarm Type	ALI
Alarmlist message	ALI Gen Ph L3 Inverted
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active if LBI **START BLOCKING (PAGE 754)** is closed before Gen-set is started.

back to List of alarms level 1

Wrn Stop Fail

Alarm Type	WRN
Alarmlist message	Wrn Stop Fail
Alarm evaluated	While the engine shall be stopped
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 786)** has been switched off and time delay **Stop Time (page 345)** has elapsed and lasts for the entire time the **FUEL SOLENOID (PAGE 786)** or **STARTER 1 (PAGE 818)** are off.

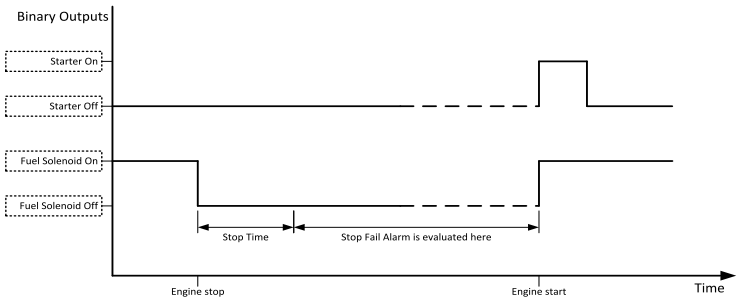


Image 8.135 Stop Fail

Note: *Gen-set cannot be started until this alarm is inactive and reset.*

back to List of alarms level 1

Wrn SUS Min Power

Alarm Type	WRN
Alarmlist message	Wrn SUS Min Power
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated at the end of **SUS RPM Window Time Out (page 363)** if

	#SUS Min Power 1 (page 360) is not met and stays active until the requirement is met or **#SUS Excitation Delay (page 364)** is up. ***Note:*** *SUS Min Power is adjusted by setpoints **#SUS Min Power 1 (page 360)**, **#SUS Min Power 2 (page 361)** and **#SUS Min Power 3 (page 362)**.*

back to List of alarms level 1

ALI SUS Sequence Blocked

Alarm Type	ALI
Alarmlist message	Wrn SUS Sequence Blocked
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm informs about SUS Sequence being Blocked due to some conditions. Possible blocking conditions: › **Gear Teeth (page 321)** = 0 (RPM → f) › **GCB Control Mode (page 308)** = External

back to List of alarms level 1

Wrn Unsupported PMS Mode

Alarm Type	WRN
Alarmlist message	Wrn Unsupported PMS Mode
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active if setpoint **#Power Management Mode (page 416)** is adjusted to not available option.

back to List of alarms level 1

HST VectorShift

Alarm Type	HST
Alarmlist message	VectorShift
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if the generator phase to phase shift will exceed preset values. The following setpoints are related to it: Vector Shift Protection, Vector Shift Limit.

back to List of alarms level 1

Wrn Voltage Regulation Limit

Alarm Type	WRN
Alarmlist message	Wrn Voltage Regulation Limit
Alarm evaluated	Gen-set is running
Related applications	MINT, SPtM
Description	This alarm is issued when AVR output (**Voltage control outputs (page 243)**) stays close to one of the limit values for more than 2 seconds.

back to List of alarms level 1

AHI Warming

Alarm Type	AHI
Alarmlist message	AHI Warming
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that Gen-set is in **Warming (page 245)** procedure.

back to List of alarms level 1

Wrn Wrong GCB Control Mode

Alarm Type	WRN
Alarmlist message	Wrn Wrong GCB Control Mode
Alarm evaluated	all the time
Related applications	MINT, SPtM
Description	This alarm is issued when GCB Control Mode is selected to option No Button and simultaneously the controller is in SPtM mode.

back to List of alarms level 1

AL Wrong PLC Configuration

Alarm Type	AL
Alarmlist message	AL Wrong PLC Configuration
Alarm evaluated	all the time
Related applications	MINT, SPtM
Description	This alarm is activated when the **PLC (page 179)** configuration is invalid. Once the alarm is active the whole PLC does not work. This alarm will be active until the PLC configuration is not fixed and the archive is written to the controller.

back to List of alarms level 1

ALI Wrong Config

Alarm Type	ALI
Alarmlist message	Wrong Config
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate that content of the configuration in controller unit does not match to configuration.

back to List of alarms level 1

Wrn Coolant Temp

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Coolant Temp
Related applications	MINT, SPtM
Description	Warning alarm for Coolant Temp user protection.

back to List of alarms level 1

Wrn Coolant Temp Low

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Coolant Temp Low
Related applications	MINT, SPtM
Description	Warning alarm for Coolant Temp Low user protection.

back to List of alarms level 1

Wrn Fuel Level

Alarm Type	WRN
Alarmlist message	All the time
Alarm evaluated	Wrn Fuel Level
Related applications	MINT, SPtM
Description	Warning alarm for Coolant Temp Low user protection.

back to List of alarms level 1

WrnAL Fuel Transfer Failed

Alarm Type	Warning
Alarmlist message	Wrn Fuel Transfer Failed
Alarm evaluated	When **FUEL PUMP (PAGE 786)** is active
Related applications	MINT, SPtM
Description	This alarm will occur when there is no increase of fuel level when **FUEL PUMP (PAGE 786)** is active.

back to List of alarms level 1

Wrn Al/Hist.msg. 1

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 1 will trigger.

back to List of alarms level 1

Wrn Al/Hist.msg. 2

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 2 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 3

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 3 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 4

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 4
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 4 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 5

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 5
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 5 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 6

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 6
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 6 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 7

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 7
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 7 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 8

Alarm Type	WRN

Alarmlist message	AI/Hist.msg. 8
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 8 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 9

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 9
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 9 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 10

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 10
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 10 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 11

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 11
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 11 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 12

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 12
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 12 will trigger.

back to List of alarms level 1

Wrn AI/Hist.msg. 13

Alarm Type	WRN
Alarmlist message	AI/Hist.msg. 13
Alarm evaluated	All the time
Related applications	MINT, SPtM

Description	This alarm is issued when history event 13 will trigger.

back to List of alarms level 1

Wrn Al/Hist.msg. 14

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 14
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 14 will trigger.

back to List of alarms level 1

Wrn Al/Hist.msg. 15

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 15 will trigger.

back to List of alarms level 1

Wrn Al/Hist.msg. 16

Alarm Type	WRN
Alarmlist message	Al/Hist.msg. 16
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when history event 16 will trigger.

back to List of alarms level 1

Mains/Bus Overfrequency

Alarm Type	MP
Alarmlist message	Mains/Bus Overfrequency
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active when Mains frequency is above the setpoint **Mains Overfrequency (page 399)** for the period longer than **Mains < > Frequency Delay (page 403)**.

back to List of alarms level 1

Mains/Bus Underfrequency

Alarm Type	MP
Alarmlist message	Mains/Bus Underfrequency
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active when Mains frequency is bellow the setpoint **Mains**

	Underfrequency (page 401) for the period longer than **Mains < > Frequency Delay (page 403)**.

back to List of alarms level 1

Wrn Rental Timer Block Start

Alarm Type	WRN
Alarmlist message	Rental Timer Block Start
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Alarm is active when there is start command and **Rental Timer 1 (page 548)** or **Rental Timer 2 (page 550)** elapsed.

back to List of alarms level 1

Wrn Oil Pressure

Alarm Type	Warning
Alarmlist message	Wrn Oil Pressure
Alarm evaluated	Gen-set is running
Related applications	MINT, SPtM
Description	This alarm indicates that the oil pressure is lower than the pressure set in the setpoint.

back to List of alarms level 1

Wrn Wrong MCB Control Mode

Alarm Type	WRN
Alarmlist message	Wrn Wrong GCB Control Mode
Alarm evaluated	all the time
Related applications	MINT, SPtM
Description	This alarm is issued when MCB Control Mode is selected to option No Button and simultaneously the controller is in SPtM mode.

back to List of alarms level 1

8.2.3 Alarms level 2

What alarms level 2 are:

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

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Sd Battery Flat

Alarm Type	SD
Alarmlist message	Sd Battery Flat
Alarm evaluated	During cranking
Related applications	MINT, SPtM
Description	This alarm will be issued if the controller was reset during cranking of the gen-set. If this situation occurs, the controller supposes the starting battery is so exhausted that its voltage drops so low when starter motor is energized that it causes controller reset.

back to List of alarms level 2

Stp Bus Meas Error

Alarm Type	ProtSTP
Alarmlist message	Stp Bus Meas Error
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued in MINT application when the voltage on the controller's bus terminals is out of limits 20 seconds after GCB or MCB was closed

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BOC Coolant Temp

Alarm Type	BOC
Alarmlist message	BOC Coolant Temp
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Breaker Open and Stop alarm for Coolant Temp user protection.

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: › **Generator Current Unbalance (page 374)** adjusts the maximum allowed difference between the highest and lowest phase current at any given time. › **Generator Current Unbalance Delay (page 375)** adjusts the alarm delay.

back to List of alarms level 2

Sd CAN 2 Units Missing

Alarm Type	Sd
Alarmlist message	Sd CAN 2 Units Missing
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is activated when actual number of unit on CAN2 is lower than value adjusted in setpoint **#Number Of Controllers On CAN (page 460)**, **#Number Of Units On CAN2 Check (page 328)** is Enabled and **#CAN2 Units Missing Protection (page 328)** is adjusted to Shutdown.

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Sd Current Unbalance

Alarm Type	SD
Alarmlist message	Current Unbalance
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued to indicate if **Generator Current Unbalance (page 374)** timer elapses.

back to List of alarms level 2

Sd Earth Fault Current

Alarm Type	SD
Alarmlist message	Sd Earth Fault Current
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that the value of earth fault current is higher than adjusted limit. The following setpoints are related to it: › **IDMT Earth Fault Current Sd (page 627)** adjusts the maximum allowed earth fault current. › **IDMT Earth Fault Current Delay (page 626)** adjusts the alarm delay.

back to List of alarms level 2

Sd ECU 1 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 1Communication Fail
Alarm evaluated	With configured LBO **ECU POWER RELAY (PAGE 782)** – only when this LBO is active Without configured LBO **ECU POWER RELAY (PAGE 782)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU 1 is configured, but the communication with the ECU 1 is not established or has dropped out.

back to List of alarms level 2

Sd ECU 2 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 2 Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 782)** – only when this LBO is active Without configured LBO **ECU Power Relay (page 782)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU 2 is configured, but the communication with the ECU 2 is not established or has dropped out.

back to List of alarms level 2

Sd ECU 2 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 2 Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 782)** – only when this LBO is active Without configured LBO **ECU Power Relay (page 782)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU 2 is configured, but the communication with the ECU 2 is not established or has dropped out.

back to List of alarms level 2

Sd ECU 3 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 3 Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 782)** – only when this LBO is active Without configured LBO **ECU Power Relay (page 782)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU 3 is configured, but the communication with the ECU 3 is not established or has dropped out.

back to List of alarms level 2

Sd ECU 4 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 4 Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 782)** – only when this LBO is active Without configured LBO **ECU Power Relay (page 782)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU 4 is configured, but the communication with the ECU 4 is not established or has dropped out.

back to List of alarms level 2

Sd ECU 5 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 5 Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 782)** – only when this LBO is active Without configured LBO **ECU Power Relay (page 782)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU 5 is configured, but the communication with the ECU 5 is not established or has dropped out.

back to List of alarms level 2

Sd ECU 6 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 6 Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 782)** – only when this LBO is active Without configured LBO **ECU Power Relay (page 782)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU 6 is configured, but the communication with the ECU 6 is not established or has dropped out.

back to List of alarms level 2

Sd ECU 7 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 7 Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 782)** – only when this LBO is active Without configured LBO **ECU Power Relay (page 782)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU 7 is configured, but the communication with the ECU 7 is not established or has dropped out.

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Sd ECU 8 Communication Fail

Alarm Type	Shutdown
Alarmlist message	Sd ECU 8 Communication Fail
Alarm evaluated	With configured LBO **ECU Power Relay (page 782)** – only when this LBO is active Without configured LBO **ECU Power Relay (page 782)** – all the time
Related applications	MINT, SPtM
Description	This alarm occurs when an ECU 8 is configured, but the communication with the ECU 8 is not established or has dropped out.

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Sd EM(A) - a message lost

Alarm Type	SD
Alarmlist message	EM(A) - a message lost
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

back to List of alarms level 2

Sd EM(B) - a message lost

Alarm Type	SD
Alarmlist message	EM(B) - a message lost
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

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Sd EM(A) - configuration mistake

Alarm Type	SD
Alarmlist message	EM(A) - configuration mistake
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with configuration of binary input or output of module in slot.

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Sd EM(B) - configuration mistake

Alarm Type	SD
Alarmlist message	EM(B) - configuration mistake
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with configuration of binary input or output of module in slot.

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Sd EM(A) - insufficient

Alarm Type	SD
Alarmlist message	EM(A) - insufficient
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that module does not support all required features.

back to List of alarms level 2

Sd EM(B) - insufficient

Alarm Type	SD
Alarmlist message	EM(B) - insufficient
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that module does not support all required features.

back to List of alarms level 2

Sd EM(A) - missing or damaged

Alarm Type	SD
Alarmlist message	EM(A) - missing or damaged
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication with module in slot (in first 5 second there was no communication and module is configured in slot).

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Sd EM(B) - missing or damaged

Alarm Type	SD
Alarmlist message	EM(B) - missing or damaged
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication with module in slot (if first 5 second there was no communication and module is configured in slot).

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Sd Emergency Stop

Alarm Type	SD
Alarmlist message	Sd Emergency Stop
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Alarm is activated when binary input **EMERGENCY STOP (PAGE 725)** is activated. The Gen-set shuts down in the moment the input is activated and starting is blocked until the input is deactivated and fault reset is pressed. ***Note:*** *Use red emergency button placed on the switchboard door and connect it to a binary input of the controller. Then configure the function Emergency Stop to this binary input. It is recommended to use NC contact of the button.* ***Note:*** *The MCB control is not affected by this alarm.*

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BOC Excitation Loss

Alarm Type	BOC
Alarmlist message	BOC Excitation Loss
Alarm evaluated	Gen-set is running
Related applications	MINT, SPtM
Description	The alarm is issued when the level of reactive power (-kVAr) gets under limit given by setpoint **Excitation Loss Level (page 381)** for time longer then the value of setpoint **Excitation Loss Delay (page 382)**.

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BOC Fence 1 Alarm

Alarm Type	BOC
Alarmlist message	BOC Fence 1 Alarm
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 553)** › **Fence 1 Protection (page 555)** › **Fence 1 Radius (page 556)**

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Sd Fence 1 Alarm

Alarm Type	Shutdown
Alarmlist message	Sd Fence 1 Alarm
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 553)** › **Fence 1 Protection (page 555)** › **Fence 1 Radius (page 556)**

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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: › **Geo-Fencing (page 553)**

	› **Fence 1 Protection (page 555)** › **Fence 1 Radius (page 556)**

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Sd Fence 2 Alarm

Alarm Type	Shutdown
Alarmlist message	Sd Fence 2 Alarm
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the GPS position of Gen-set. The following setpoint are related to it: › **Geo-Fencing (page 553)** › **Fence 1 Protection (page 555)** › **Fence 1 Radius (page 556)**

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BOC Fuel Level

Alarm Type	BOC
Alarmlist message	BOC Fuel Level
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Breaker Open and Stop alarm for Fuel Level user protection.

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Stp GCB Fail

Alarm Type	Stp
Alarmlist message	Stp GCB Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm will occur when the **GCB Feedback (page 735)** input does not match the expected position given by the **GCB Close/Open (page 788)** output. It stays active until the mismatch between the output and feedback persists. › If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately. › The alarm will be also issued if the breaker does not respond to an open or close command within 5 seconds.

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Sd GCB Fail To Close

Alarm Type	SD
Alarmlist message	Sd GCB Fail To Close
Alarm evaluated	All the time

Related applications	MINT, SPtM
Description	

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Sd GCB Fail To Open

Alarm Type	SD
Alarmlist message	Sd GCB Fail To Open
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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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: › **Generator V Unbalance (page 378)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Generator V Unbalance Delay (page 378)** adjusts the alarm delay.

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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: › **Generator V Unbalance (page 378)** adjusts the maximum allowed difference between the highest and lowest phase voltage at any given time. › **Generator V Unbalance Delay (page 378)** adjusts the alarm delay.

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Sd Generator L1 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L1 > Voltage

Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 1. The following setpoints are related to it: › **Generator Overvoltage Sd (page 376)** › **Generator <> Voltage Delay (page 378)**

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Sd Generator L2 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 2. The following setpoints are related to it: › **Generator Overvoltage Sd (page 376)** › **Generator <> Voltage Delay (page 378)**

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Sd Generator L3 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phase 3. The following setpoints are related to it: › **Generator Overvoltage Sd (page 376)** › **Generator <> Voltage Delay (page 378)**

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Sd Generator L1L2 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L1L2 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: › **Generator Overvoltage Sd (page 376)** › **Generator <> Voltage Delay (page 378)**

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Sd Generator L2L3 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L2L3 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: › **Generator Overvoltage Sd (page 376)** › **Generator <> Voltage Delay (page 378)**

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Sd Generator L3L1 Overvoltage

Alarm Type	SD
Alarmlist message	Sd Generator L3L1 > Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: › **Generator Overvoltage Sd (page 376)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L1 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phases 1. The following setpoints are related to it: › **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L2 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phases 2. The following setpoints are related to it: › **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L3 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase voltage in phases 3. The following setpoints are related to it: › **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L1L2 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L1L2 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 1 and 2. The following setpoints are related to it: › **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L2L3 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L2L3 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 2 and 3. The following setpoints are related to it: › **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L3L1 Undervoltage

Alarm Type	BOC
Alarmlist message	Sd Generator L3L1 < Voltage
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm evaluates the generator phase to phase voltage between phases 3 and 1. The following setpoints are related to it: › **Generator Undervoltage BOC (page 377)**

	› **Generator <> Voltage Delay (page 378)**

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BOC Generator L1 Undervoltage

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: › **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L2 Undervoltage

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: › **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L3 Undervoltage

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: › **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L1L2 Undervoltage

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:

	› **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L2L3 Undervoltage

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: › **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator L3L1 Undervoltage

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: › **Generator Undervoltage BOC (page 377)** › **Generator <> Voltage Delay (page 378)**

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BOC Generator Overfrequency

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: › **Generator Overfrequency BOC (page 379)** › **Generator <> Frequency Delay (page 380)**

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BOC Generator Underfrequency

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: › **Generator Underfrequency BOC (page 380)** › **Generator <> Voltage Delay (page 378)**

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Sd Charging Alternator Fail

Alarm Type	SD
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%**D+ Threshold (page 348)** of the controller supply voltage. This alarm works similar to the red “battery” alarm indicator on a vehicle dashboard. The setpoint has to be in Charge Fail or Enabled position to enable this alarm.

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Sd IDMT Earth Fault Current

Alarm Type	SD
Alarmlist message	Sd IDMT Earth Fault Current
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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MP Mains/Bus L1 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: › **Mains Overvoltage (page 394)** › **Mains Overvoltage Delay (page 395)**

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MP Mains/Bus L1 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it:

	› **Mains Undervoltage (page 397)** › **Mains Undervoltage Delay (page 397)**

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MP Mains/Bus L1L2 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases L1 and L2. The following setpoints are related to it: › **Mains Overvoltage (page 394)** › **Mains Overvoltage Delay (page 395)**

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MP Mains/Bus L1L2 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases L1 and L2. The following setpoints are related to it: › **Mains Undervoltage (page 397)** › **Mains Undervoltage Delay (page 397)**

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MP Mains/Bus L2 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: › **Mains Overvoltage (page 394)** › **Mains Overvoltage Delay (page 395)**

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MP Mains/Bus L2 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM

Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: › **Mains Undervoltage (page 397)** › **Mains Undervoltage Delay (page 397)**

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MP Mains/Bus L2L3 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases L2 and L3. The following setpoints are related to it: › **Mains Overvoltage (page 394)** › **Mains Overvoltage Delay (page 395)**

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MP Mains/Bus L2L3 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases L2 and L3. The following setpoints are related to it: › **Mains Undervoltage (page 397)** › **Mains Undervoltage Delay (page 397)**

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MP Mains/Bus L3 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: › **Mains Overvoltage (page 394)** › **Mains Overvoltage Delay (page 395)**

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MP Mains/Bus L3 Overvoltage

Alarm Type	MP
Alarmlist message	No

Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases. The following setpoints are related to it: › **Mains Undervoltage (page 397)** › **Mains Undervoltage Delay (page 397)**

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MP Mains/Bus L3L1 Overvoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases L3 and L1. The following setpoints are related to it: › **Mains Overvoltage (page 394)** › **Mains Overvoltage Delay (page 395)**

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MP Mains/Bus L3L1 Undervoltage

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases L3 and L1. The following setpoints are related to it: › **Mains Undervoltage (page 397)** › **Mains Undervoltage Delay (page 397)**

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MP Mains/Bus Overfrequency

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases 1. The following setpoints are related to it: › **Mains Overfrequency (page 399)** › **Mains < > Frequency Delay (page 403)**

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MP Mains/Bus Underfrequency

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus phase voltage in phases 1. The following setpoints are related to it: › **Mains Underfrequency (page 401)** › **Mains < > Frequency Delay (page 403)**

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MP Mains/Bus Volt Unbal Ph-N

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus voltage unbalance in phase Ph-N. The following setpoints are related to it: › **Mains Voltage Unbalance (page 399)** › **Mains Voltage Unbalance (page 399)**

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MP Mains/Bus Volt Unbal Ph-N

Alarm Type	MP
Alarmlist message	No
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm evaluates the Mains/Bus voltage unbalance in phase Ph-Ph. The following setpoints are related to it: › **Mains Voltage Unbalance (page 399)** › **Mains Voltage Unbalance (page 399)**

back to List of alarms level 1

Stp Maintenance Timer 1 Interval

Alarm Type	Stp
Alarmlist message	Stp Maintenance Timer 1 Interval
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 1 RunHours (page 669)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 Interval (page 365)** (unit is in months-m) and it counts down in days based on actual date (No matter

	if engine is running or not). Setpoint **Maintenance Timer 1 Protection (page 366)** has to be set to: Warning

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Stp Maintenance Timer 1 RunHours

Alarm Type	Stp
Alarmlist message	Stp Maintenance Timer 1 RunHours
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 1 RunHours (page 669)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 1 RunHours (page 365)** (unit is hours-h) and it counts down while engine is running. Setpoint **Maintenance Timer 1 Protection (page 366)** has to be set to: BOC

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Stp Maintenance Timer 2 Interval

Alarm Type	Stp
Alarmlist message	Stp Maintenance Timer 2 Interval
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 2 RunHours (page 669)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 2 Interval (page 367)** (unit is in months-m) and it counts down in days based on actual date (No matter if engine is running or not). Setpoint **Maintenance Timer 2 Protection (page 367)** has to be set to: Warning

back to List of alarms level 2

Stp Maintenance Timer 2 RunHours

Alarm Type	Stp
Alarmlist message	Stp Maintenance Timer 2 RunHours
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 2 RunHours (page 669)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 2 RunHours (page 366)** (unit is hours-h) and it counts down while engine is running. Setpoint **Maintenance Timer 2 Protection (page 367)** has to be set to: BOC

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Stp Maintenance Timer 3 Interval

Alarm Type	Stp
Alarmlist message	Stp Maintenance Timer 3 Interval

Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 3 RunHours (page 670)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 3 Interval (page 368)** (unit is in months-m) and it counts down in days based on actual date (No matter if engine is running or not). Setpoint **Maintenance Timer 3 Protection (page 369)** has to be set to: Warning

back to List of alarms level 2

Stp Maintenance Timer 3 RunHours

Alarm Type	Stp
Alarmlist message	Stp Maintenance Timer 3 RunHours
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value **Maintenance Timer 3 RunHours (page 670)** reaches 0. The value is adjustable by setpoint **Maintenance Timer 3 RunHours (page 368)** (unit is hours-h) and it counts down while engine is running. Setpoint **Maintenance Timer 3 Protection (page 369)** has to be set to: BOC

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Stp Maintenance Timer 4 Interval

Alarm Type	Stp
Alarmlist message	Stp Maintenance Timer 4 Interval
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value Maintenance Timer 4 Interval reaches 0. The value is adjustable by setpoint **Maintenance Timer 4 Interval (page 370)** (unit is in months-m) and it counts down in days based on actual date (No matter if engine is running or not). Setpoint **Maintenance Timer 4 Protection (page 370)** has to be set to: Warning

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Stp Maintenance Timer 4 RunHours

Alarm Type	Stp
Alarmlist message	Stp Maintenance Timer 4 RunHours
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	The alarm is active when the value Maintenance Timer 4 RunHours reaches 0. The value is adjustable by setpoint **Maintenance Timer 4 RunHours (page 369)** (unit is hours-h) and it counts down while engine is running. Setpoint **Maintenance Timer 4 Protection (page 370)** has to be set to: BOC

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Sd Module(slotA) - false module

Alarm Type	SD
Alarmlist message	Module(slotA) - fake module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that false module is inserted in slot.

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Sd Module(slotA) - comm. outage

Alarm Type	SD
Alarmlist message	Module(slotA) - comm. outage
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

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Sd Module(slotA) - unattended

Alarm Type	SD
Alarmlist message	Module(slotA) - unattended
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

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Sd Module(slotA) - unexpected

Alarm Type	SD
Alarmlist message	Module(slotA) - unexpected
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

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Sd Module(slotA) - unknown module

Alarm Type	SD
Alarmlist message	Module(slotA) - unknown module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that unknown module is inserted in slot.

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Sd Module(slotB) - comm. outage

Alarm Type	SD
Alarmlist message	Module(slotB) - comm. outage
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that there is a problem with communication between controller and module in slot.

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Sd Module(slotB) - false module

Alarm Type	SD
Alarmlist message	Module(slotB) - fake module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that false module is inserted in slot.

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Sd Module(slotB) - unattended

Alarm Type	SD
Alarmlist message	Module(slotB) - unattended
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that two same communication modules are inserted in slots and one of them will be inactive.

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Sd Module(slotB) - unexpected

Alarm Type	SD
Alarmlist message	Module(slotB) - unexpected
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that in slot is inserted different module than which is configured or the module is unconfigured and has to be configured for proper function.

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Sd Module(slotB) - unknown module

Alarm Type	SD
Alarmlist message	Module(slotB) - unknown module
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm indicates that unknown module is inserted in slot.

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Sd Module: Slot 1

Alarm Type	SD
Alarmlist message	Module: Slot 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 1.

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Sd Module: Slot 2

Alarm Type	SD
Alarmlist message	Module: Slot 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 2.

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Sd Module: Slot 3

Alarm Type	SD
Alarmlist message	Module: Slot 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 3.

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Sd Module: Slot 4

Alarm Type	SD
Alarmlist message	Module: Slot 4
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 4.

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Sd Module: Slot 5

Alarm Type	SD
Alarmlist message	Module: Slot 5
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if controller will not be able to communicate with preconfigured module 5.

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BOC NCB fail

Alarm Type	BOC
Alarmlist message	BOC NCB fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued when the **NCB Feedback (page 744)** input does not match the expected position given by the **NCB Close/Open (page 809)** output. It stays active until the mismatch between the output and feedback persists. › If there was no command issued by the controller and the breaker (feedback) changes suddenly the position itself, the alarm will be issued immediately. › The alarm will be also issued if the breaker does not respond to an open or close command within 5 seconds.

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Sd Oil Pressure

Alarm Type	BOCSD
Alarmlist message	Sd Oil Pressure
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Shutdown alarm for Oil Pressure user protection.

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BOC Overcurrent IDMT

Alarm Type	BOC
Alarmlist message	Sd + Name of binary input
Alarm evaluated	Generator excited only
Related applications	MINT, SPtM
Description	This alarm is issued if IDMT protection is activated due to over-crossing the IDMT curve set by setpoints **IDMT Generator >A Delay (page 373)**. The behaviour of the overcurrent alarm is adjusted by the following setpoints: › **IDMT Generator >A Delay (page 373)** defines the reaction time of the protection when the current is twice the amount of nominal value. › **Nominal Current (page 312)** set the nominal current level, where the

	alarm starts to be evaluated. The reaction time is infinite at this point.

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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: › **Overload BOC (page 371)** adjusts the overload limit. › **Overload Delay (page 372)** adjusts the delay

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Sd Overspeed

Alarm Type	SD
Alarmlist message	Sd Overspeed
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm occurs immediately when the engine speed has exceeded the limit. The behavior of the overspeed alarm is adjusted by the following setpoints: › **Overspeed Sd (page 349)** adjust the overspeed limit

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Sd Parallel Work

Alarm Type	Shutdown
Alarmlist message	Sd Parallel Work
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is active when GCB is closed externally while MCB is closed.

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BOC Rental Timer 1 Exceeded

Alarm Type	BOC
Alarmlist message	BOC Rental Timer 1 Exceeded
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if Rental Timer 1 BOC will timer elapse.

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BOC Rental Timer 2 Exceeded

Alarm Type	BOC

Alarmlist message	BOC Rental Timer 2 Exceeded
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if Rental Timer 2 BOC will timer elapse.

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Stp Request under MinPowerPTM

Alarm Type	ProtSTP
Alarmlist message	Stp Request under MinPowerPTM
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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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 381)** for time longer than the value of setpoint **Reverse Power Delay (page 381)**.

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Sd RPM Measurement Fail

Alarm Type	SD
Alarmlist message	Sd RPM Measurement Fail
Alarm evaluated	During cranking
Related applications	MINT, SPtM
Description	The alarm is issued if the engine speed has not exceeded the **Starting RPM (page 334)** within the **Maximum Cranking Time (page 333)**, although some of additional running engine indication sources indicate that the engine has started.

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Sd SHAIN 1

Alarm Type	SD
Alarmlist message	Sd SHAIN 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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Sd SHAIN 2

Alarm Type	SD
Alarmlist message	Sd SHAIN 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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Sd SHAIN 3

Alarm Type	SD
Alarmlist message	Sd SHAIN 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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Sd SHAIN 4

Alarm Type	SD
Alarmlist message	Sd SHAIN 4
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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Sd SHBIN 1

Alarm Type	SD
Alarmlist message	Sd SHBIN 1
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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Sd SHBIN 2

Alarm Type	SD
Alarmlist message	Sd SHBIN 2
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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Sd SHBIN 3

Alarm Type	SD

Alarmlist message	Sd SHBIN 3
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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Sd SHBIN 4

Alarm Type	SD
Alarmlist message	Sd SHBIN 4
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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Sd SHBIN 5

Alarm Type	SD
Alarmlist message	Sd SHBIN 5
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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Sd SHBIN 6

Alarm Type	SD
Alarmlist message	Sd SHBIN 6
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

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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: › **Short Circuit (page 373)** adjusts the short current limit › **Short Circuit Delay (page 373)** adjusts the delay in fine steps

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Sd Start Fail

Alarm Type	SD
Alarmlist message	Sd Start Fail
Alarm evaluated	When the gen-set is being started
Related applications	MINT, SPtM
Description	This alarm will be issued after all attempts to start the gen-set have run out but the Gen-set did not start. The following setpoints are related to this alarm: › **Cranking Attempts (page 332)** adjust the number of attempts

back to List of alarms level 2

Stp GCB Fail To Close

Alarm Type	ProtSTP
Alarmlist message	Stp GCB Fail To Close
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Alarm is issued after 2 (5 if synchro is not used) seconds when LBO **GCB CLOSE/OPEN (PAGE 788)** closed and LBI **GCB FEEDBACK (PAGE 735)** did not close for the second try.

back to List of alarms level 2

Stp GCB Fail To Open

Alarm Type	ProtSTP
Alarmlist message	Stp GCB Fail To Open
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	Alarm is issued after 2 (5 if synchro is not used) seconds when LBO **GCB CLOSE/OPEN (PAGE 788)** opened and LBI **GCB FEEDBACK (PAGE 735)** did not open.

back to List of alarms level 2

Stp GCB Fail

Alarm Type	ProtSTP
Alarmlist message	Stp GCB Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is immediately activated when there is an unexpected change of GCB state. That means LBI **GCB FEEDBACK (PAGE 735)** changes without request from LBO **GCB CLOSE/OPEN (PAGE 788)** while Setpoint **GCB Control Mode (page 308)** is set to Internal or Follow. Or it is activated after 500 ms when there is a mismatch between LBI **GCB FEEDBACK (PAGE 735)** and LBI **GCB FEEDBACK NEGATIVE* (PAGE 736)**.

back to List of alarms level 2

Stp Request under MinPowerPTM

Alarm Type	ProtSTP
Alarmlist message	Stp Request under MinPowerPTM
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	

back to List of alarms level 2

Stp Synchronisation Fail

Alarm Type	ProtSTP
Alarmlist message	Stp Synchronisation Fail
Alarm evaluated	All the time
Related applications	MINT, SPtM
Description	This alarm is issued if the synchronization timeout gets elapsed (forward synchronization).

back to List of alarms level 2

Sd Total Emergency Stop

Alarm Type	SD
Alarmlist message	Sd Total Emergency 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 Underspeed

Alarm Type	SD
Alarmlist message	Sd Underspeed
Alarm evaluated	Engine running only
Related applications	MINT, SPtM
Description	This alarm will be issued when the Gen-set is running and then stops by itself, i.e. the RPM drops under the value of setpoint **Underspeed Sd (page 349)**. 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

8.3 AVR interfaces

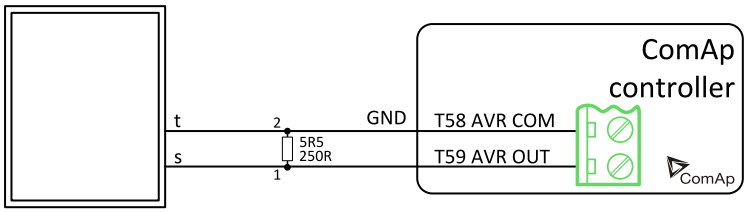
It is possible to connect various AVRis to the controllers.

> **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!**

> **IMPORTANT: The actual number of Terminals may vary. To be sure, see Terminal Diagram on page 32.**

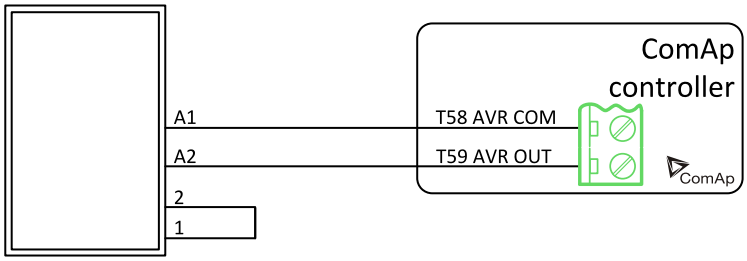
8.3.1 AVR interfaces alphabetically

AVK Newage Cosimat N+



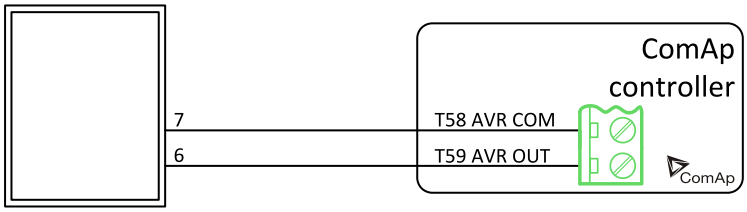
Voltage/PF Control:
Voltage Regulator Character = NEGATIVE
Voltage Regulator Bias = 0,50 V
Voltage Regulator Low Limit = 0,00 V
Voltage Regulator High Limit = 2,00 V

AVK Newage MA330, 327, 321, 341



Voltage/PF 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

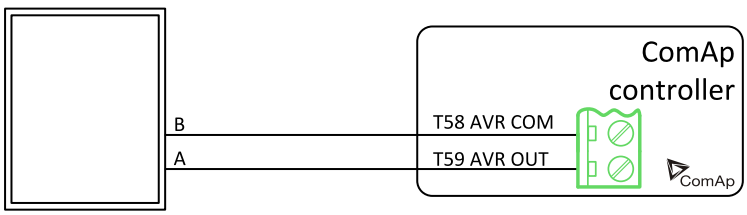
Basler: APR 63-5, AEC 63-7, KR-FX, KR-FFX



AVR output is connected instead of external resistor for voltage adjusting.

Voltage/PF 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

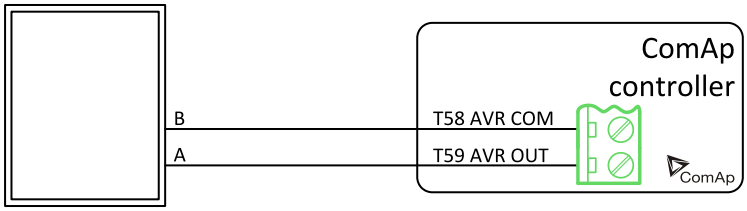
Basler: DECS 100



AVR output is connected instead of external resistor for voltage adjusting.

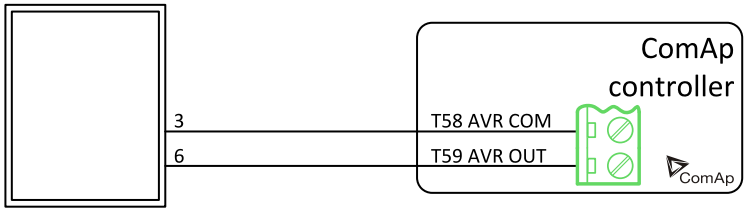
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,00 V
Voltage Regulator Low Limit = -2,00 V
Voltage Regulator High Limit = 2,00 V

Basler: DECS 200



Voltage/PF 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

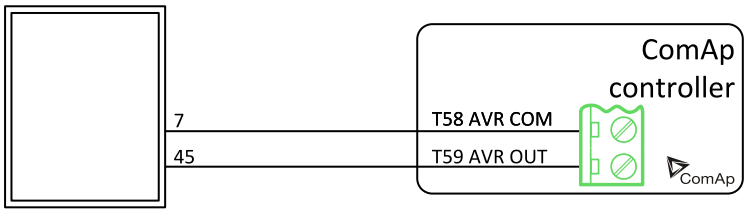
Catterpillar CDVR



Pin 44 on DVR – PF regulation directly from DVR is not connected.

Voltage/PF 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

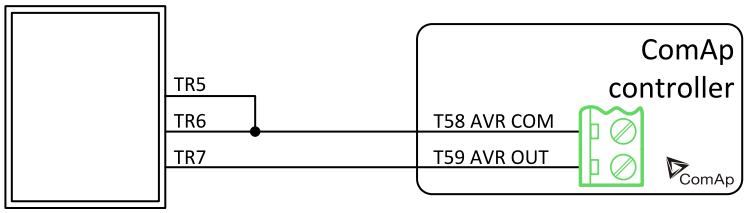
Catterpillar DVR



Pin 44 on DVR – PF regulation directly from DVR is not connected.

Voltage/PF 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

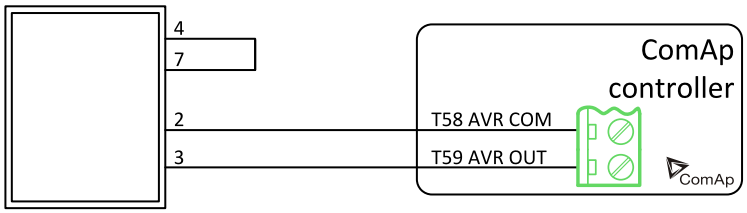
Catterpillar VR6, VR3F



For VR3F link 4-7 has to be removed.

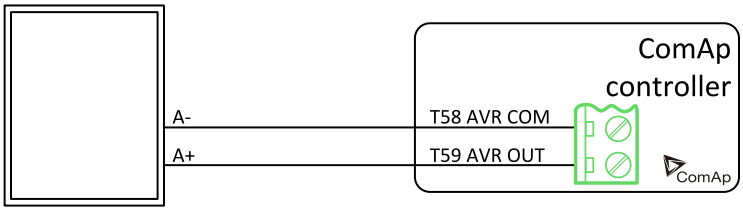
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 1,00 V
Voltage Regulator Low Limit = 0,00 V
Voltage Regulator High Limit = 2,00 V

Catterpillar VR6-B



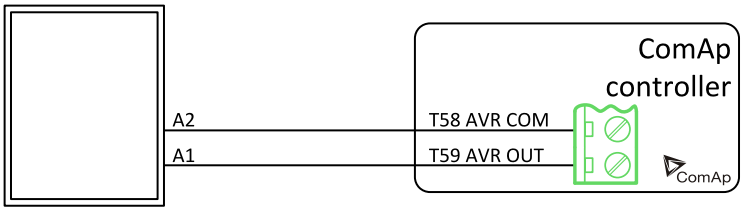
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,00 V
Voltage Regulator Low Limit = -2,00 V
Voltage Regulator High Limit = 2,00 V

ENGGA WT- 2



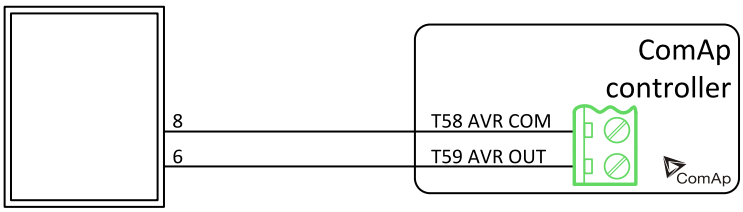
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,00 V
Voltage Regulator Low Limit = -2,00 V
Voltage Regulator High Limit = 2,00 V

ENGGA WT- 3



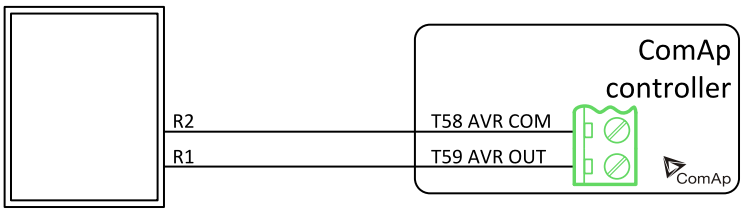
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,00 V
Voltage Regulator Low Limit = -2,00 V
Voltage Regulator High Limit = 2,00 V

KATO KCR 360



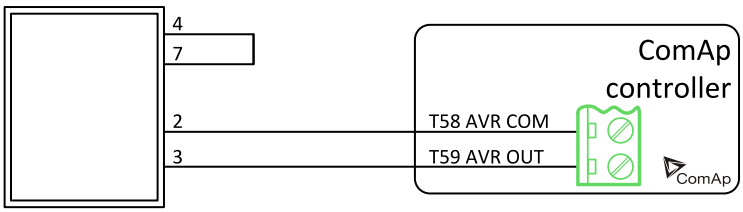
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,00 V
Voltage Regulator Low Limit = -2,00 V
Voltage Regulator High Limit = 2,00 V

KATO KCR 760



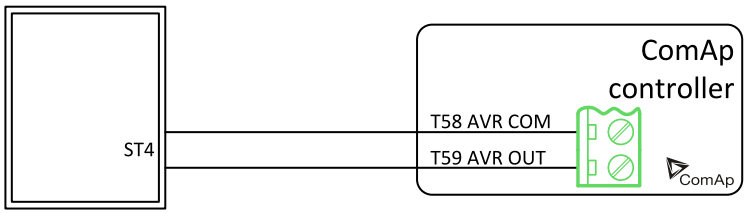
Voltage Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = -0,20 V
Voltage Regulator Low Limit = -2,00 V
Voltage Regulator High Limit = 2,00 V

KATO KCR K-65-12B



Voltage/PF 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



AVR output is connected instead of Remote voltage trimmer 470 Ω to terminal ST4. Module R726 is not required.

Voltage/PF Control:

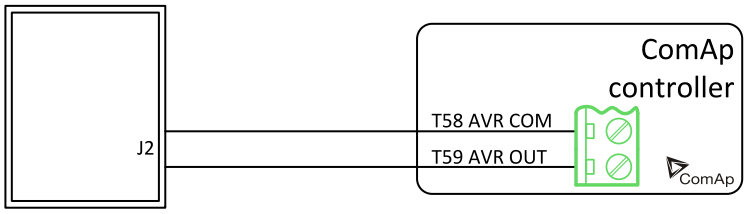
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 1,00 V

Voltage Regulator Low Limit = 0,00 V

Voltage Regulator High Limit = 2,00 V

Leroy Somer: R 129



AVR output is connected instead of Remote voltage trimmer 470 Ω to terminal J2. module R726 is not required.

Voltage/PF Control:

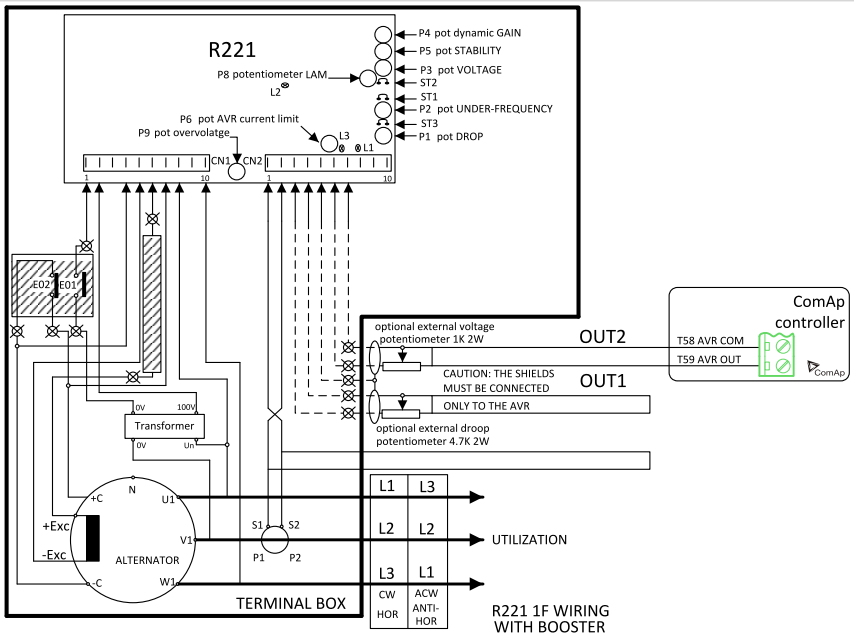
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 1,00 V

Voltage Regulator Low Limit = 0,00 V

Voltage Regulator High Limit = 2,00 V

Leroy Somer: R 221, R 222



Module R726 is not required. AVR trim to minimum counter clockwise +5%.

Voltage/PF Control:

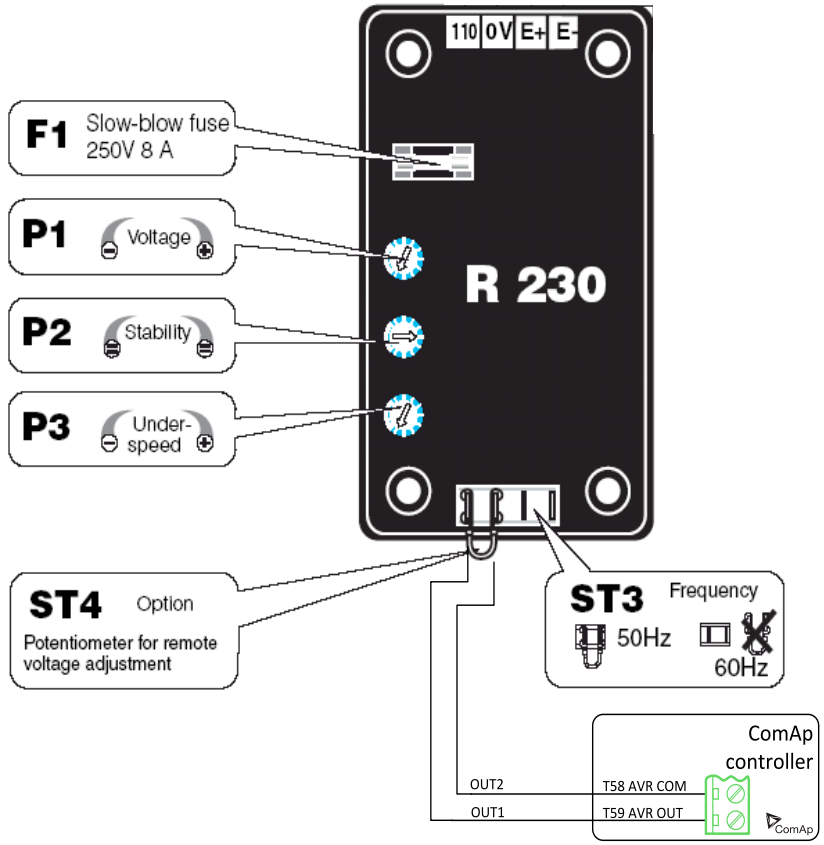
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = -1,00 V

Voltage Regulator Low Limit = -2,10 V

Voltage Regulator High Limit = 2,10 V

Leroy Somer: R 230



Module R726 is not required. AVR trim minimum counter clockwise.

Voltage/PF Control:

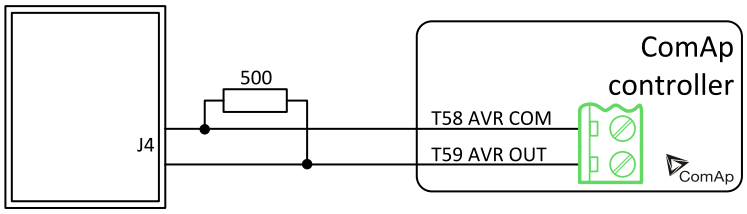
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0,00 V

Voltage Regulator Low Limit = -2,00 V

Voltage Regulator High Limit = 2,00 V

Leroy Somer: R 230



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 AVR potentiometer to get Range
- Set exact Value with Voltage Regulator Bias regulation (gain = 0)
- Stop gen-set and connect when equal Voltage and polarity is achieved
- Set again regulation loop on demand

Voltage Control:

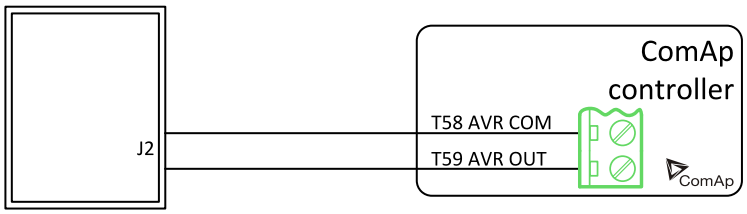
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0,00 V

Voltage Regulator Low Limit = -2,00 V

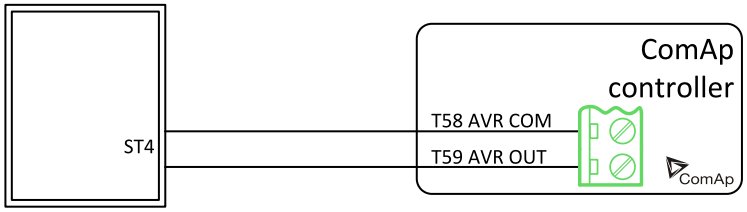
Voltage Regulator High Limit = 2,00 V

Leroy Somer: R 250



Voltage/PF 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

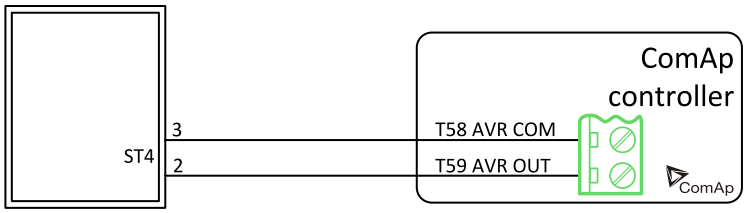
Leroy Somer: R 438 LS, R448



AVR output is connected (Specific.Remote Voltage trimmer 470 Ω to terminals) ST4.
(Specific Module R726 is not required.).

Voltage/PF 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

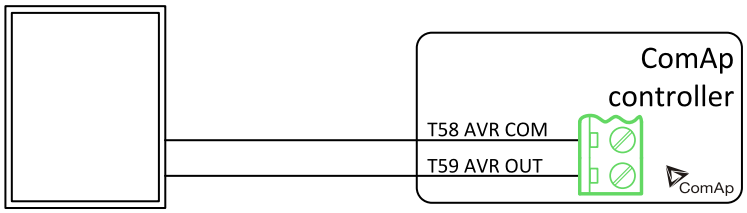
Leroy Somer: R 449



Module R726 is not required..

Voltage/PF 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

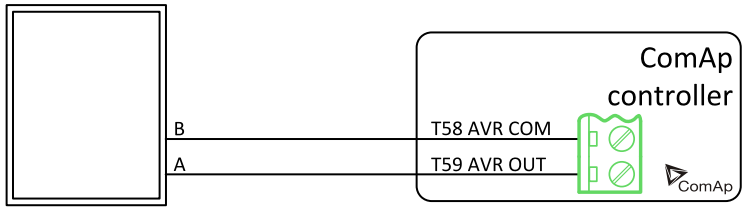
Leroy Somer: R 450



Use AVR instead pf potentiometer 1000 Ω. Read Leroy Somer R 450 manual before use.

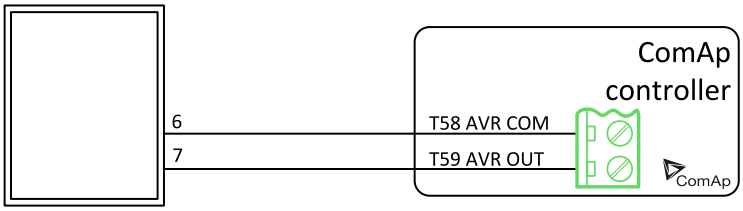
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 1,00 V
Voltage Regulator Low Limit = 0,00 V
Voltage Regulator High Limit = 2,00 V

Marathon DVR2000E



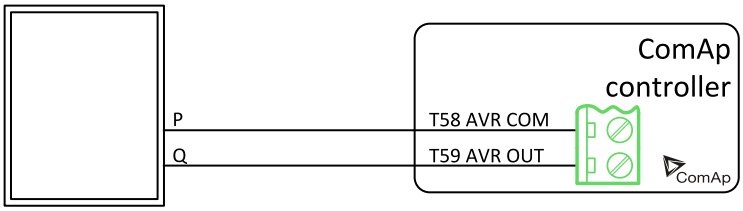
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,00 V
Voltage Regulator Low Limit = -5,00 V
Voltage Regulator High Limit = 5,00 V

Marathon PM100, 200



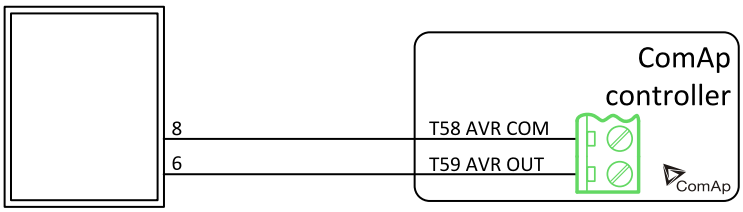
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,00 V
Voltage Regulator Low Limit = -2,00 V
Voltage Regulator High Limit = 2,00 V

MarelliGenerators MARK 5 (M16FA655A)



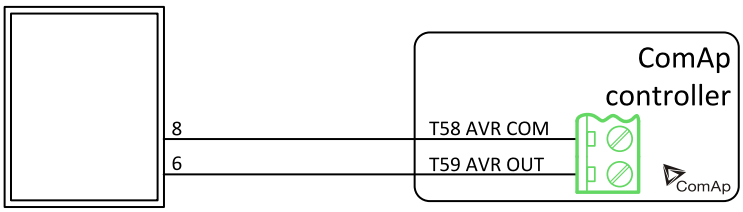
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,60 V
Voltage Regulator Low Limit = 0,00 V
Voltage Regulator High Limit = 4,00 V

MarelliMotori (M40FA610A)



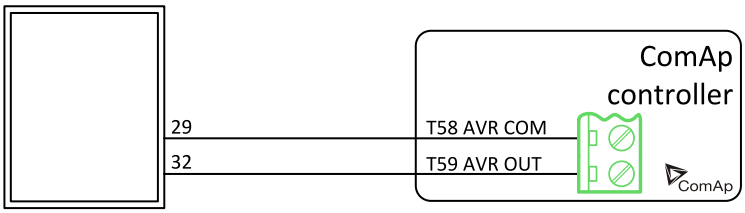
Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,00 V
Voltage Regulator Low Limit = -3,50 V
Voltage Regulator High Limit = 3,50 V

MarelliMotori Mark I (M40FA640A/A)



Voltage/PF Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,00 V
Voltage Regulator Low Limit = -3,50 V
Voltage Regulator High Limit = 3,50 V

Mecc Alte DER1

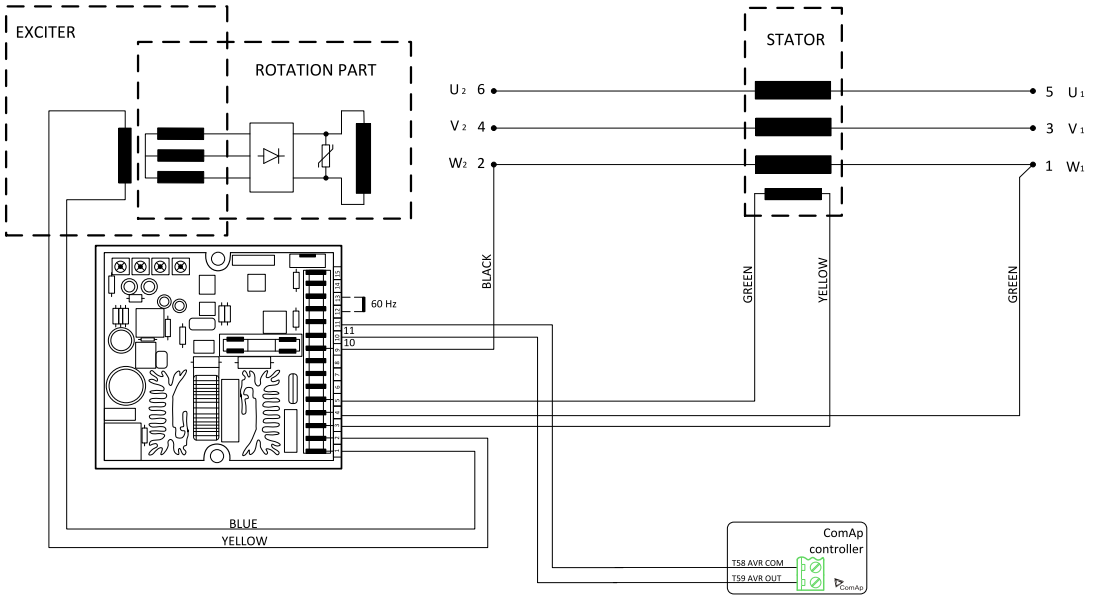


Remove jumpers connecting input 27 to 28 and input 31 to 32.

Note: *For values exceeding the limits of ±10 V the external input is automatically disabled.*

Voltage Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0.00 V
Voltage Regulator Low Limit = -10.00 V
Voltage Regulator High Limit = 10.00 V

Mecc Alte DSR



The Vext input (connector CN1 – terminals 10 and 11) permits analogical remote control of output voltage with a programmable variation range of up to ±10% (parameter 16, by default the setting is ±5%) with respect to the value set. If you want to use continuous voltage, it will be effective if it is in the range between 0 V and +2,5 V. The input tolerates voltages from –5 V to +5 V, but for values exceeding the limits of 0 V / +2,5 V (or in the event of disconnection) it is automatically disabled and the voltage adjustment goes back to the value set through the trimmer (if enabled) or through parameter 19 (as shown on the picture). Changing of DSR parameters requires PC with dedicated software and DI1-DSR unit! DSR automatically detects presence of transformer for parallel operation (if used it works with droop, if not used it works isochronous).

Voltage/PF Control:

Voltage Regulator Character = POSITIVE

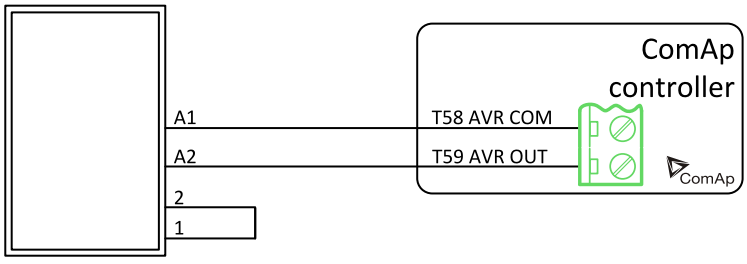
Voltage Regulator Bias = 1,25 V

Voltage Regulator Low Limit = 0,00 V

Voltage Regulator High Limit = 2,50 V

Note: *For values exceeding the limits of 0 V / +2,5 V, the external input is automatically disabled.*

Newer Leroy Somer



Regulation signal +/- 0...2,5 V

Voltage/PF Control:

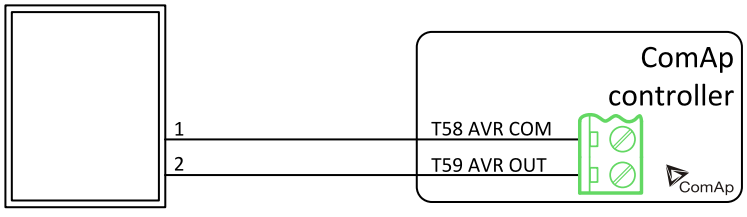
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = 0,00 V

Voltage Regulator Low Limit = -2,50 V

Voltage Regulator High Limit = 2,50 V

Piller



AVR output is connected instead Remote voltage trimmer 100 kΩ.

Voltage Control:

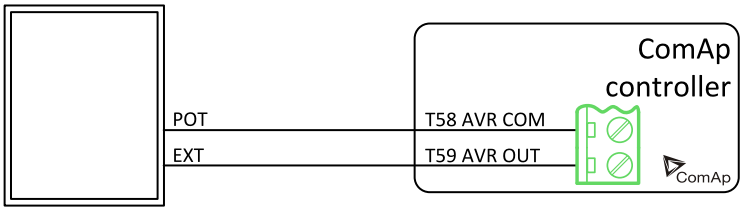
Voltage Regulator Character = POSITIVE

Voltage Regulator Bias = -0,44 V

Voltage Regulator Low Limit = -2,00 V

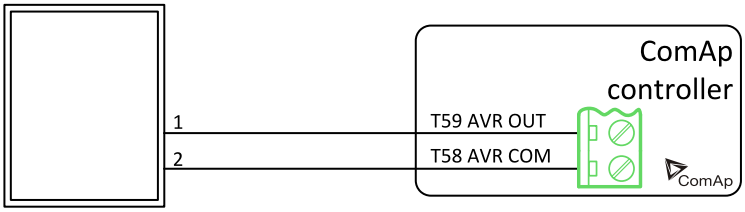
Voltage Regulator High Limit = 2,00 V

SINCRO AVR BL4 or AVR BL3



Voltage/PF 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

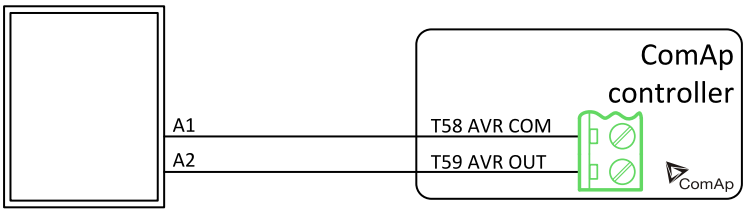
Stamford AS480



AVR output is connected instead of external resistor for voltage adjusting.

Voltage/PF 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

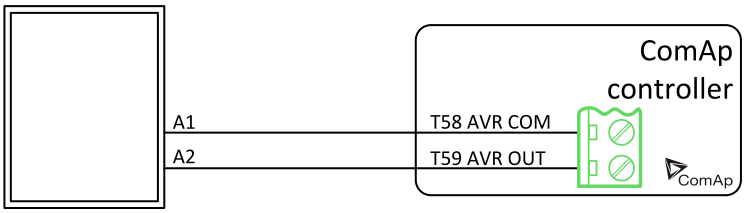
Stamfrod MX 341



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

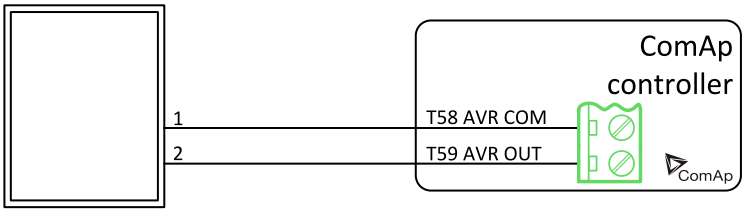
Stamford SX 440, AS 440, MX 321, SX 421



PFC3 module is not required.

Voltage/PF 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



AVR output is connected instead of external resistor for voltage adjusting.

Voltage Control:
Voltage Regulator Character = POSITIVE
Voltage Regulator Bias = 0,00 V
Voltage Regulator Low Limit = -2,00 V
Voltage Regulator High Limit = 2,00 V

back to Appendix

8.4 Speed governors interfaces

It is possible to connect various Speed governors to the controller.

> **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!**

> **IMPORTANT: The actual number of Terminals may vary. To be sure, see Terminal Diagram on page 32.**

8.4.1 Electronic engines interface

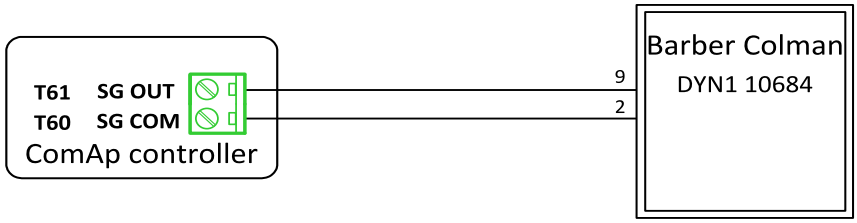
All below mentioned interface examples describe analog interface even if they are (in some cases) used for Electronic Control Units (electronic engines) with CAN data bus. There are several possibilities to connect CAN bus interface between Electronic engine and ComAp controller. Refer to ComAp Electronic 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:

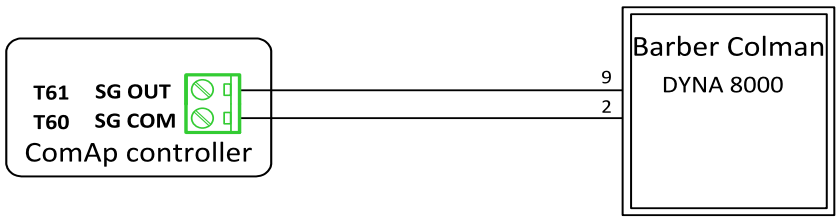
Speed Governor Bias = 6,00 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 4,00 V

Speed Governor High Limit = 8,00 V

Barber Colman DYNA 8000



Speed/Load control:

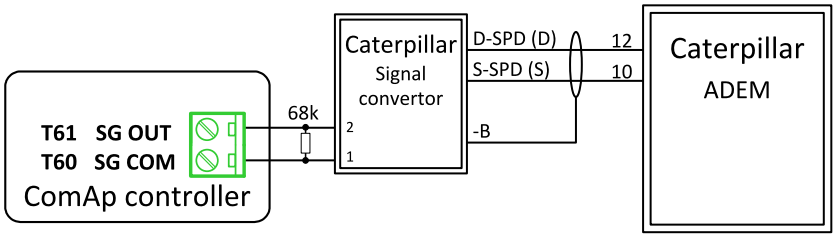
Speed Governor Bias = 6,00 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 4,00 V

Speed Governor Hi Limit = 8,00 V

Caterpillar ADEM + Signal convertor



Speed/Load control:

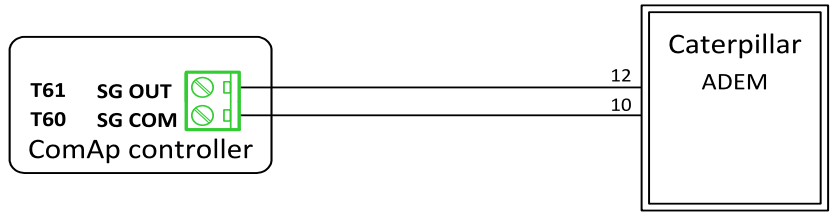
Speed Governor Bias = 5,10 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,00 V

Speed Governor High Limit = 10,00 V

Caterpillar ADEM



Speed/Load control:

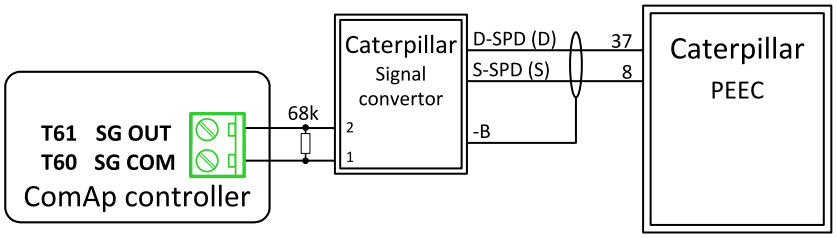
Speed Governor Bias = 5,10 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,00 V

Speed Governor High Limit = 10,00 V

Caterpillar PEEC + Signal convertor



Speed/Load control:

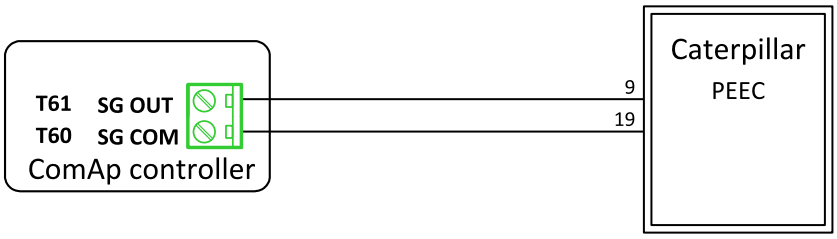
Speed Governor Bias = 5,10 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,00 V

Speed Governor High Limit = 10,00 V

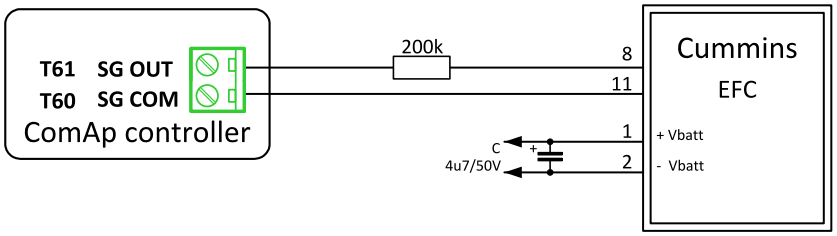
Caterpillar PEEC



Speed/Load control:

Speed Governor PWM rate = 500 Hz

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:

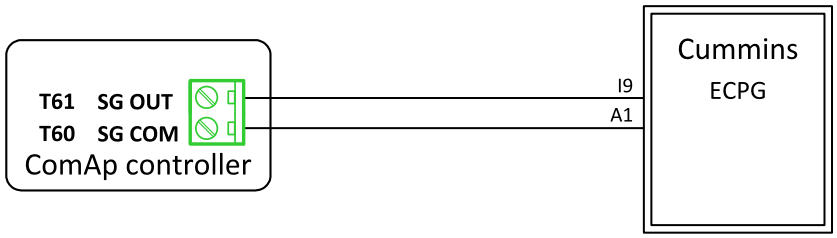
Speed Governor Bias = 6,40 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 5,00 V

Speed Governor High Limit = 7,80 V

Cummins ECPG

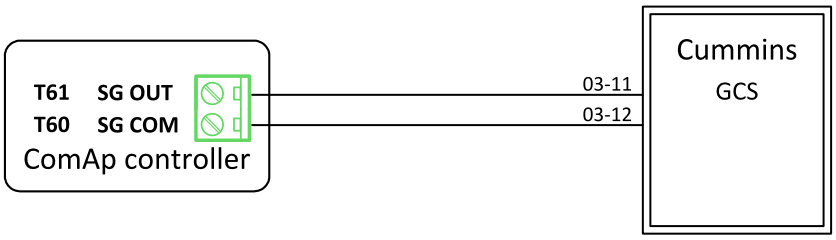


Speed/Load control:

Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Cummins GCS



Speed/Load ctrl:

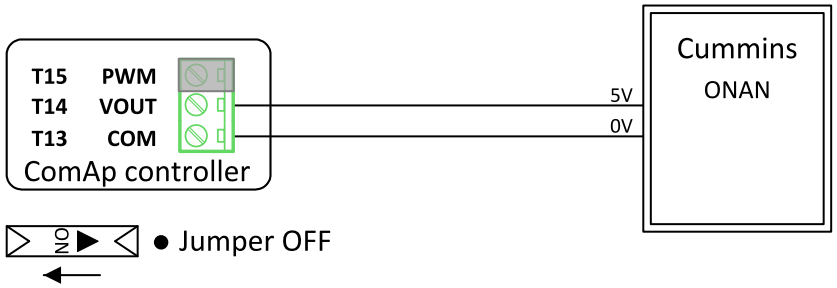
Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 2,50 V

Speed Governor High Limit = 7,50 V

Cummins ONAN



Speed/Load ctrl:

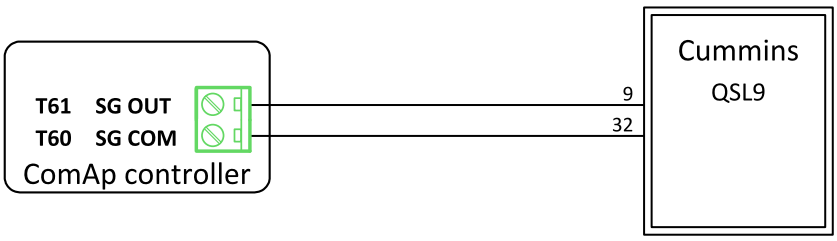
Speed Govovernor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0V

Speed Governor High Limit = 5 V

Cummins QSL9



Speed/Load ctrl:

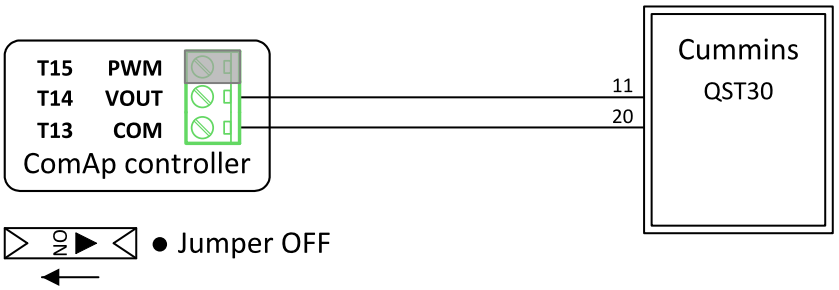
Speed Governor Bias = 3,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 2,50 V

Speed Governor High Limit = 5,00 V

Cummins QST30

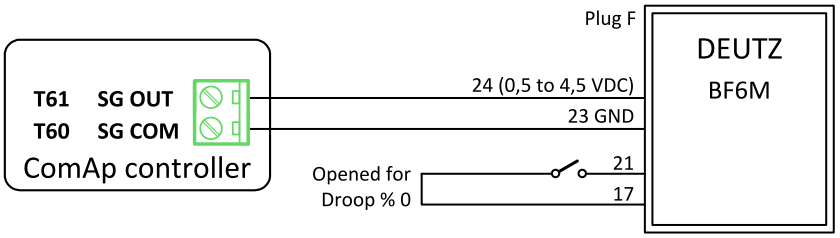


Speed/Load ctrl:

Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

DEUTZ BF6M



Speed/Load ctrl:

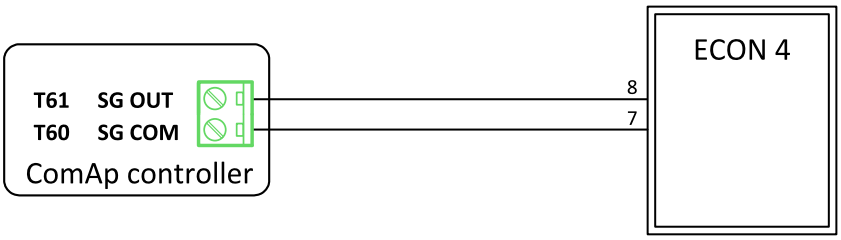
Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,50 V

Speed Governor High Limit = 4,50 V

ECON 4



Speed/Load ctrl:

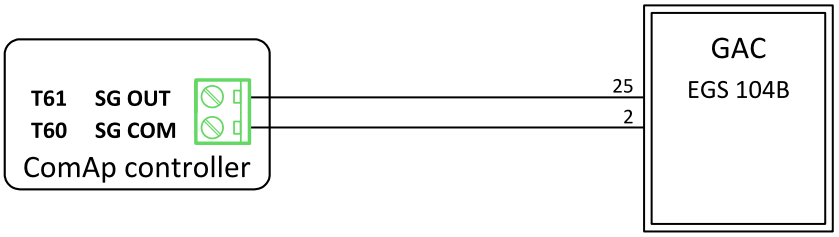
Speed Governor Bias = 5,10 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,0 V

Speed Governor High Limit = 10,00 V

GAC EGS 104B



Speed/Load ctrl:

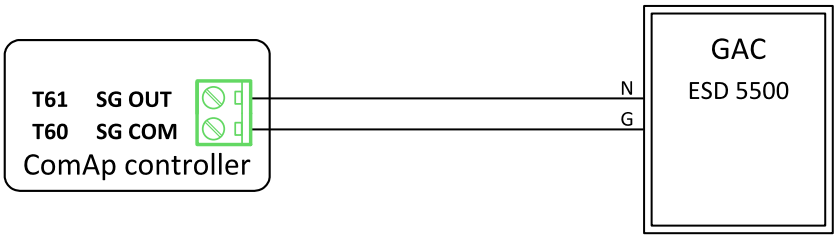
Speed Governor Bias = 5,00 V

Speed Regulator Character = NEGATIVE

Speed Governor Low Limit = 4,00 V

Speed Governor High Limit = 6,00 V

GAC ESD 5500



Speed/Load ctrl:

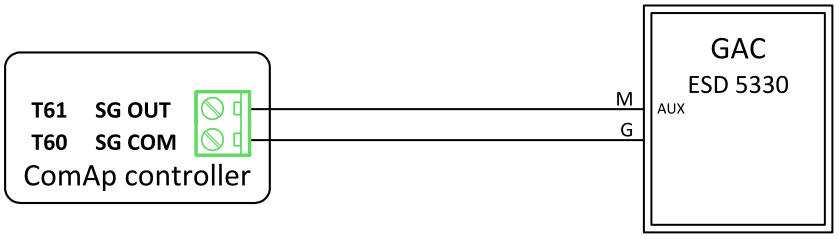
Speed Governor Bias = 5,00 V

Speed Regulator Character = NEGATIVE

Speed Governor Low Limit = 4,00 V

Speed Governor High Limit = 6,00 V

GAC ESD 5330

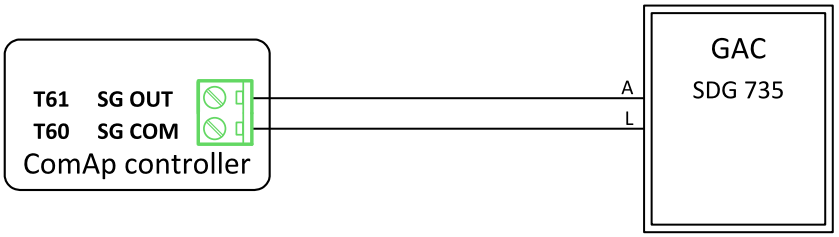


Speed/Load ctrl:

Speed Gov Bias = 5,00 V

Speed Regulator Character = NEGATIVE

GAC SDG 735



Speed/Load ctrl:

Speed Governor Bias = 5,00 V

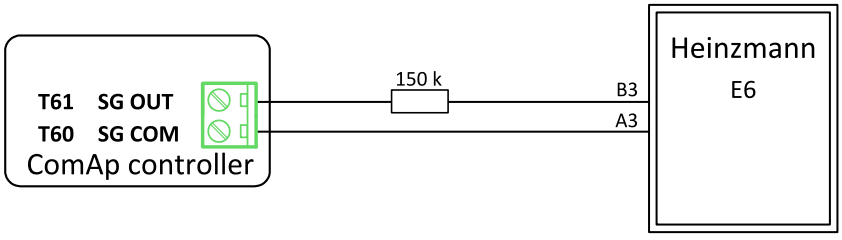
Speed Regulator Character = NEGATIVE

Speed Governor Low Limit = 2,50 V

Speed Governor High Limit = 7,50 V

Tau Speed Governor Actuator = 1,0 s

Heinzmann E6



Speed/Load ctrl:

Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

Heinzmann E16

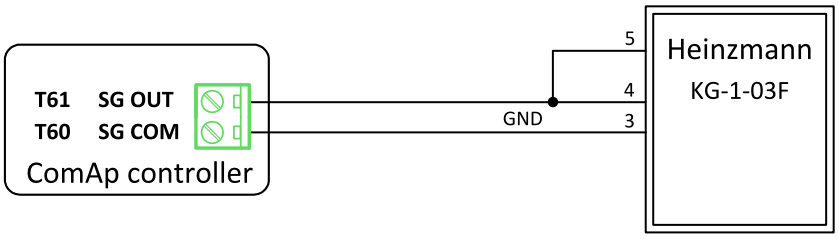


Speed/Load ctrl:

Speed Governor Bias = 0,00 V

Speed Regulator Character = POSITIVE

Heinzmann KG-1-03F

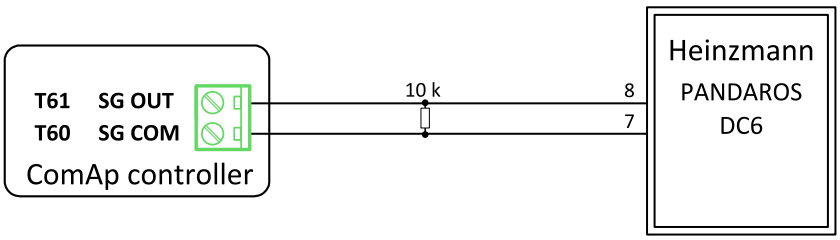


Speed/Load ctrl:

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:

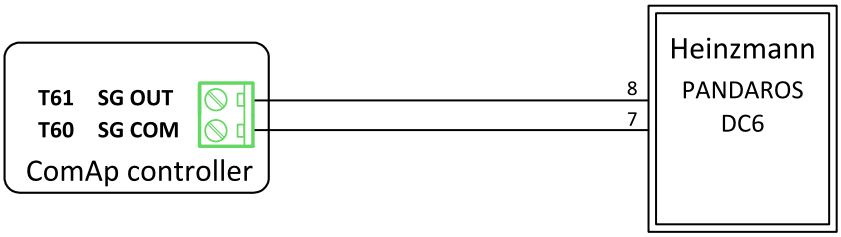
Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,80 V

For connection w/o resistor refer to the next setting

Heinzmann PANDAROS DC6



Speed/Load ctrl:

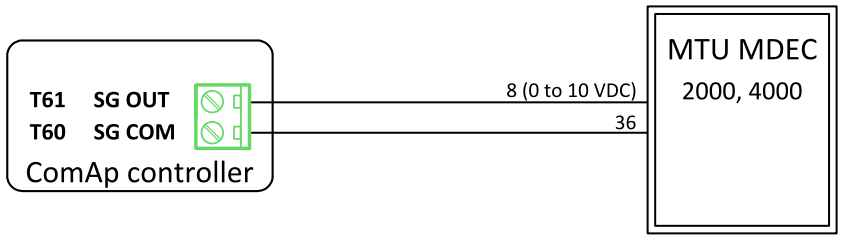
Speed Governor Bias = 2,70 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,00 V

Speed Governor High Limit = 6,00 V

MTU MDEC 2000, 4000



Speed/Load ctrl:

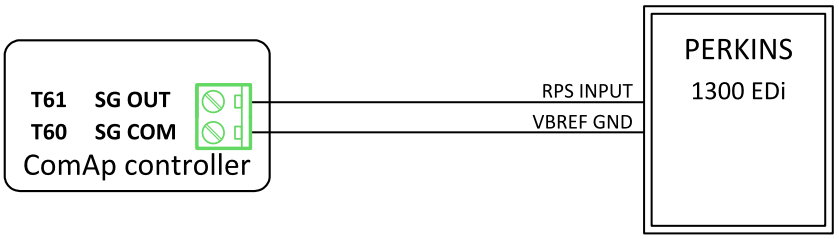
Speed Governor Bias = 4,90 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,00 V

Speed Governor High Limit = 10,00 V

PERKINS 1300 EDi



Speed/Load ctrl:

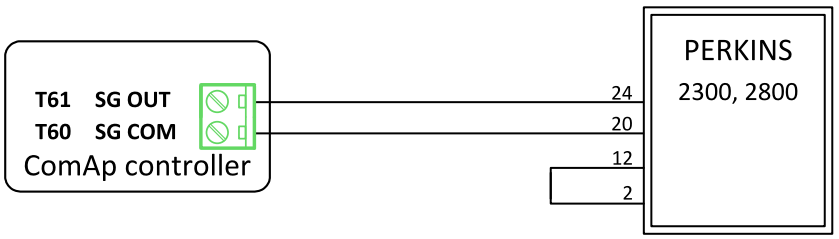
Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,80V

Speed Governor High Limit = 4,50 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:

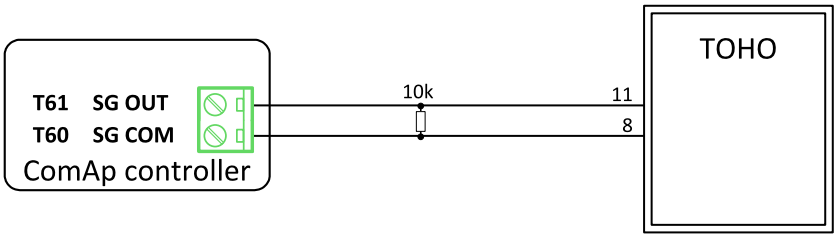
Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,50 V

Speed Governor High Limit = 4,50 V

TOHO



Speed/Load ctrl:

Speed Governor Bias = 4,00 V

Speed Regulator Character = POSITIVE

WOODWARD 2301A LS and Speed

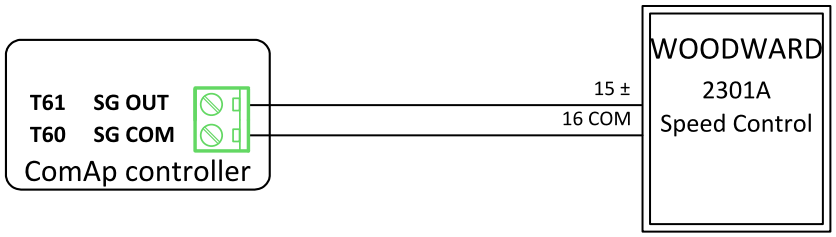


Speed/Load ctrl:

Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

WOODWARD 2301A Speed Control

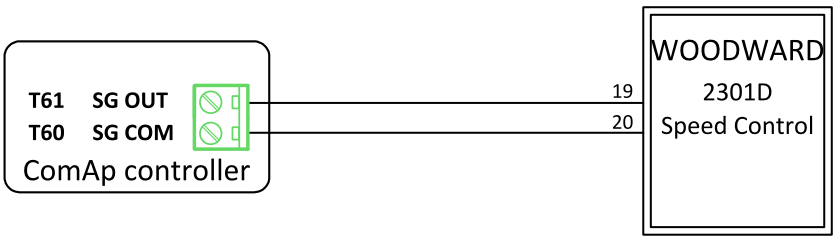


Speed/Load ctrl:

Speed Governor Bias = 5,00 V

Speed Regulator Character = POSITIVE

WOODWARD 2301D Speed Control



Terminals 19 and 20 are marked as Analog inputs #1.

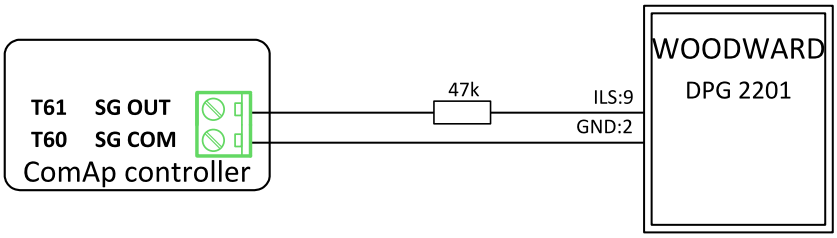
25,26 = Speed Signal Inputs

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:

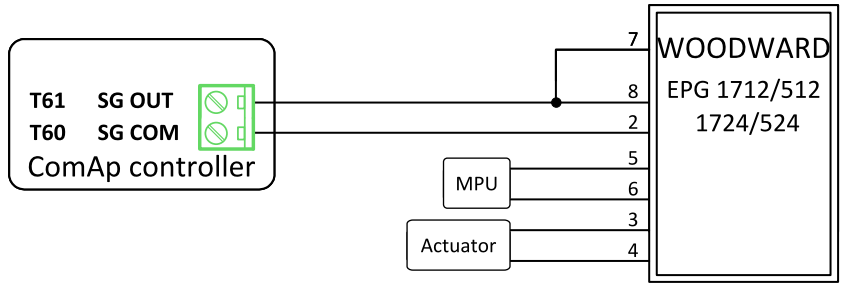
Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,00 V

Speed Governor High Limit = 5,00 V

WOODWARD EPG 1712/512 (1724/524)



Speed/Load ctrl:

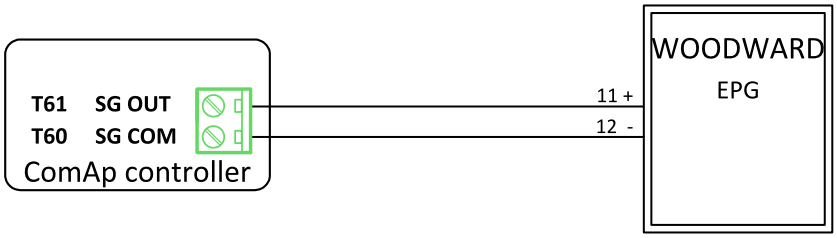
Speed Governor Bias = 3,10 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 6,50 V

Speed Governor High Limit = 0,00 V

WOODWARD EPG



For Woodward EPG speed governor (revision F) are limits:

Speed Governor Low Limit = -3,00 V

Speed Governor High Limit = +2,00 V

Speed Governor Bias = -0,50 V

Speed/Load ctrl:

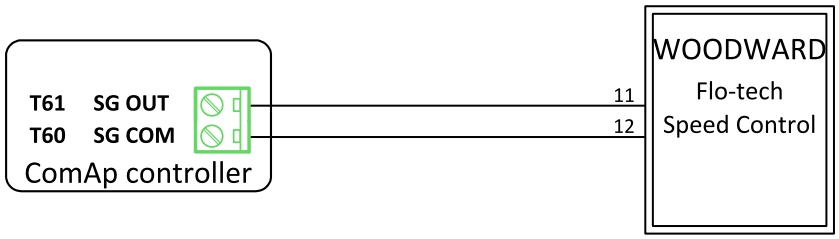
Speed Governor Bias = 0,00 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = -3,00 V

Speed Governor High Limit = 3,00 V

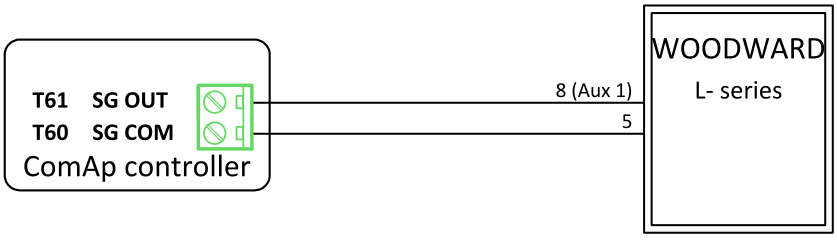
WOODWARD Flo - tech Speed Control



Speed/Load ctrl:

Speed Governor Bias = 0,00 V

WOODWARD L - series



Speed/Load ctrl:

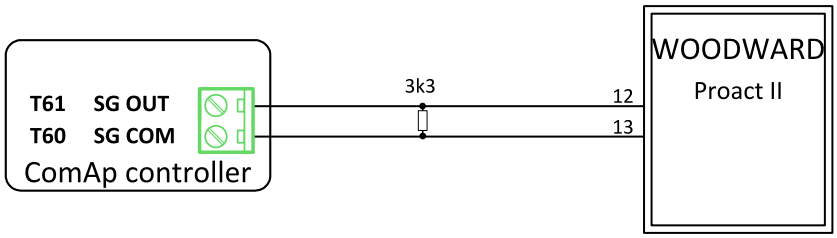
Speed Governor Bias = 2,50 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = 0,00 V

Speed Governor High Limit = 5,00 V

WOODWARD Proact II



Speed/Load ctrl:

Speed Governor Bias = 0,00 V

Speed Regulator Character = POSITIVE

Speed Governor Low Limit = -2,50 V

Speed GovernorHigh Limit = 2,50 V

back to Appendix

8.5 Modules

8.5.1 Plug-in modules

IMPORTANT: 2nd generation of InteliGen 500 G2 controllers does not support new modules and 3rd generation does not support all old modules.

The available communication plug-in modules are:

- CM-RS232-485 – communication module for connection via RS232 or RS485 line
- CM2-4G-GPS – communication module for connection via 4G
- CM3-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	CM3-Ethernet	CM2-4G-GPS	CM-RS232-485	EM-BIO8-EFCP
CM3-Ethernet	✗	✓	✓	✓
CM2-4G-GPS	✓	✗	✓	✓
CM-RS232-485	✓	✓	✗	✓
EM-BIO8-EFCP	✓	✓	✓	✓

Communication modules

CM-RS232-485 962
CM3-Ethernet 964
CM2-4G-GPS 966

CM-RS232-485

CM-RS232-485 is optional plug-in card to enable InteliGen 500 G2 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.

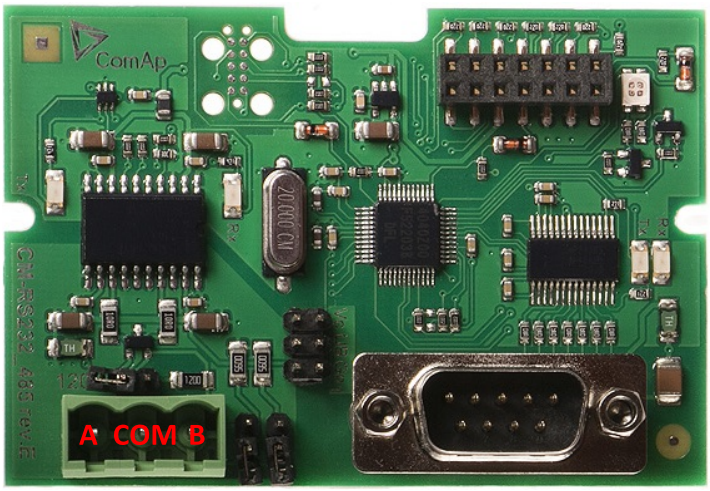


Image 8.136 CM-RS232-485 interface

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

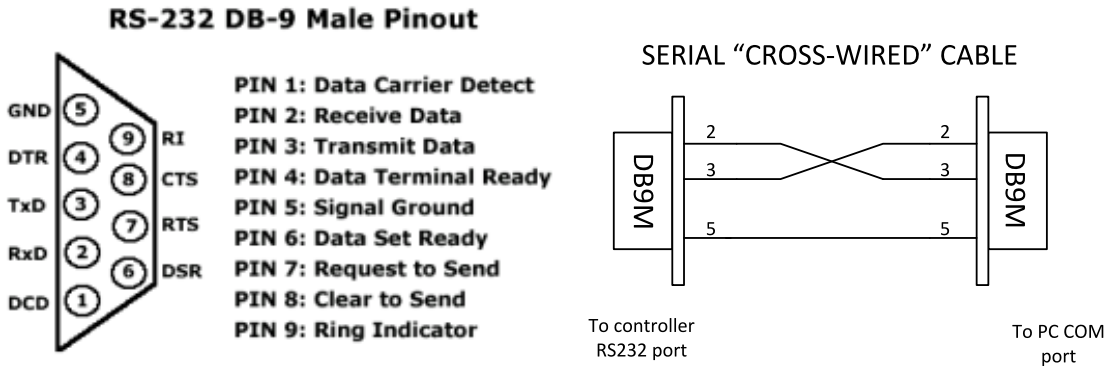


Image 8.137 Pinout of RS232 line

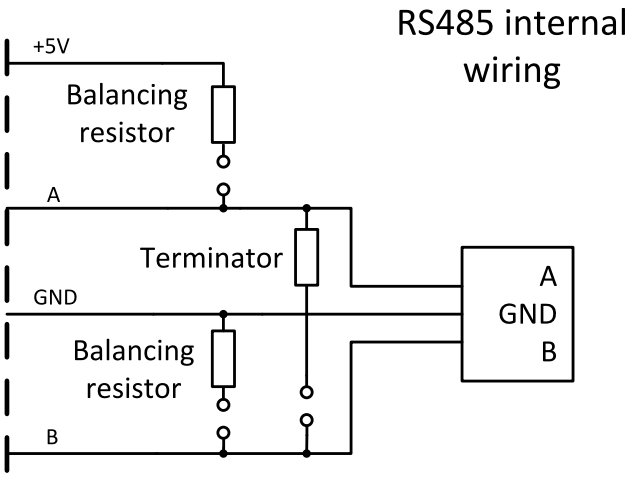


Image 8.138 Pinout of RS485 line

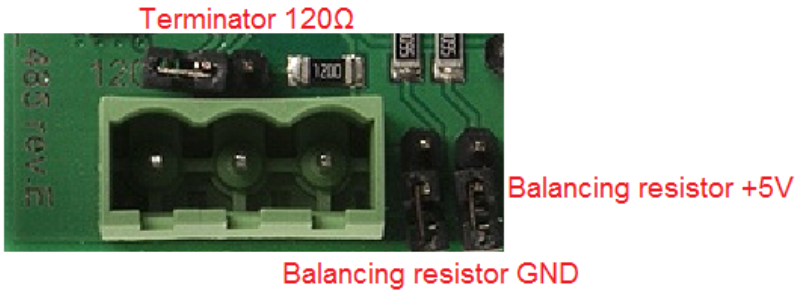


Image 8.139 Jumpers description

Note: *Balancing resistors should both be closed at only one device in the whole RS485 network.*

Maximal distance of line is 10 m for RS232 line and 1200 m for RS485 line.

Terminator 120 Ω

Balancing resistor +5 V

Technical data

Power consumption	40 mA / 8 VDC 26 mA / 12 VDC 14 mA / 24 VDC 10 mA / 36 VDC
Isolation	Galvanic separation

Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Install package to computer or open PSI to install it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate

firmware you want to program into the module (in InteliConfig).

› Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

CM3-Ethernet

CM3-Ethernet is a plug-in card with Ethernet 10/100 Mbit interface in RJ45 connector. It provides an interface for connecting a PC through ethernet/internet network, for sending active e-mails and for integration of the controller into a building management (MODBUS TCP and SNMP protocols).

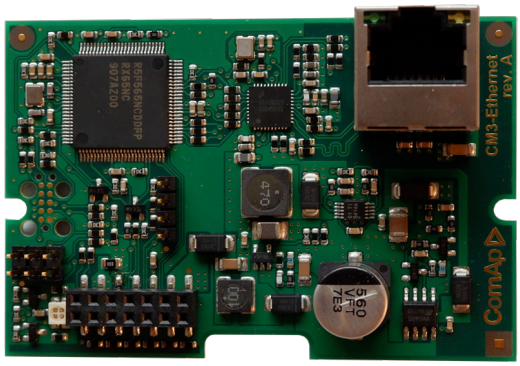


Image 8.140 CM3-Ethernet interface

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.

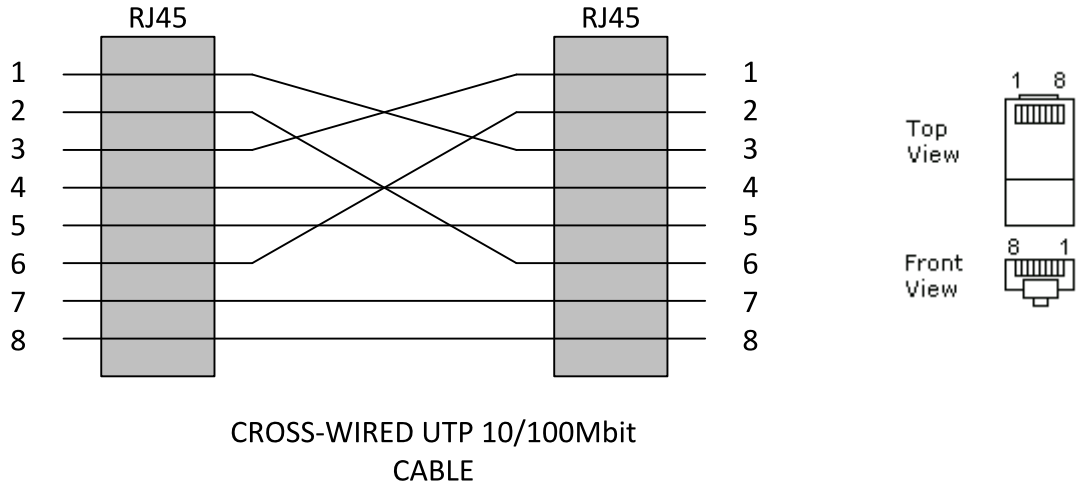


Image 8.141 Cross-wired cable

Technical data

General

Width × Height × Depth	73.8 × 50.3 × 21

Weight	~30 g
Power supply	8-36 V DC
Power consumption	1 W
Peak power consumption	2 W
Operating temperature	-40 ˚C to +70 ˚C
Storage temperature	-40 ˚C to +80 ˚C

Ethernet port

100 Mbit/s, full duplex
RJ45 socket

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 584)**.

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 Red – some of following errors occurred: › unplugged Ethernet cable › module cannot connect to AirGate › module can not obtain IP address from DHCP
10 Hz	Green – firmware is currently being programmed 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)
- Install package to computer or open PSI to install it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

CM2-4G-GPS

CM2-4G-GPS plug-in module containing a GPS receiver and GSM/WCDMA/LTE modem which can work in two modes of operation based on the settings in the setpoint **Internet Connection (page 563)**.

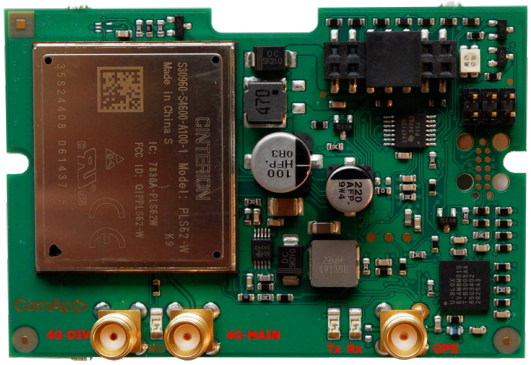


Image 8.142 CM2-4G-GPS module

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

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.*

CM2-4G-GPS module works with:

- WebSupervisor – internet-based remote monitoring solution
- AirGate – powerful connection technology to make internet access as simple as possible

CM2-4G-GPS module also works like GPS locator. Geo-fencing function can be used with this module.

4G module types

- If the anthenna is CELLULAR only and has 1 cable (OT1A4GXXMCX), it is connected to the 4G-MAIN connector.
- If the anthenna is CELLULAR only and has 2 cables, cables are connected to the 4G-MAIN or 4G-DIV connectors (does not matter which cable to which connector).
- If the anthenna is a combination of CELLULAR/GPS and has 2 cables (OT1A4GGPSCX), then cable "4G/LTE" needs to be connected to the 4G-MAIN connector and "GPS" cable to the GPS connector.
- If the anthenna is a combination of CELLULAR/GPS and has 3 cables (OT2A4GGPSCX), then cables "4G/LTE" need to be connected to the 4G-MAIN and 4G-DIV connectors (does not matter which cable to which connector) and "GPS" cable to the GPS connector.

Note: *Type of the cable is labeled on its side.*



Technical data

General

Width × Height × Depth	73.8 × 50.3 × 15
Weight	~35 g
Power supply	8-36 V DC
Power consumption	1.7 W
Peak power consumption	10 W
Operating temperature	-30 ˚C to +70 ˚C
Storage temperature	-40 ˚C to +80 ˚C

GNSS

Antenna interface	SMA female, 2.8 V / 20 mA
Antenna type	Active

Cellular

Supported networks and frequency bands	› 2G (GSM/GPRS/EDGE) Quad band, 850/900/1800/1900 MHz › 3G (UMTS/HSPA+) Seven band, 800 (BdXIX) / 850 (BdV) / 900 (BdVIII) / AWS (BdIV) / 1800 (BdIX) / 1900 (BdII) / 2100MHz (BdI) › 4G (LTE) Twelve band, 700 (Bd12 <MFBI Bd17>, Bd28) 800 (Bd18, Bd19, Bd20) 850 (Bd5) / 900 (Bd8) / AWS (Bd4) / 1800 (Bd3) / 1900 (Bd2) / 2100 (Bd1) / 2600MHz (Bd7)
Antenna interface	2x SMA female (Main and Diversity)

SIM card settings

SIM card 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 CM2-4G-GPS module

- You will need a controller, CM2-4G-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 CM2-4G-GPS card
- Connect the antenna to Cellular module antenna connector.
- If you want to use the built-in GPS receiver, also connect an **active** GPS antenna to the GPS antenna connector.
- Switch off the controller.
- Insert CM2-4G-GPS module into controller
- Power up the controller.
- Select the mode of CM2-4G-GPS module by adjusting setpoint **Internet Connection (page 563)**.
- Activate CM2-4G-GPS module by switching the setpoint **Internet Connection (page 563)** to enabled
- 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.
- Enter correct **Access Point Name** (this information is provided by Mobile Operator). Setpoint can be set on controller's front panel or by InteliConfig.
- Switch the controller off and on.
- Wait for approx 2 – 4 minutes for first connection of the system to AirGate. AirGate will automatically generate the AirGate ID value. Then navigate to measurement screens where you will find signal strength bar and AirGate ID identifier.

Modem Status

Code	Description
OK	Module successfully initialized and connected to the cellular network
E01	Unsuccessful restore to the factory settings
E02	Modem configuration error
E SIM	SIM not inserted or locked by PIN. › Use another device (e.g. mobile phone) to disable the option for SIM to be locked by PIN
E04	It is not possible to set manually chosen network mode 2G/3G/4G/Automatic
E registration	It is not possible to register into cellular network. Possible reasons: › No signal (no coverage, broken or unconnected antenna)

	› Manually chosen network mode 2G/3G/4G is not available
E context	It is not possible to set PDP (Packet Data Protocol) context for defined APN (Access Point Name). Possible reasons: › Setpoint Access Point Name is not correctly set (format) › Wrong PDP context number
E connect	It is not possible to connect to cellular network (ATD*99***context) Possible reasons: › Setpoint Access Point Name is not correctly set (wrong text)
E08	Modem configuration error
E09	It is not possible to get signal strength
E10	It is not possible to get operator name
E11	Loss of registration into cellular network was detected
E12	Data error
E13	Data error
E14	Modem was restarted
E SMS send	It is not possible to send SMS. Possible reasons: › Wrong number › SIM doesn't support SMS
E18	Modem hardware configuration error
E conn lost	Loss of connection with cellular network
E19	Modem configuration error
Restart-config	Modem was restarted due to the change of controller setpoint
Restart-app	Modem was restarted due to the performed cellular connection check

AirGate Status

Code	Description
Not defined	Setpoint AirGate Connection is Disabled
Wait to connect	Waiting to connect
Resolving	Resolving
Connecting	Connecting
Creat sec chan	Creating secure channel
Registering	Registering
Conn inoperable	Connected, inoperable
Conn operable	Connected, operable
Susp AGkeyEmpty	AirGate is not set in the controller

Firmware upgrade

› Download the newest FW of module from ComAp website (in form of PSI file or installation package)
› Install package to computer or open PSI to install it into InteliConfig
› Plug the module into the controller and power the controller on.
› Open a connection with controller via InteliConfig

- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

Extension modules

EM-BIO8-EFCP 970

EM-BIO8-EFCP

EM-BIO8-EFCP is optional plug-in card. Through this card, the controller can accommodate one AC current (CT) measuring input (1A or 5A input) and up to 8 binary inputs or outputs. In InteliConfig PC configuration tool it is possible to easily choose whether particular I/O will be binary input or output.

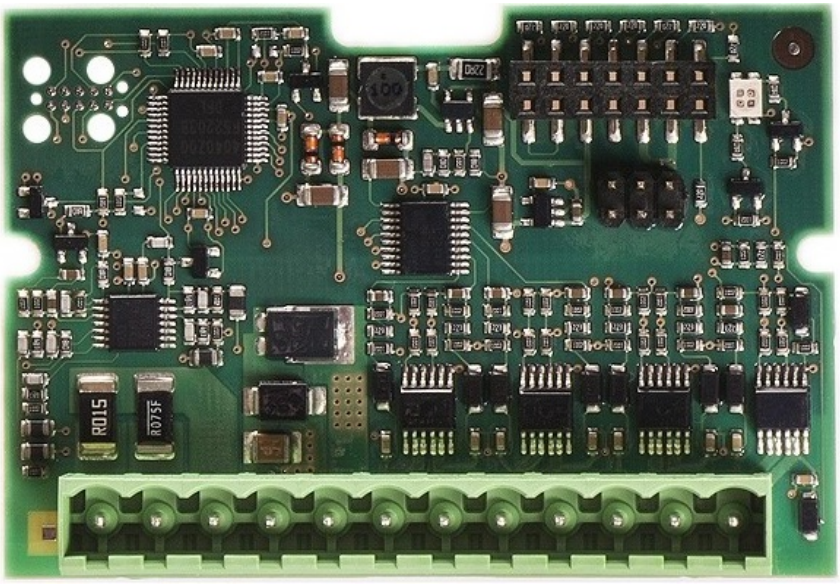


Image 8.143 EM-BIO8-EFCP interface

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

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

IMPORTANT: Earth fault current measurement is supported by controller only in slot A.

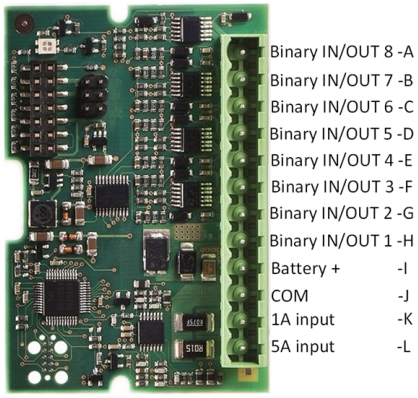


Image 8.144 Overview of EM-BIO8-EFCP

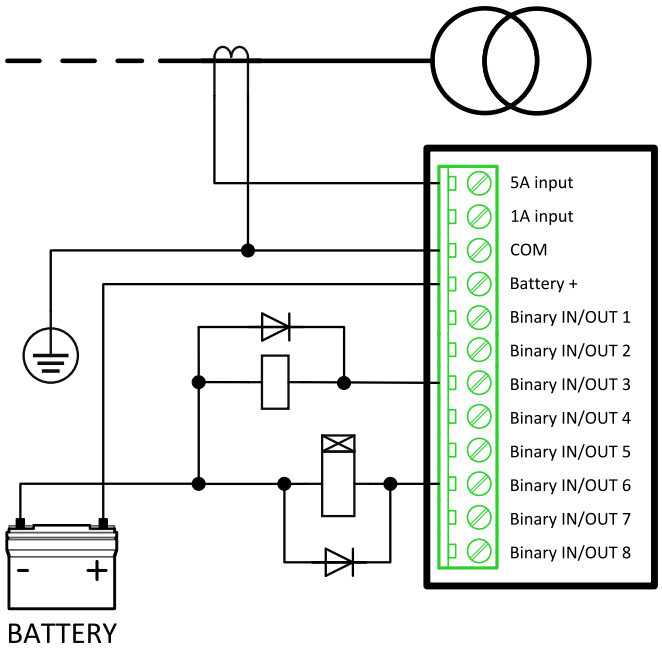


Image 8.145 EM-BIO8-EFCP wiring

Note: *There is a possibility to contact directly to binary input terminals.*

EM-BIO8-EFCP technical data

Power supply

Power supply range	8-36 VDC
Power consumption	40 mA / 8 VDC 27 mA / 12 VDC 22 mA / 24 VDC 19 mA / 36 VDC

Binary inputs

Number	Up to 8, non-isolated
Close/Open indication	0-2 VDC close contact >6 VDC open contact

Binary outputs

Number	Up to 8 , non-isolated
Max. current	0,5A
Switching to	positive supply terminal

Current measuring input

Number of inputs	2
Nominal input current	1A/5A
Load (CT output impedance)	< 0,1
Max measured current from CT	10 A
Current measurement tolerance	2% from Nominal current
Max peak current from CT	150 A / 1 s
Max continuous current	10 A

Earth fault current measurement

The Earth Fault protection is done by the extension module EM-BIO8-EFCP.

When the measured current exceeds the set value, which indicates that part of the current is dispersed to earth, and when the set **IDMT Earth Fault Current Delay (page 626)** time elapses, the **Earth Fault Current Protection (page 626)**, **Sd Earth Fault Current (page 912)** alarms activate. Earth Fault protection is not active when Gen-set does not run and when the **Earth Fault Current Protection (page 626)** is disabled.

> **IMPORTANT: Earth fault current measurement is not intended to protect human health, but the device!**

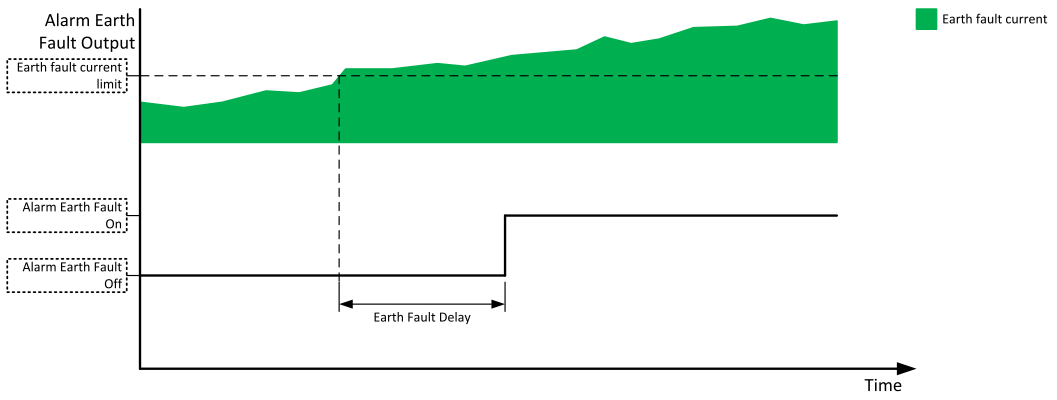


Image 8.146 Earth fault current protection

Firmware upgrade

- Download the newest FW of module from ComAp website (in form of PSI file or installation package)
- Install package to computer or open PSI to install it into InteliConfig
- Plug the module into the controller and power the controller on.
- Open a connection with controller via InteliConfig
- Go the menu Tools -> Firmware upgrade, select the Plug-in modules tab and select the appropriate firmware you want to program into the module (in InteliConfig).
- Press the OK button to start upgrade of firmware.

The firmware update process may be performed via any kind of connection including connection via the same module in which the firmware is to be updated. The connection is re-established again automatically when the update process is finished.

8.5.2 CAN modules

Supported combinations of modules 973

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.

Supported combinations of modules

The maximal number of CAN modules is limited by the number of the controller's generic modules. Once the physical module is configured, it allocates necessary generic modules. So, it is possible to configure as many CAN modules as many generic modules are available. The maximum number of CAN modules is also limited

by the number of addresses (indexes) that can be configured for each type of the generic module. CAN modules and generic modules share indexes.

> **Example:** If you configure Inteli IO8/8 module which is using 1x BI, BO, and AO generic module with index (address) 1, any other module using same generic modules will not be able to be configured with index (address) 1 (IGS-PTM, Inteli AIO9/1).

Each generic module has 8 "terminals" (inputs/outputs) and the InteliGen 500 G2 has the following amount of the generic modules:

- AI generic: 16
- AO generic: 8
- BI generic: 16
- BO generic: 16
- AI32 generic: 2

In the table below, you can see how many generic modules are necessary for each CAN module and how many indexes are available for each type of CAN module in the InteliGen 500 G2.

CAN Module	Max number of indexes	AI generic	AO generic	BI generic	BO generic
Inteli AIN8	10	1	0	0	0
Inteli IO 8/8	12	0	1	1	1
Inteli IO 16/0	8	0	1	2	0
IGL-RA15	**4**	0	0	0	2
IGS-PTM	**4**	1	1	1	1
Inteli AIO9/1	**5**	2	1	0	0
Inteli AIN8TC	10	1	0	0	0
I-AOUT8	**4**	0	1	0	0
IS-AIN8	10	1	0	0	0
IS-AIN8TC	10	1	0	0	0
IS-BIN16/8	7	0	0	2	1

Note: *When configuring modules do not forget to let first 4 indexes free for modules which can't use high addresses such as IGL-RA15, IGS-PTM, AIO9/1, I-AOUT8.*

Note: *Module Inteli IO8/8 has available AOUT only if it is configured with index number below 9 and Inteli AIO9/1 has available AOUT only if it is configured with index number below 5.*

Note: *Module Inteli IO8/8 with older FW than 1.3.1.2 has available AOUT only if it is configured with index number below 5.*

Extension modules

Inteli AIN8 975
Inteli IO8/8 980
IGS-PTM 987
Inteli AIN8TC 993
Inteli AIO9/1 997

Inteli AIN8

Inteli AIN8 module is an extension module equipped with analog inputs. Inteli AIN8 module is connected to controller by CAN1 bus.



Image 8.147 Inteli AIN8

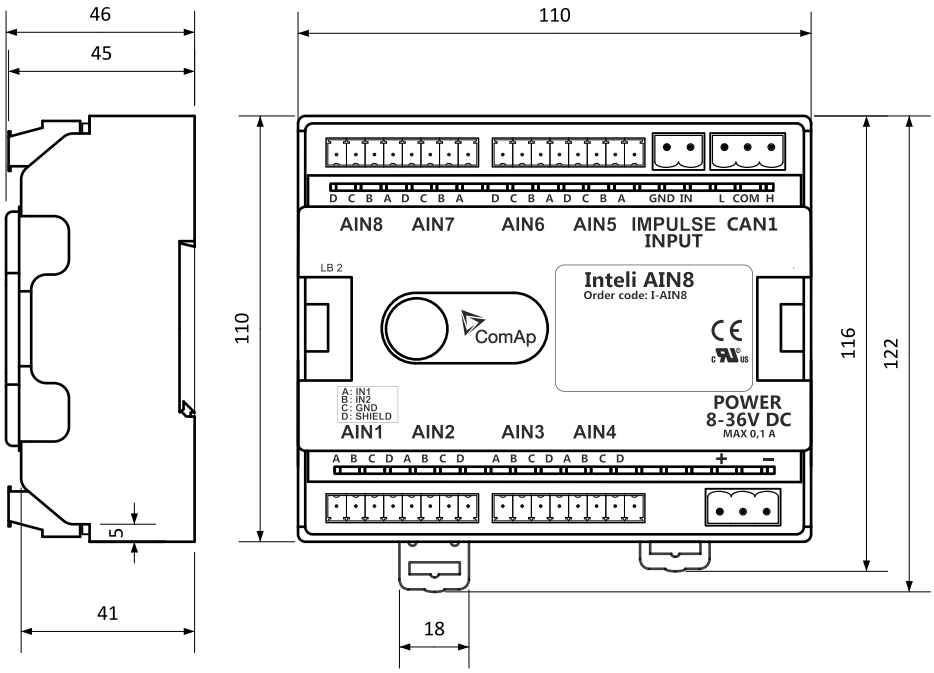
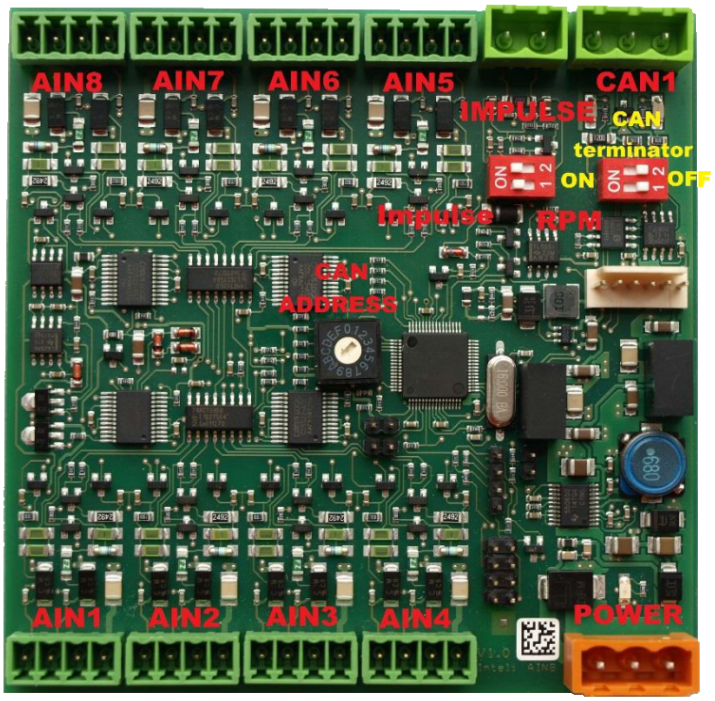


Image 8.148 Inteli AIN8 dimensions

Note: *All dimensions are in mm.*

Terminals



Analog input	8 analog Inputs
CAN	CAN1 line
Power	Power supply
CAN LED Tx, Rx	Indication transmitted or received data
Status LED	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON" – switch both switches)

Note: *Impulse input is not supported.*

Analog inputs

- 8 channels
- can be configured as:
  - resistor three wire input
  - current input
  - voltage input

All inputs can be configured to any logical function or protection.

IMPORTANT: Impulse input is not supported in controller.

Supported sensors

Sensors		
User curves	NI100 [°F] (fix)	0-5 V
PT100 [°C] (fix)	NI1000 [°F] (fix)	0-10 V
PT1000 [°C] (fix)		4-20 mA passive
NI100 [°C] (fix)	0-2400 Ω	4-20 mA active

Sensors		
NI1000 [°C] (fix)	0-10 kΩ	0-20 mA passive
PT100 [°F] (fix)	±1 V	±20 mA active
PT1000 [°F] (fix)	0-2.4 V	

CAN address

DIP switch determinates CAN address for analog inputs.

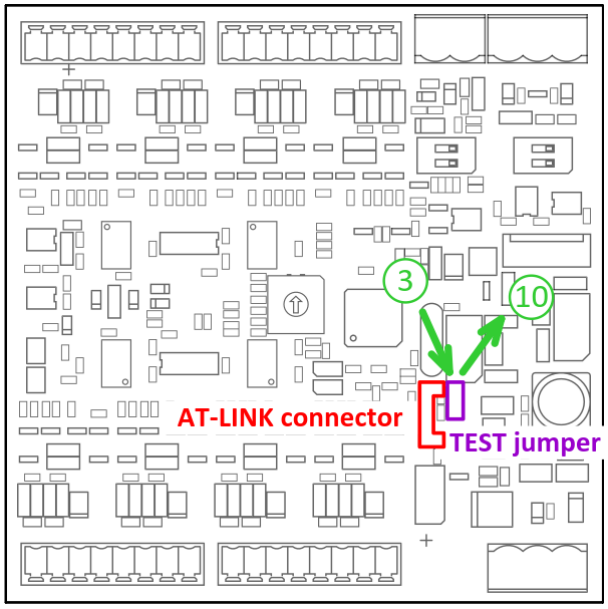


Note: *When setting the CAN address to zero, the appropriate group of signals is deactivated.*

Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Remove the top cover of module
3. Put the TEST jumper on pins
4. Connect the unit with PC via RS232-null modem cable and AT-Link conv



5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli AIN8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press the Start button
9. Wait till process is done (If the process does not start – after 60 seconds the "Timeout" will be evaluated. In this case please check:

- You have proper connection with the unit
- COM port selection is correct
- Module has power supply, (no CAN bus connection, status LED lights continuously)

10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blink)
12. Module FW is upgraded

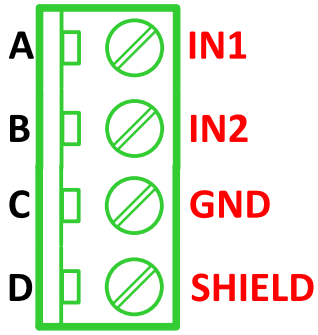
LED indication

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address).
Lights	Power supply is in the range and the communication between Inteli AIN8 and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller).

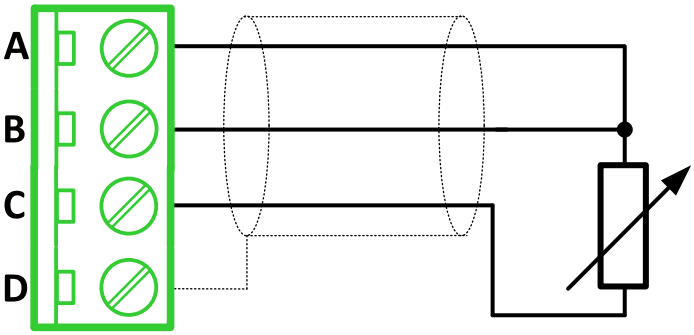
Wiring

The following diagrams show the correct connection of sensors.

Terminator

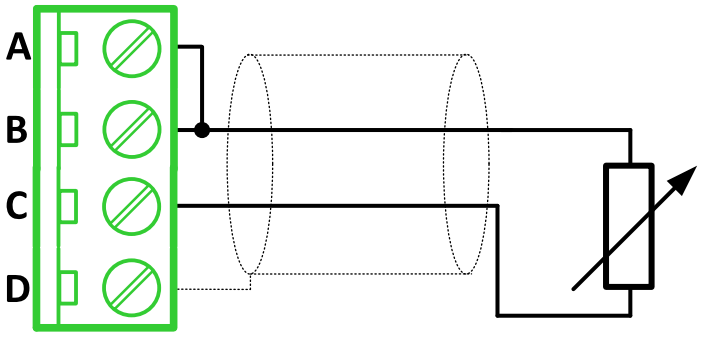


Resistance sensor - 3 wires



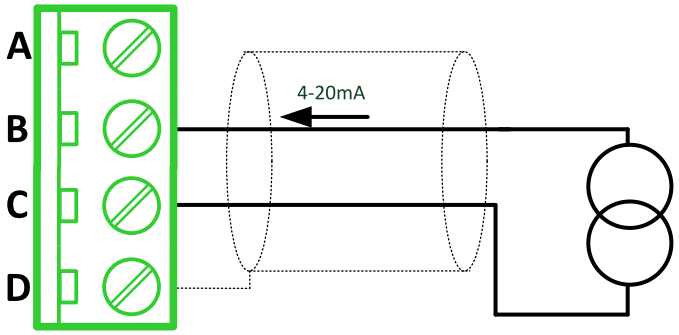
Note: *Ranges: Pt100, Pt1000, Ni100, Ni1000, 0-2400 Ω, 0-10 kΩ*

Resistance sensor – 2 wires



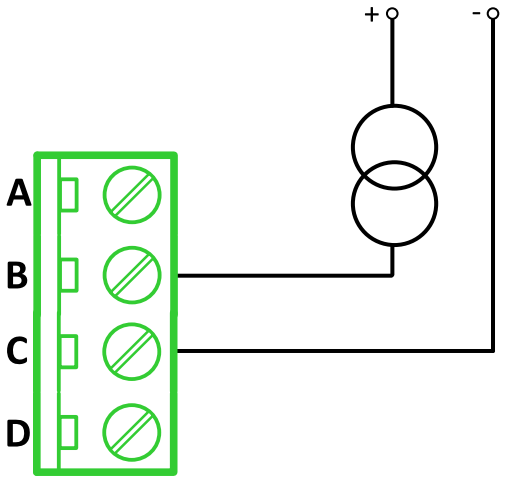
Note: *Ranges: Pt100, Pt1000, Ni100, Ni1000, 0-2400 Ω, 0-10 kΩ*

Current sensor - active



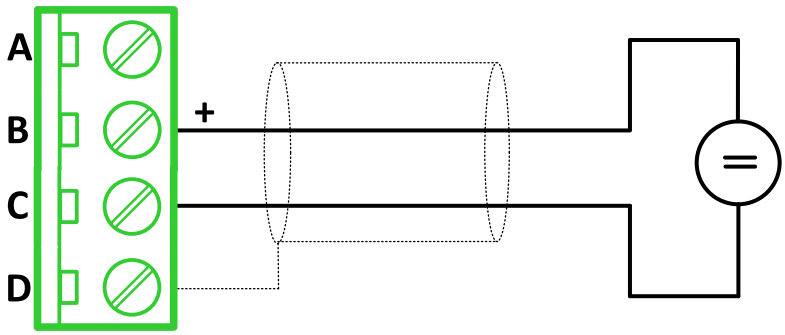
Note: *Ranges: ±20 mA, 4 – 20 mA*

Current sensor - passive



Note: *Ranges: 0 – 20 mA, 4 – 20 mA*

Voltage sensor



Note: *Ranges: ±1 V, 0 – 2,5 V, 0 – 5 V, 0 – 10 V*

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	35 mA at 24 V ÷ 100 mA at 8 V
Interface to controller	CAN1
Protection	IP20
Storage temperature	-40 °C to +80 °C
Operating temperature	-30 °C to +70 °C
Dimensions (WxHxD)	110 × 110 × 46 mm (4.3" × 4.3" × 1.8")
Weight	221.5 grams

Analog inputs

Number of channels	8
Voltage	Range 0-10 V Accuracy: ±0.25 % of actual value + ±25 mV
Current	Range: ±20 mA Accuracy: ±0.25 % of actual value + ±50 µA
Resistive	Range: 0- 10 kΩ Accuracy: ±0.5 % of actual value + ±2 Ω

Inteli IO8/8

Inteli IO8/8 module is an extension module equipped with binary inputs, binary outputs and analog outputs.

Inteli IO8/8 is the name of the module, but it is possible to configure the module (by internal switch) to two configurations:

- Inteli IO8/8 – 8 binary inputs, 8 binary outputs and 2 analog outputs
- Inteli IO16/0 – 16 binary inputs, 0 binary outputs and 2 analog outputs

The detection of communication speed is indicated by rapid flashing of status LED. Once the speed is detected the module remains set for this speed even when the communication is lost. Renewal of communication speed detection is done by resetting of the module.



Image 8.149 Inteli IO8/8

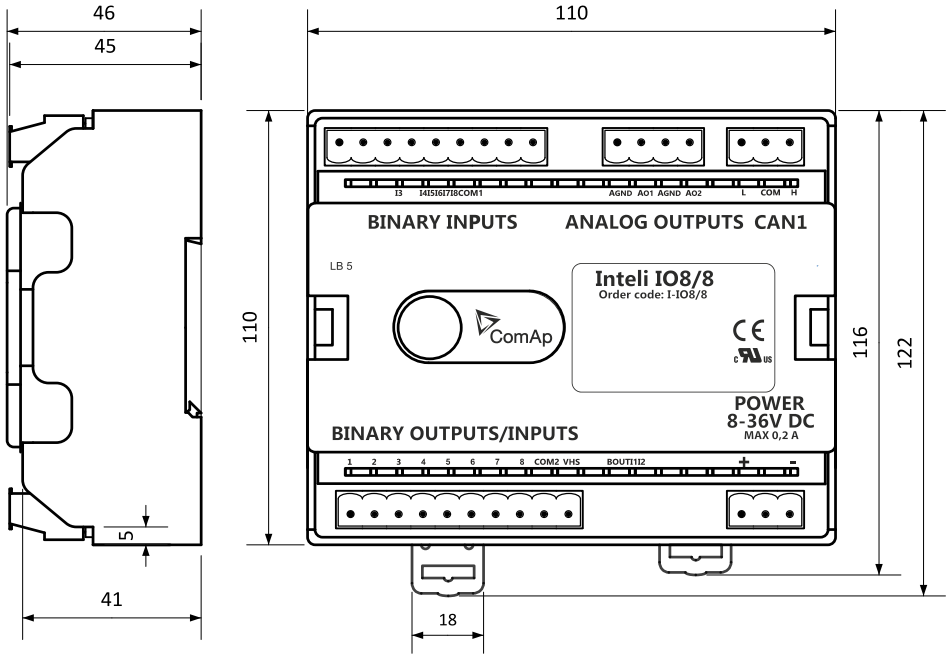
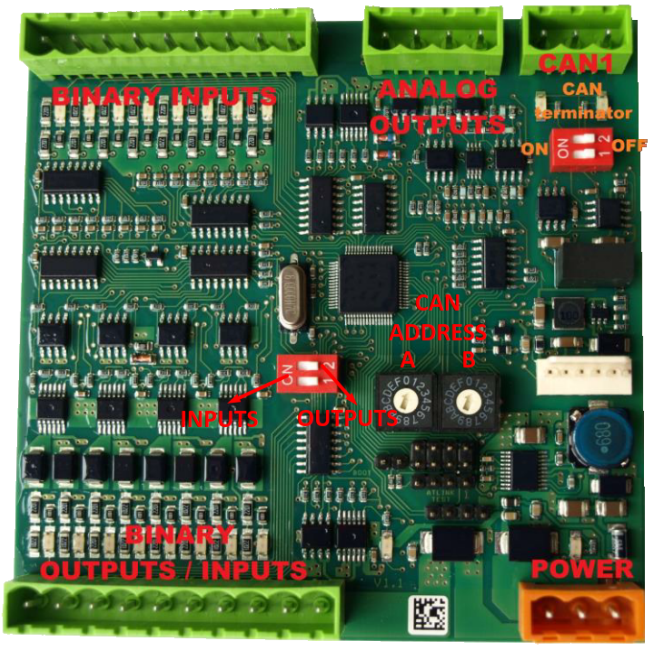


Image 8.150 Inteli IO8/8 dimensions

Note: *All dimensions are in mm.*

Terminals



Binary inputs	8 binary inputs
Binary outputs	8 binary outputs (8 binary inputs)
Analog outputs	2 analog outputs
CAN	CAN1 line
Power	Power supply
Binary inputs LEDs	8 LEDs for binary input indication
Binary outputs LEDs	8 LEDs for binary output indication
CAN LED	Indication transmitted or received data
Status	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON" – switch both switches)

Inputs and outputs

Binary inputs

- 8 channels
- can be configured as:
  - pull up
  - pull down

All 8 inputs are configured to one type together.

All inputs can be configured to any logical function or protection.

Binary outputs

- 8 channels
- can be configured as:
  - High side switch
  - Low side switch

All 8 inputs are always configured to one type (HSS/LSS) together. All 8 outputs can be modified to inputs by switch on the PCB (Inteli IO8/8 to Inteli IO16/0).

Analog outputs

- 2 channels
- can be configured as:
  - voltage 0-10V
  - current 0-20mA
  - PWM (level 5 V, with adjustable frequency from 200 Hz to 2400 Hz, with step 1 Hz)

All inputs/outputs can be configured to any logical function or protection.

Output state check

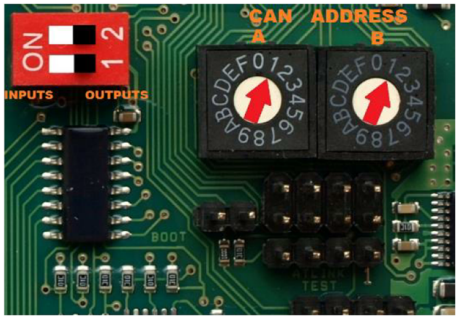
Output state check function evaluates in real time the state of binary outputs and adjusted (required) state. In case of failure (a difference between the required state and real state) history record and alarm are issued (type of the alarm is set by "Protection upon module failure" – (No protection / Warning / Shutdown)).

This function is designed for short-circuit or other failure, which causes change of set state of binary output.

CAN address

In Inteli IO8/8 mode CAN address for binary inputs is determined by DIP switch A, CAN address for binary output and analog outputs is determined by DIP switch B.

In Inteli IO16/0 mode CAN address for binary inputs is determined by DIP switch A, first group of 8 input has address A, second group of 8 inputs has address A+1. CAN address of analog outputs is set by DIP switch B.



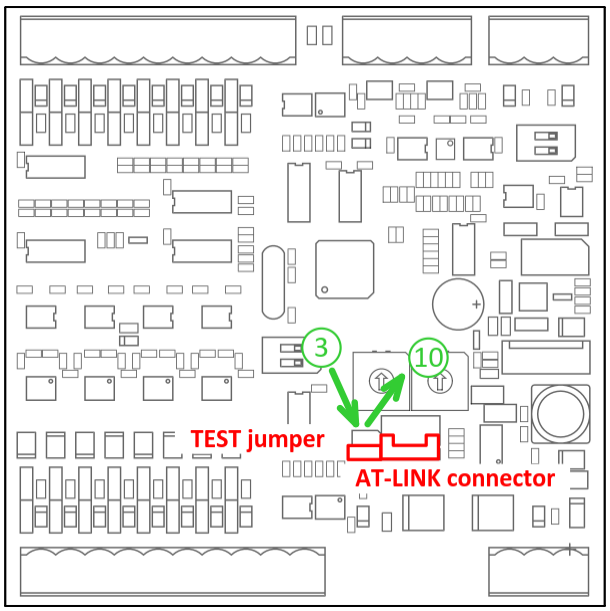
Note: *When setting the CAN address to zero, the appropriate group of signals is deactivated.*

Programming firmware

Firmware upgrade process:

1. Disconnect all terminals from the unit.
2. Remove the top cover of module
3. Put the TEST jumper on pins

4. Connect the unit with PC via RS232-null modem cable and AT-Link conv



5. Connect power supply of the module (status LED lights continuously)
6. Launch FlashPgr.exe PC software (version 4.2 or higher)
7. In FlashPrg program choose card Inteli IO8/8 and load FW for the module
8. Set the proper COM port (connected with the unit) and press the Start button
9. Wait till process is done (if the process does not start – after 60 seconds the "Timeout" will be evaluated). In this case please check:
   - You have proper connection with the unit
   - COM port selection is correct
   - Module has power supply, (no CAN bus connection, status LED lights continuously)
10. After successful programming disconnect AT-Link conv , remove TEST jumper and disconnect power supply
11. Connect power supply again (status LED should blink)
12. Module FW is upgraded

LED indication

Binary input

Each binary input has an LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

Binary output

Each binary output has an LED which indicates output signal. Binary output LED is shining when binary output is set. When this LED is shining, then the module is configured as 8 binary inputs and 8 binary outputs. When this LED is dark, the module is configured as 16 binary inputs.

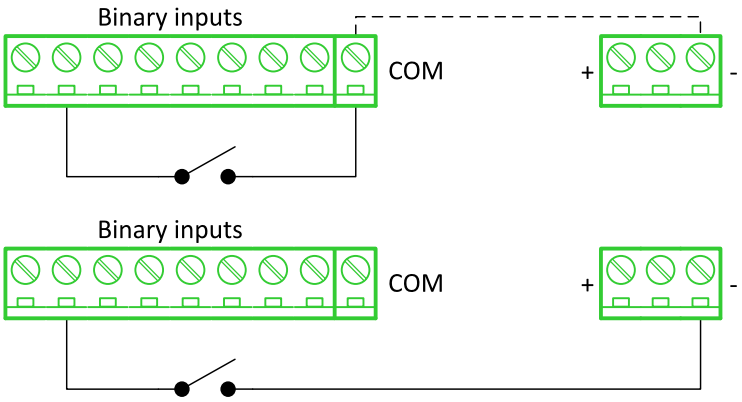
LED at power connector – status LED

LED status	Description
Dark	FW in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address).
Lights	Power supply is in the range and the communication between Inteli IO8/8 and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller).

Wiring

The following diagrams show the correct connection of inputs and outputs.

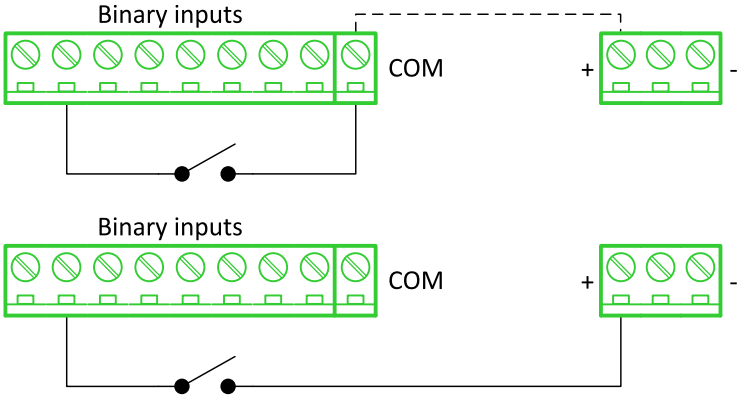
Binary inputs – pull up



There are two options of wiring. On upper picture you can see example of binary input is connected between BIN2 and COM (COM is connected internally to the GND (-) – dashed line).

In lower picture is an example of wiring between BIN2 and GND (-). Both ways are correct.

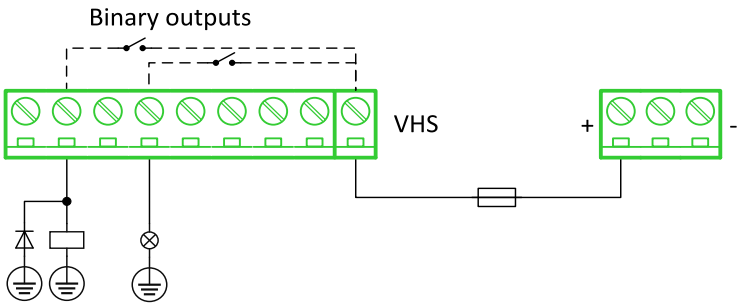
Binary inputs – pull down



There are two options of wiring. In the upper picture you can see an example of binary input connected between BIN2 and COM (COM is connected internally to the Ucc (+) – dashed line).

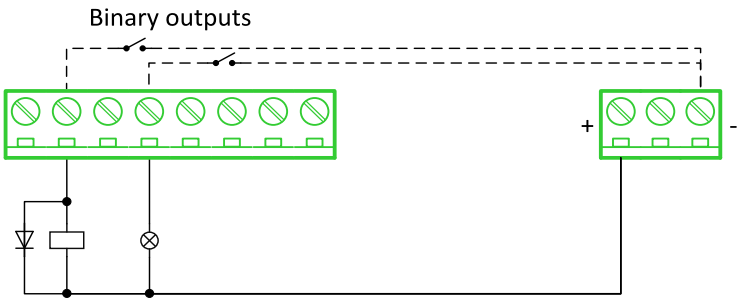
In the lower picture is an example of wiring between BIN2 and Ucc (+). Both ways are correct.

Binary outputs – high side



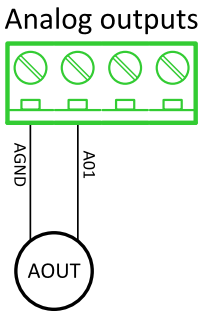
When high side setting of outputs is chosen – binary output must be connected to the negative potential directly Terminal VHS (voltage High side) must be connected to positive potential directly. Maximal current of each binary output is 500 mA. Size of fuse depends on load.

Binary outputs – low side



When low side setting of outputs is chosen – binary output must be connected to the positive potential of power supply directly. Negative potential is connected internally – dashed line.

Analog outputs



Note: *Limit of analog ground (AGND) is 100 mA.*

> **IMPORTANT: Terminator for analog output has special analog ground (AGND), which must not be connected to the GND.**

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	35 mA at 24 V ÷ 100 mA at 8 V
Interface to controller	CAN1
Protection	IP20
Storage temperature	-40 °C to +80 °C

Operating temperature	-30 °C to +70 °C
Dimensions (W × H × D)	110 × 110 × 46 mm (4.3” × 4.3” × 1.8”)
Weight	240 grams

Analog outputs

Number of channels	2
Voltage	Range 0-10 V Accuracy: ±20 mV + ±0.5 % of actual value Imax 5 mA
Current	Range: 0-20 mA Accuracy: ±100 µA + ±0.5 % of actual value Rmax 500 Ω
PWM	Level 5 V Frequency – adjustable 200÷2400 Hz Imax 20 mA

Binary inputs

Number of channels	8 for Inteli IO8/8, 16 for Inteli IO16/0
Input resistance	4400 Ω
Input range	0 to 36 V DC
Switching voltage level for close contact indication	0 to 2 V DC
Max voltage level for open contact indication	6 to 36 V DC

Note: *Signals and communications can't be connected as long distance lines (not to be connected outside of the building or longer than 30 m).*

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 8.151 IGS-PTM

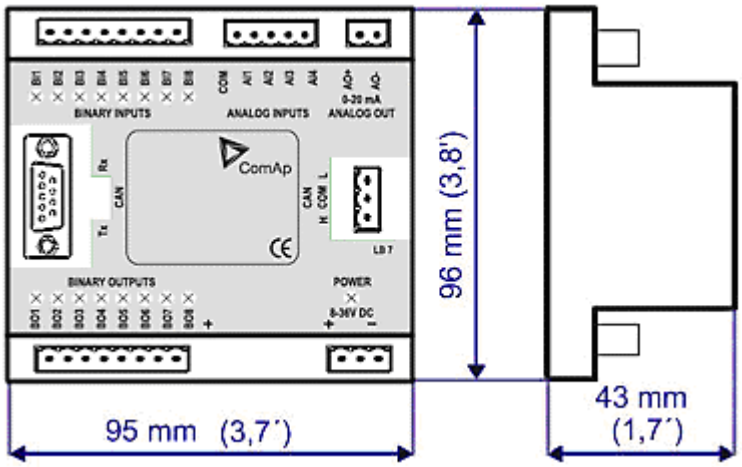
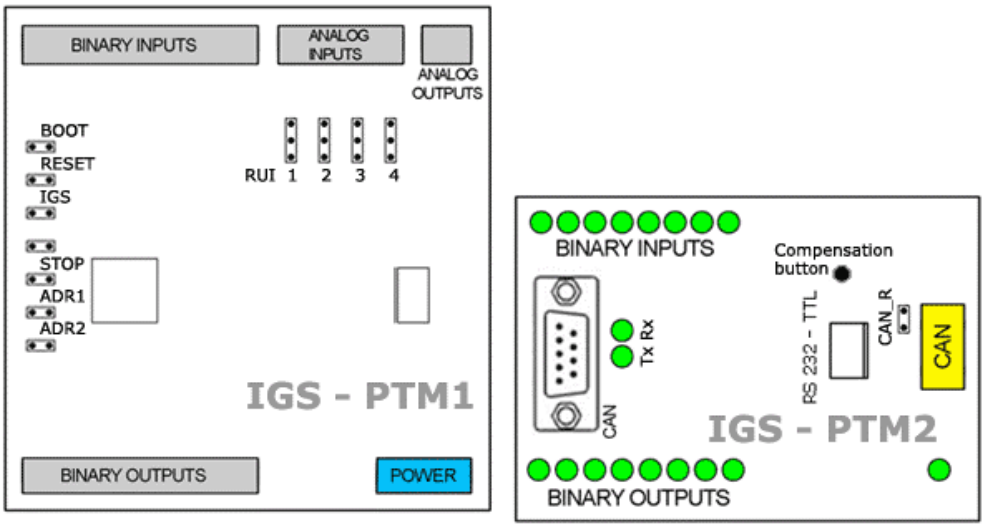


Image 8.152 IGS-PTM dimensions

Terminals



Binary inputs	8 binary inputs
Analog inputs	4 analog inputs
Analog outputs	1 analog output
Binary outputs	8 binary outputs
CAN	CAN1 line
RS232-TTL	Interface for programming
Power	Power supply

Analog inputs

Analog inputs can be configured for:

- Resistance measurement
- Current measurement
- Voltage measurement

The type of analog input is configured via jumpers RUI located on lower PCB.

RUI	Analog input configuration
1 - 2	Resistance measuring
2 - 3	Current measuring
no jumper	Voltage measuring

Supported sensors

Sensors	
PT100 [°C] (fix)	User curves
NI100 [°C] (fix)	0-100 mV
PT100 [°F] (fix)	0-2400 Ω
NI100 [°F] (fix)	±20 mA

CAN address

Controller type selection

The type of controller to be used with IGS-PTM must be selected via jumper labeled IGS accessible at the lower PCB.

IGS jumper	Controller type
OPEN	IL-NT, IC-NT
CLOSE	IG-NT, IS-NT, InteliGen 500 G2

Address configuration

If InteliGen 500 G2 controller type is selected (by IGS jumper), address of IGS-PTM could be modified via jumpers labeled ADR1 and ADR2.

ADR1	ADR2	ADR offset	BIN module	BOUT module	AIN module
Open	Open	0 (default)	1	1	1
Close	Open	1	2	2	2
Open	Close	2	3	3	3
Close	Close	3	4	4	4

Programming firmware

Firmware upgrade is available via AT-link (TTL). For programming it is necessary to close jumper BOOT. RESET jumper is used to reset the device. Close jumper to reset the device. For programming FlashProg PC tool should be used.

LED indication

Binary input

Each binary input has an LED which indicates input signal. LED is shining when input signal is set, and LED is dark while input signal has other state.

Binary output

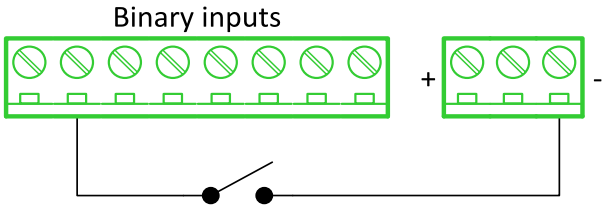
Each binary output has an LED which indicates output signal. Binary output LED is shining when binary output is set.

LED at power connector – status LED

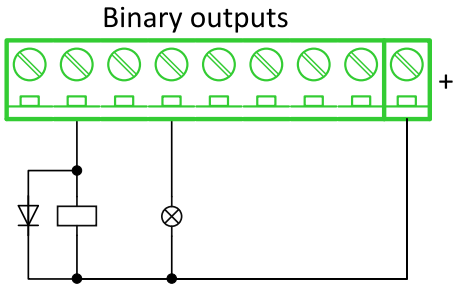
LED status	Description
Dark	No required power connected.
Quick flashing	Program check failure.
One flash and pause	Compensation fail.
Three flashes and pause	Compensation successful.
Flashes	There is no communication between IGS-PTM and the controller.
Lights	Power supply is in the range and communication between IGS-PTM and controller properly works.

Wiring

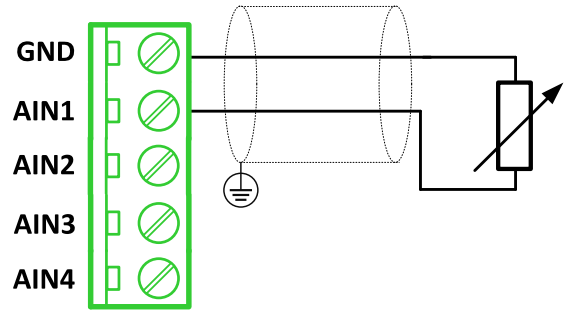
Binary inputs



Binary outputs



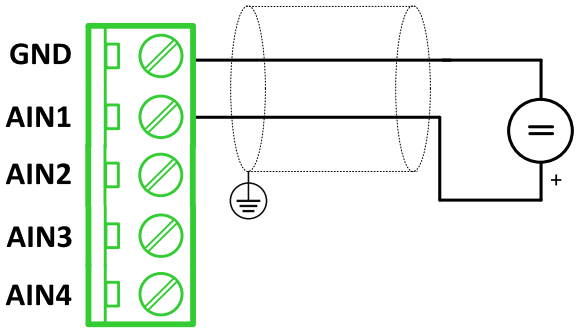
Resistance sensor



Note: *Range: 0-2400 Ω*

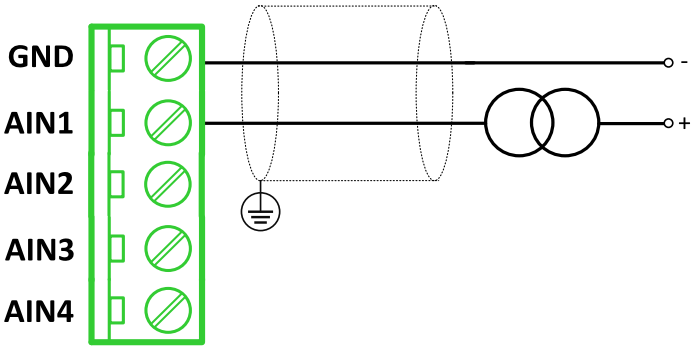
IMPORTANT: Physical analog input range is 0-250 Ω. In sensor configuration in PC tool it is necessary to chose 0-2400 Ω sensor HW type to ensure proper function of analog input.

Voltage sensor



Note: *Range 0-100 mV*

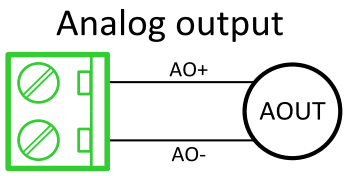
Current sensor – passive



Note: *Range: ±0-20 mA*

IMPORTANT: Physical analog input range is 0-20 mA. In sensor configuration in PC tool it is necessary to chose ±20 mA active sensor HW type to ensure proper function of analog input.

Analog outputs



Note: *Range: 0 to 20 mA ±0.33 mA*

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	100 mA at 24V ÷ 500 mA
Interface to controller	CAN1
Protection	IP20
Storage temperature	-40 °C to +80 °C
Operating temperature	-30 °C to +70 °C
Dimensions (WxHxD)	95 × 96 × 43 mm (3.7" × 3.8" × 1.7")

Analog inputs

Number of channels	8
Voltage	Range 0-100 mV Accuracy: 1.5 % ±1 mV out of measured value
Current	Range: 0-20 mA Accuracy: 2.5 % ±0.5 Ω out of measured value
Resistive	Range: 0-250 Ω Accuracy: 1 % ±2 Ω out of measured value

Analog outputs

Number of channels	1
Current	Range: 0 to 20 mA ± 0.33 mA Resolution 10 bit

Binary inputs

Number of channels	8
Input resistance	4700 Ω
Input range	0 to 36 V DC
Switching voltage level for close contact indication	0 to 2 V DC
Max voltage level for open contact indication	8 to 36 V DC

Note: *Signals and communications can't be connected as long distance lines (not to be connected outside of the building or longer than 30 m).*

Binary outputs

Number of channels	8
Max current	500 mA
Max switching voltage	36 V DC
Number of channels	8
Voltage	Range 0-100 mV Accuracy: 1.5 % ±.1 mV out of measured value
Current	Range: 0-20 mA Accuracy: 2.5 % ± 0.5 Ω out of measured value
Resistive	Range: 0-250 Ω Accuracy: 1 % ±2 Ω out of measured value

Inteli AIN8TC

Inteli AIN8TC module is an extension module equipped with 8 analog inputs dedicated for thermocouple sensors only.

The detection of communication speed is indicated by rapid flashing of status LED. Once the speed is detected the module remains set for this speed even when the communication is lost. Renewal of communication speed detection is done by resetting of the module.



Image 8.153 Inteli AIN8TC

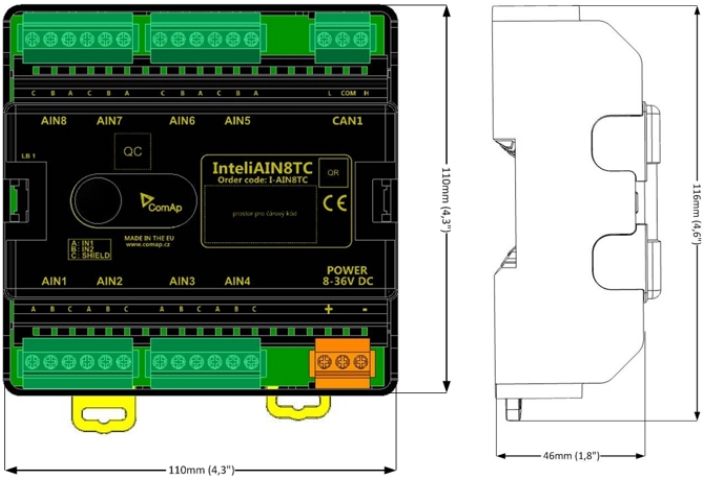
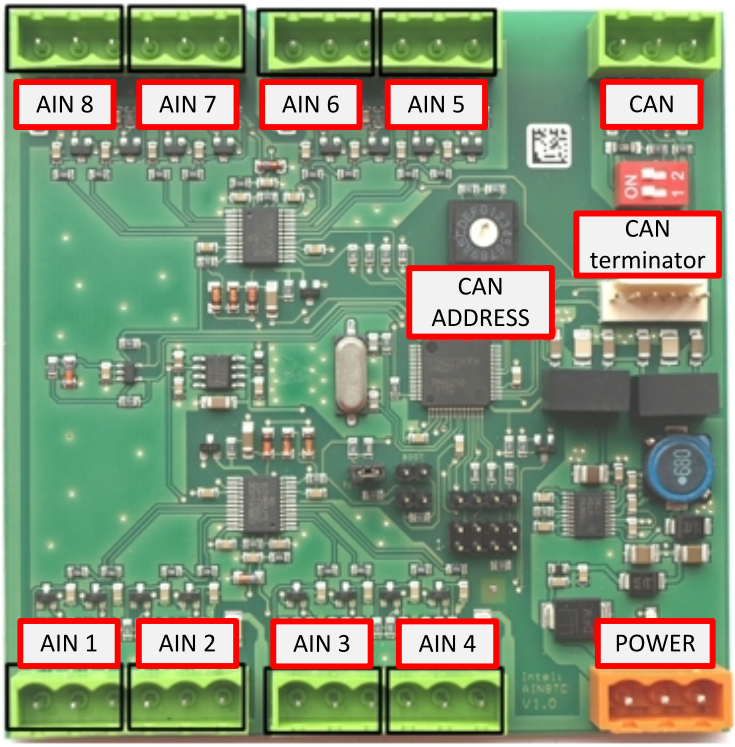


Image 8.154 Inteli AIN8TC dimensions

Terminals



ANALOG INPUT	8 analog Inputs
CAN	CAN1 line
POWER	Power supply
CAN LED Tx, Rx	Indication transmitted or received data
Status LED	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON")
TEST jumper	Upgrade of SW
AT-LINK	Connector for AT-LINK

Analog inputs

- 8 channels
- can be configured as thermocouple sensors only

Supported sensors

Sensors
Thermocpl J [°C] (fix)
Thermocpl K [°C] (fix)
Thermocpl L [°C] (fix)
Thermocpl J [°F] (fix)
Thermocpl K [°F] (fix)
Thermocpl L [°F] (fix)
Thermocpl (nc) J [°C] (fix)

Thermocpl (nc) K [°C] (fix)
Thermocpl (nc) L [°C] (fix)
Thermocpl (nc) J [°F] (fix)
Thermocpl (nc) K [°F] (fix)
Thermocpl (nc) L [°F] (fix)

Note: *"nc" means not cold junction compensation (by external sensor). In this case is used internal temperature sensor on the PCB*

Address and DIP switch setting

Address configuration

DIP switch determines CAN address for analog inputs.

Programming firmware

Firmware is upgraded via AT-link (TTL). For programming it is necessary to close jumper TEST.

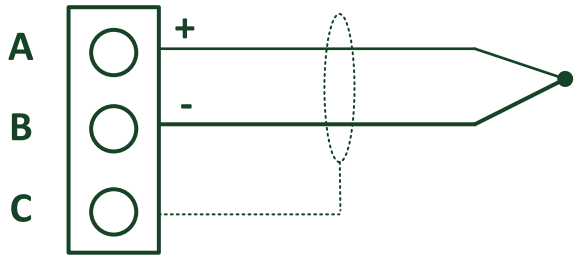
For programming FlashProg PC tool version 4.2 or higher must be used.

LED indication

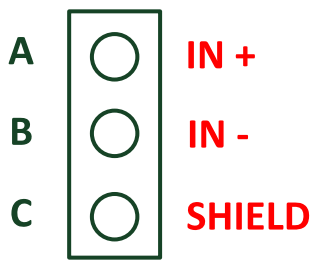
LED status	Description
Dark	FW in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address)
Fast flashing	Detection of CAN communication speed
Lights	Power supply is in the range and the communication between Inteli AIN8TC and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller)

Wiring

Analog inputs



Terminator



Technical data

Dimension (W × H × D)	110 × 110 × 46 mm (4.3” × 4.3” × 1.8”)
Weight	237.5 grams
Interface to controller	CAN1

Analog inputs (not electric separated)	8, no galvanic separated
Measuring	±100 mV
Accuracy	± 0.1 % of actual value + ± 100 µV (± 3 °C)
Internal sensor for measuring cold junction - Accuracy	±1 °C in temperature range -20 °C ÷ +70 °C
Galvanic separation	CANbus is galvanic separated from the measurement and power supply. All analog inputs are galvanic separated from power supply. Analog inputs are not galvanic separated between channels

Power supply	8 to 36 V DC
Protection	IP20
Current consumption	35 mA at 24 V ÷ 100 mA at 8 V
Storage temperature	- 40 °C to + 80 °C
Operating temperature	- 30 °C to + 70 °C
Heat radiation	2 W

Thermocouples which are galvanically separated and galvanically non-separated are supported.

Inteli AIO9/1

Inteli AIO9/1 module is an extension module equipped with analog inputs and outputs – designed for DC measurement.

The detection of communication speed is indicated by rapid flashing of status LED. Once the speed is detected the module remains set for this speed even when the communication is lost. Renewal of communication speed detection is done by resetting of the module.



Image 8.155 Inteli AIO9/1

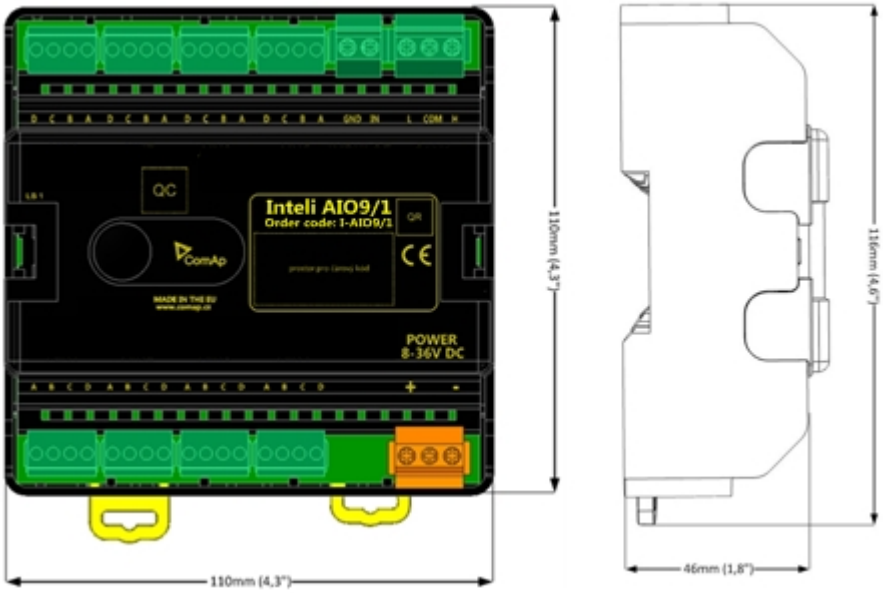
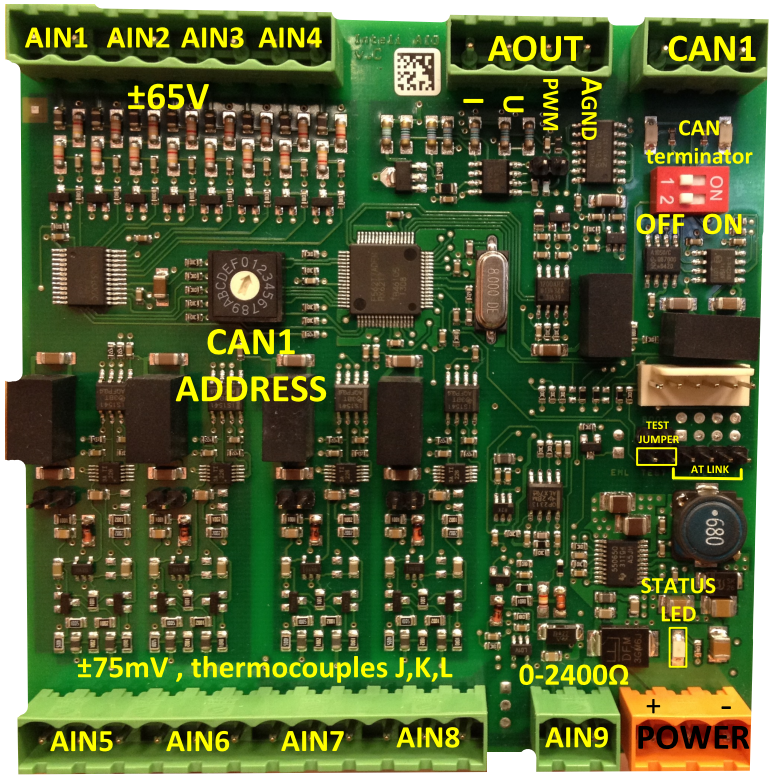


Image 8.156 Inteli AIO9/1 dimensions

Terminals



ANALOG INPUT	9 channels
ANALOG OUTPUTS	1 channel
CAN	CAN1 line
POWER	Power supply
CAN LED Tx, Rx	Indication transmitted or received data
Status LED	LED indication of correct function
CAN terminator	Terminating CAN resistor (active in position "ON")
TEST jumper	Upgrade of SW
AT-LINK	Connector for AT-LINK (Upgrade of SW)

Analog inputs

- 4 channels AIN1 – AIN4 can be configured as:
  - Sensor ±65V (determined for measurement of battery voltage)
- 4 channels AIN5 – AIN8 can be configured as:
  - Thermocouples – type J,K or L (in °C or °F)
  - Sensor ±75mV DC – (for connecting current shunts)
- 1 channel AIN9 can be configured as:
  - RTD (Pt1000, Ni1000)
  - Common resistance 0-2400Ω

Analog outputs

- 1 channel AOUT1. Type of output:
  - 0-10V DC
  - 0-20mA
  - PWM (5 V, freq 2.4 Hz ÷2.4 kHz)
- Analog output has 4-pins connector – GND and one pin for each type of output.

All analog inputs can be configured to any logical function or protection.

Supported sensors

Sensors
User curves
PT1000 [°C] (fix)
NI1000 [°C] (fix)
PT1000 [°F] (fix)
NI1000 [°F] (fix)
0-2400 Ω (fix linear)
±65 V DC (fix linear)
±75 mV (fix linear)
Thermocpl J [°C] (fix)
Thermocpl K [°C] (fix)
Thermocpl L [°C] (fix)
Thermocpl (nc) J [°C] (fix)
Thermocpl (nc) K [°C] (fix)
Thermocpl (nc) L [°C] (fix)
Thermocpl (nc) J [°F] (fix)
Thermocpl (nc) K [°F] (fix)
Thermocpl (nc) L [°F] (fix)

Address and DIP switch setting

Address configuration

DIP switch determinates CAN address for analog inputs and outputs.

Programming Firmware

Firmware upgrade is available via AT-link (TTL). For programming it is necessary to close jumper TEST and switch OFF and ON the power supply.

For programming use FlashProg PC tool version 4.4 or higher.

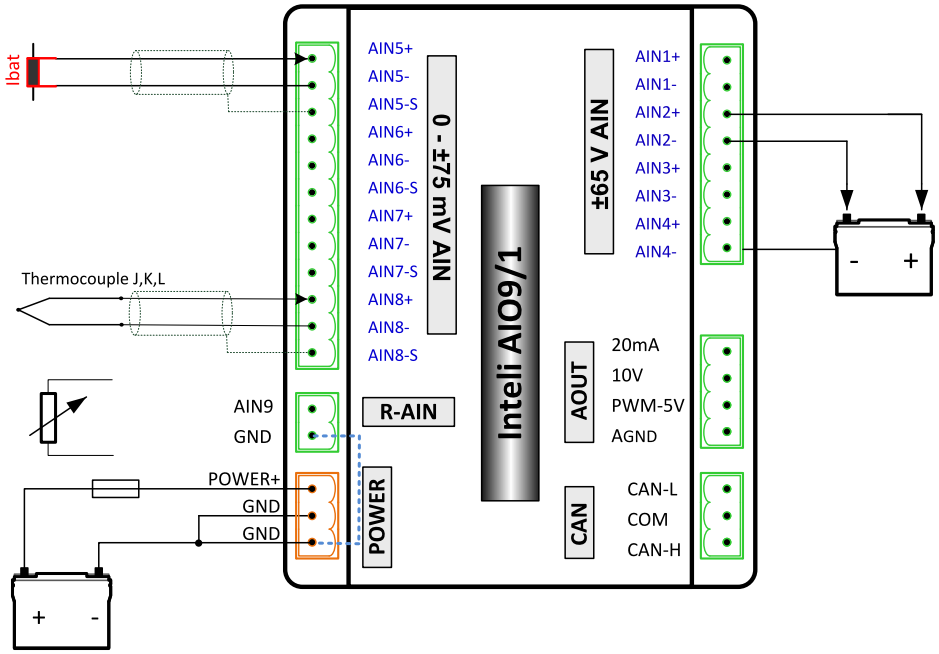
LED indication

LED status	Description
Dark	Fw in module does not work correctly.
Flashing	Module does not communicate with controller (in case non-zero CAN address)

Fast flashing	Detection of CAN communication speed
Lights	Power supply is in the range and the communication between Inteli AIN8TC and controller works properly. Or power supply is in range and zero CAN address is set. (in case zero CAN address module doesn't communicate with the controller)

Wiring

The following diagrams show the correct connection of sensors.



Measuring resistance – AIN9

› 2 – wire measurement



Ranges: Pt1000, Ni1000, 0 – 2400 Ω.

Analog input 9 is determined for measuring resistance only.

Technical data

Dimension (W × H × D)	110 × 110 × 46 mm (4.3" × 4.3" × 1.8")
Weight	248 grams
Interface to controller	CAN1 – galvanic separated from power supply and measurement,

Analog inputs (not electric separated)		9 channels
AIN1-AIN4 – Voltage inputs	**Range**	0-65 V ± 0.25 % of actual value + ± 120 mV Measurement is not galvanic separated from power supply, but IN- is not interconnected with GND – there is floating measurement.
	Accuracy of measurement	± 0,1 % of actual value + ± 100 µV (± 3 °C)
AIN5-AIN8 – Voltage inputs	**Range**	± 75 mV (nominal) (measurement up to ±80 mV)
	Accuracy of measurement	± 0.1 % of actual value + ± 75 µV Galvanic separated from power supply
AIN9 resistance input	**Range**	0- 2400 Ω
	Accuracy of measurement	± 0.5 % of actual value + ± 4 Ω Pt1000, Ni1000 ± 2,5 °C It is not galvanic separated from power supply.

Analog output
I 0-20mA /500Rmax. ± 1 % of actual value + ± 200 uA U 0-10V ± 0.5 % of actual value + ± 50 mV PWM – 5 V, 200 Hz-2.4kHz 15 mA max. Galvanic separated from power supply

Galvanic separation	CAN bus is galvanic separated from the measurement and power supply

Power supply	8 to 36 V DC
Protection	IP20
Current consumption	150 mA at 24 V ÷ 400 mA at 8 V
Storage temperature	- 40 °C to + 80 °C
Operating temperature	- 30 °C to + 80 °C

The product is fully supported in firmware IGS-NT 3.1.1 or higher.

For information about support of this module in IGS-NT fw branches and ID-DCU – please read New Feature Lists.

IGL-RA15

Remote annunciator (IGL-RA15) is designed as an extension signalling unit.

The unit is equipped with a fully configurable tricolor (red, orange, green) LED for intuitive operation together with high functionality.



Image 8.157 IGL-RA15

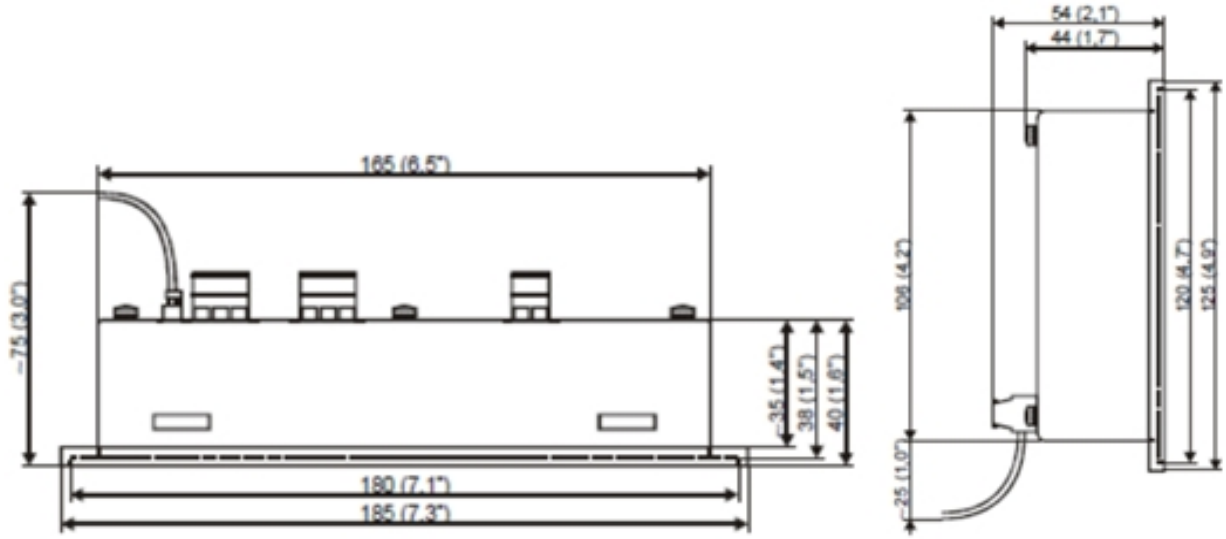


Image 8.158 IGL-RA15 dimensions

Terminals

Horn	Horn
CAN	CAN1 line
Power	Power supply

CAN address

Address	Jumper A	Jumper B
1	OPEN	OPEN
5+6	CLOSED	OPEN
Customer defined	CLOSED	CLOSED

SW changing of CAN1 address is enabled only when both jumpers are closed. Any one of these addresses (1+2 or 3+4 or 5+6 or 7+8) can be set via the following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow

- Press Lamp test sixteen times
- Set the address up by pressing Horn reset.
  - The number of red luminous LEDs means the CAN1 addresses (two for addresses 1+2, four for addresses 3+4, six for addresses 5+6 and eight for addresses 7+8)
- Press Lamp test

LED indication

Each LED color is adjusted independently of controller output settings. If controller output 1 is set as "Common Shutdown" it does not mean red LED1 color for iGL-RA15. The LEDs color can be adjusted by following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- Press Horn reset to change the LED1 color (green, yellow, red)
- Press Lamp test to switch to the next LED color adjusting
- Continue to adjust all LEDs color
- After LED15 color adjusting press Lamp test three times

Note: *If there is no operator action during address setting, color adjusting or timeout setting, the unit returns to normal operation without changes saving.*

Status LED

The signals LEDs are handled like binary outputs. This means everything that can be configured to binary outputs can be also configured to the LEDs of IGL-RA15.

LED status	Description
Lights	Configured logical output is active on the controller
Dark green LED	Configured logical output is not active on the controller
Dark yellow or red LED	Configured logical output is not active on the controller and horn reset was pressed.
Yellow or red LED blinks	Configured logical output is not active on the controller and horn reset was still not pressed.

Power LED

LED status	Description
Blinking green	The unit is OK and the communication to the master controller is OK.
Blinking red	The unit is OK, but the communication to the master controller is not running.
Blinking yellow	EEPROM check not passed OK after power on
Yellow	Horn timeout or controller address adjustment

Horn setting

The horn output is activated if any of red or yellow LED is on. Output is on until pressing Horn reset or horn timeout counts down. The timeout can be set via the following steps:

- Switch to programming mode (Hold the Horn reset and Lamp test when unit is powering on). Status led is yellow
- Press Lamp test fifteen times

- Set the horn timeout by pressing Horn reset.
  - The number of green luminous LEDs means timeout in 10 s (any for disabling horn output, 1 for 10s timeout, 2 for 10s timeout, 15 for disabling horn timeout).
  - Press Lamp test two times

Note: *If there is no operator action during address setting, color adjusting or timeout setting, the unit returns to normal operation without changes saving.*

The horn is activated:

- If any red or yellow LED lights up or
- At the end of the extended lamp test. See chapter **Lamp and horn test (page 1005)**

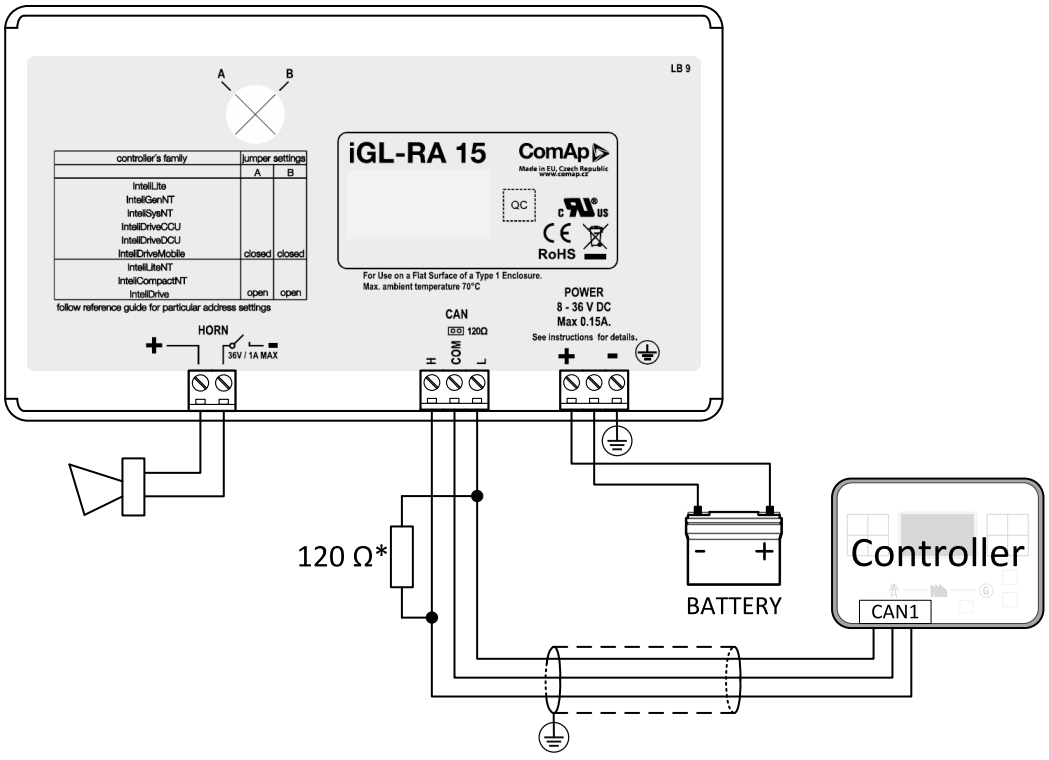
The horn can be silenced:

- By pressing horn reset button or
- It silences automatically after adjusted time

Lamp and horn test

Pressing and holding lamp test button for less than 2 s executes the basic lamp test. All LEDs light up with the configured color. If the button is held longer than 2 s, an extended test is started. Every LED is tested step-by-step in green color and then in red color. The horn is activated at the end of the test. Afterwards, that the unit returns to normal operation. The horn can be silenced with horn reset.

Wiring



* terminator resistor only when iGL-RA 15 is the last unit on the CAN1 bus.

Note: *The shielding of the CAN bus cable must be grounded at one point only!*

Note: *See the section **Technical data (page 281)** for recommended CAN bus cable type.*

Technical data

General data

Power supply	8 to 36 V DC
Current consumption	0.35-0.1A (+1Amax horn output) depends on supply voltage
Protection	IP65
Humidity	85%
Storage temperature	-30 °C to +80 °C
Operating temperature	-20 °C to +70 °C
Dimensions (WxHxD)	180 × 120 × 55 mm
Weight	950 g

Horn output

Maximum current	1.0 A
Maximum switching voltage	36 V DC

CAN bus interface

Galvanic separated	
Maximal CAN bus length	200 m
Speed	250 kBd
Nominal impedance	120 Ω
Cable type	twisted pair (shielded)
Following dynamic cable parameters are important especially for maximal 200 meters CAN bus length	
Nominal Velocity of Propagation	min. 75 % (max. 4.4 ns/m)
Wire crosscut	min.0.25 mm^2
Maximal attenuation (at 1 MHz)	2 dB / 100 m
Recommended Industrial Automation & Process Control Cables	
BELDEN (www.belden.com)	› 3082A DeviceBus for Allen-Bradley DeviceNet › 3083A DeviceBus for Allen-Bradley DeviceNet › 3086A DeviceBus for Honeywell SDS › 3087A DeviceBus for Honeywell SDS › 3084A DeviceBus for Allen-Bradley DeviceNet › 3085A DeviceBus for Allen-Bradley DeviceNet › 3105A Paired EIA Industrial RS485 cable
LAPP CABLE (www.lappcable.com)	› Unitronic BUS DeviceNet Trunk Cable › Unitronic BUS DeviceNet Drop Cable › Unitronic BUS CAN › Unitronic-FD BUS P CAN UL/CSA

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